RECOMMENDED PAINTING SPECIFICATIONS

MARINE MAINTENANCE

SYSTEM SELECTION

BOTTOM

RECOMMENDED PAINTING SYSTEMS
BOTTOM (ANTICORROSION)

			Surface preparation:
BAC-1	HEMPATEX HI-BUILD 46330 HEMPATEX HI-BUILD 46330 HEMPATEX HI-BUILD 46330 HEMPATEX HI-BUILD 46330	80 micron / 3.2 mils 80 micron / 3.2 mils 80 micron / 3.2 mils 40 micron / 1.6 mils	**A**
BAC-2	HEMPADUR 15130 HEMPADUR 15130 HEMPATEX HI-BUILD 46330	150 micron / 6 mils 150 micron / 6 mils 40 micron / 1.6 mils	**C**
BAC-3	HEMPADUR 15130 HEMPADUR 15130 HEMPADUR 45182	150 micron / 6 mils 150 micron / 6 mils 50 micron / 2 mils	**C**
BAC-4	HEMPADUR 45141/45143 HEMPADUR 45141/45143 HEMPADUR 45182	150 micron / 6 mils 150 micron / 6 mils 50 micron / 2 mils	**C**
BAC-5	HEMPADUR MASTIC 45880/45881 HEMPADUR MASTIC 45880/45881 HEMPATEX HI-BUILD 46330	150 micron / 6 mils 150 micron / 6 mils 40 micron / 1.6 mils	**C**
BAC-6	HEMPADUR MASTIC 45880/45881 HEMPADUR MASTIC 45880/45881 HEMPADUR 45182	150 micron / 6 mils 150 micron / 6 mils 50 micron / 2 mils	**C**
BAC-7	HEMPADUR 15570 HEMPADUR 15570 HEMPADUR 15570 HEMPADUR 45182	100 micron / 4 mils 100 micron / 4 mils 100 micron / 4 mils 50 micron / 2 mils	**C**
BAC-8	HEMPADUR MULTI-STRENGTH 45753 HEMPADUR MULTI-STRENGTH 45753 HEMPADUR 45182	150 micron / 6 mils 150 micron / 6 mils 50 micron / 2 mils	**D**
BAC-9	HEMPADUR MULTI-STRENGTH 45751 HEMPADUR MULTI-STRENGTH 45751 HEMPADUR 45182	150 micron / 6 mils 150 micron / 6 mils 50 micron / 2 mils	**D**

GENERAL NOTES: SURFACE PREPARATION

BOTTOM

Type:	Description:
A	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2 - Sa 2½, alternatively mechanically cleaned to St 2 - St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues.
C	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot repairs) or abrasive blasted to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues. As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound and intact paint. Dust off residues. On pit-corroded surfaces excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.
D	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Abrasive blasting to minimum Sa 2½. Grit-blasted surfaces: Recommended profile is Rz minimum 100 micron/4 mils - maximum 150 micron/6 mils, corresponding to ISO Comparator Coarse (G).

RECOMMENDED PAINTING SPECIFICATIONS
BOTTOM (ANTICORROSION)

System numbers			BAC-1
Surface preparation grade			A
System description		**Theoretical**	
		Spreading rate m^2/litre[1)]	**Dry film thickness micron/mils**
BAC-1	HEMPATEX HI-BUILD 46330 HEMPATEX HI-BUILD 46330 HEMPATEX HI-BUILD 46330 HEMPATEX HI-BUILD 46330	5.3 5.3 5.3 10.5	80/3.2 80/3.2 80/3.2 40/1.6

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPATEX HI-BULD 46330: 40-100 micron / 1.6-4 mils

A low-cost and simple system.
For relatively short dry-docking periods.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS BOTTOM (ANTICORROSION)

System numbers		BAC-2, BAC-3	
Surface preparation grade			C
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
BAC-2	HEMPADUR 15130 HEMPADUR 15130 HEMPATEX HI-BUILD 46330	4.7 4.7 10.5	150/6 150/6 40/1.6
BAC-3	HEMPADUR 15130 HEMPADUR 15130 HEMPADUR 45182	4.7 4.7 9.2	150/6 150/6 50/2

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 15130:	125-200 micron / 5-8 mils
HEMPADUR 45182:	50*-125 micron / 2*-5 mils
HEMPATEX HI-BUILD 46330:	40-100 micron / 1.6-4 mils

* Thinning may be required to facilitate proper film formation if specified below 75 micron/3 mils.

Use of HEMPATEX 46330 will result in certain limits on the choice of antifouling system.
HEMPADUR 45182 can be overcoated with any antifouling system.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS BOTTOM (ANTICORROSION)

System numbers		BAC-4, BAC-5, BAC-6
Surface preparation grade		C
System description		**Theoretical**
		Spreading rate m²/litre[1)] / **Dry film thickness micron/mils**
BAC-4	HEMPADUR 45141/45143	4.0 / 150/6
	HEMPADUR 45141/45143	4.0 / 150/6
	HEMPADUR 45182	9.2 / 50/2
BAC-5	HEMPADUR MASTIC 45880/45881	5.1 / 150/6
	HEMPADUR MASTIC 45880/45881	5.1 / 150/6
	HEMPATEX HI-BUILD 46330	10.5 / 40/1.6
BAC-6	HEMPADUR MASTIC 45880/45881	5.1 / 150/6
	HEMPADUR MASTIC 45880/45881	5.1 / 150/6
	HEMPADUR 45182	9.2 / 50/2

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 45141/45143	125-175 micron / 5-7 mils
HEMPADUR MASTIC 45880/45881:	125-200 micron / 5-8 mils
HEMPADUR 45182:	50*-125 micron / 2*-5 mils
HEMPATEX HI-BUILD 46330:	40-100 micron / 1.6-4 mils

* Thinning may be required to facilitate proper film formation if specified below 75 micron/3 mils.

HEMPADUR 45141/45143:
HEMPADUR 45143 is intended for curing conditions down to -10°C/14°F, HEMPADUR 45141 is to be selected in warmer climates. A shift from HEMPADUR 45143 to HEMPADUR 45141 is most convinient to take place when temperature is between 15°C/59°F and 25°C/77°F.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS BOTTOM (ANTICORROSION)

System numbers			BAC-7
Surface preparation grade			C
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
BAC-7	HEMPADUR 15570 HEMPADUR 15570 HEMPADUR 15570 HEMPADUR 45182	5.4 5.4 5.4 9.2	100/4 100/4 100/4 50/2

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval Normal range is:

HEMPADUR 15570: 50-125 micron / 2-5 mils
HEMPADUR 45182: 50*-125 micron / 2*-5 mils

* Thinning may be required to facilitate proper film formation if specified below 75 micron/3 mils.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS BOTTOM (ANTICORROSION)

System numbers		BAC-8, BAC-9	
Surface preparation grade		D	
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
BAC-8	HEMPADUR MULTI-STRENGTH 45753 HEMPADUR MULTI-STRENGTH 45753 HEMPADUR 45182	5.1 5.1 9.2	150/6 150/6 50/2
BAC-9	HEMPADUR MULTI-STRENGTH 45751 HEMPADUR MULTI-STRENGTH 45751 HEMPADUR 45182	5.3 5.3 9.2	150/6 150/6 50/2

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 45182:	50*-125 micron / 2*-5 mils
HEMPADUR MULTISTRENGTH 45753:	150-250 micron / 6-10 mils
HEMPADUR MULTISTRENGTH 45751:	150-250 micron / 6-10 mils

* Thinning may be required to facilitate proper film formation if specified below 75 micron/3 mils.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

WORKING SPECIFICATIONS

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BAC-1
Area: BOTTOM

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPATEX HI-BUILD 46330	t/u	Redbrown	50630	200	80	5.3	(X)		X	.021"-.023"	150 bar
HEMPATEX HI-BUILD 46330	t/u	Grey	11480	200	80	5.3	(X)		X	.021"-.023"	150 bar
HEMPATEX HI-BUILD 46330	t/u	Redbrown	50630	200	80	5.3	(X)		X	.021"-.023"	150 bar
HEMPATEX HI-BUILD 46330	f/c	Grey	11480	100	40	10.5	(X)		X	.021"-.023"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			280		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
46330	80	46330	4 Hrs	None	6 Hrs	None	8 Hrs	None	14 Hrs	None	24 Hrs	None	52 Hrs	None
46330	80	46330	5 Hrs	None	8 Hrs	None	11 Hrs	None	19 Hrs	None	32 Hrs	None	69 Hrs	None
46330	80	46330	7 Hrs	None	10 Hrs	None	14 Hrs	None	24 Hrs	None	41 Hrs	None	4 Day	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BAC-1**
Area: **BOTTOM**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

Full coat of HEMPATEX HI-BUILD 46330 is optional depending on type and condition of old/existing antifouling and of type of new antifouling system to be applied.

A series of maintenance jobs may result in build up of a too high total film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended NOT to apply HEMPATEX in excessive film thickness.

Limited resistance to vegetable and animal oils (e.g. fish oil).

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C Max. RH%
HEMPATEX HI-BUILD 46330	50630	42				8 h	32	510	08080	
HEMPATEX HI-BUILD 46330	11480	42				8 h	32	510	08080	
HEMPATEX HI-BUILD 46330	50630	42				8 h	32	510	08080	
HEMPATEX HI-BUILD 46330	11480	42				8 h	32	510	08080	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BAC-2
Area: BOTTOM

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15130	t/u	Black	19990	225	150	4.7	(X)		X	.023"	200 bar
HEMPADUR 15130	t/u	Brown	60430	225	150	4.7	(X)		X	.023"	200 bar
HEMPATEX HI-BUILD 46330	f/c	Grey	11480	100	40	10.5	(X)		X	.021"-.023"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			340		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15130	150	15130	3 Hrs	19 Hrs	5 Hrs	32 Hrs	8 Hrs	48 Hrs	17 Hrs	5 Day	N/R	N/R	N/R	N/R
15130	150	46330	3 Hrs	6 Hrs	5 Hrs	11 Hrs	8 Hrs	16 Hrs	17 Hrs	36 Hrs	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BAC-2**
Area: **BOTTOM**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

Full coat of HEMPATEX HI-BUILD 46330 is optional depending on type and condition of old/existing antifouling and of type of new antifouling system to be applied.

Tar bleeding may occur. This is solely a cosmetic effect. It has no negative influence on neither the anticorrosive nor the antifouling properties.

HEMPADUR 15130:
The temperature of the paint itself should preferably be above 15°C/59°F. Best results are obtained at surface and paint temperatures of 15-25°C/59-77°F.

The maximum recoating interval between layers of HEMPADUR 15130 can be doubled on the condition that the coating has not been exposed to sunlight, water/condensation, or to (other) contamination before recoating. Furthermore the surface of the first layer of HEMPADUR 15130 must be free of any exudations. This is secured by keeping the conditions of application, drying and curing, i.e. such as ventilation, temperature, film thickness and thinning within the described limits. Note that excessive temperatures also must be avoided.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15130	19990	70	95140	4 : 1	2 h	7 h	25	295	08450	5	
HEMPADUR 15130	60430	70	95140	4 : 1	2 h	7 h	25	300	08450	5	
HEMPATEX HI-BUILD 46330	11480	42				8 h	32	510	08080		

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BAC-3
Area: BOTTOM

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15130	t/u	Black	19990	225	150	4.7	(X)		X	.023"	200 bar
HEMPADUR 15130	t/u	Brown	60430	225	150	4.7	(X)		X	.023"	200 bar
HEMPADUR 45182	t/u	Black	19990	100	50	9.2	(X)		X	.023"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			350		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15130	150	15130	3 Hrs	19 Hrs	5 Hrs	32 Hrs	8 Hrs	48 Hrs	17 Hrs	5 Day	N/R	N/R	N/R	N/R
15130	150	45182	3 Hrs	19 Hrs	5 Hrs	32 Hrs	8 Hrs	48 Hrs	17 Hrs	5 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BAC-3**
Area: **BOTTOM**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

Tar bleeding may occur. This is solely a cosmetic effect. It has no negative influence on neither the anticorrosive nor the antifouling properties.

HEMPADUR 15130:
The temperature of the paint itself should preferably be above 15°C/59°F. Best results are obtained at surface and paint temperatures of 15-25°C/59-77°F.

The maximum recoating interval between layers of HEMPADUR 15130 can be doubled on the condition that the coating has not been exposed to sunlight, water/condensation, or to (other) contamination before recoating. Furthermore the surface of the first layer of HEMPADUR 15130 must be free of any exudations. This is secured by keeping the conditions of application, drying and curing, i.e. such as ventilation, temperature, film thickness and thinning within the described limits. Note that excessive temperatures also must be avoided.

HEMPADUR 45182.
If the maximum recoating interval is exceeded, apply a (thin) additional coat of HEMPADUR 45182. A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing. Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advise if in doubt. To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15130	19990	70	95140	4 : 1	2 h	7 h	25	295	08450	5	
HEMPADUR 15130	60430	70	95140	4 : 1	2 h	7 h	25	300	08450	5	
HEMPADUR 45182	19990	46	98180	4 : 1	3 h	6 h	23	490	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BAC-4, summer version
Area: BOTTOM

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 45141	t/u	Grey	12170	250	150	4.0	(X)		X	.019"-.023"	250 bar
HEMPADUR 45141	t/u	Grey	11480	250	150	4.0	(X)		X	.019"-.023"	250 bar
HEMPADUR 45182	t/u	Yellowish grey	25150	100	50	9.2	(X)		X	.023"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			350		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45141	150	45141	4 Hrs	9 Day	6 Hrs	15 Day	12 Hrs	30 Day	30 Hrs	75 Day	N/R	N/R	N/R	N/R
45141	150	45182	4 Hrs	9 Day	6 Hrs	15 Day	12 Hrs	30 Day	30 Hrs	75 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BAC-4, summer version**
Area: **BOTTOM**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

HEMPADUR 45141:
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warm climates, the paint should be stored in a cool place. At paint temperatures below 15°C/59°F or in case of very long spray hoses, thinning may be necessary. This will cause lower film build and longer drying time. MIx the components thoroughly.
If the paint temperature, as an exception, is below approx. 10°C/50°F, allow the mixture to prereact 30 minutes before use.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 45141/3.

HEMPADUR 45182:
If the maximum recoating interval is exceeded, apply a (thin) additional coat of HEMPADUR 45182. A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing. Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advise if in doubt. To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 45141	12170	60	97820	3 : 1	2 h	7 h	25	385	08450	10	
HEMPADUR 45141	11480	60	97820	3 : 1	2 h	7 h	25	385	08450	10	
HEMPADUR 45182	25150	46	98180	4 : 1	3 h	6 h	23	490	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BAC-4, winter version
Area: BOTTOM

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 45143	t/u	Grey	12170	250	150	4.0	(X)		X	.019"-.023"	250 bar
HEMPADUR 45143	t/u	Grey	11480	250	150	4.0	(X)		X	.019"-.023"	250 bar
HEMPADUR 45182	t/u	Yellowish grey	25150	100	50	9.2	(X)		X	.023"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			350		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45143	150	45143	N/R	N/R	5 Hrs	23 Day	6 Hrs	30 Day	12 Hrs	60 Day	27 Hrs	90 Day	54 Hrs	90 Day
45143	150	45182	N/R	N/R	5 Hrs	23 Day	6 Hrs	30 Day	12 Hrs	60 Day	27 Hrs	90 Day	54 Hrs	90 Day

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BAC-4, winter version**
Area: **BOTTOM**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

HEMPADUR 45143:
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. At paint temperatures below 15°C/59°F or in case of very long spray hoses, thinning may be necessary. This will cause lower film build and longer drying time. MIx the components thoroughly.
If the paint temperature, as an exception, is below approx. 10°C/50°F, allow the mixture to prereact 30 minutes before use.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 45141/3.

HEMPADUR 45182:
If the maximum recoating interval is exceeded, apply a (thin) additional coat of HEMPADUR 45182. A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing. Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advise if in doubt. To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 45143	12170	60	97430	3 : 1	1 h	4 h	25	385	08450	-10	
HEMPADUR 45143	11480	60	97430	3 : 1	1 h	4 h	25	385	08450	-10	
HEMPADUR 45182	25150	46	98180	4 : 1	3 h	6 h	23	490	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BAC-5
Area: BOTTOM

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MASTIC 45880	t/u	Grey	11480	200	150	5,1	(X)		X	.017"-.023"	250 bar
HEMPADUR MASTIC 45880	t/u	Grey	12170	200	150	5,1	(X)		X	.017"-.023"	250 bar
HEMPATEX HI-BUILD 46330	f/c	Grey	11480	100	40	10,5	(X)		X	.021"-.023"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			340		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45880	150	45880	5 Hrs	27 Day	8 Hrs	45 Day	16 Hrs	90 Day	40 Hrs	90 Day	N/R	N/R	N/R	N/R
45880	150	46330	2 Hrs	5 Hrs	4 Hrs	9 Hrs	8 Hrs	18 Hrs	20 Hrs	45 Hrs	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BAC-5**
Area: **BOTTOM**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

Full coat of HEMPATEX HI-BUILD 46330 is optional depending on type and condition of old/existing antifouling and of type of new antifouling system to be applied.

HEMPADUR MASTIC 45880:
The temperature of the paint itself should be 15°C/59°F or above, but advantageously below approximately 30°C/86°F to secure proper application properties.
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warmer climates, the paint should be stored in a cool place.
In case the paint temperature is 15°C/59°F or below, allow the mixture to pre react before use.
In case of a paint temperature at 15°C/59°F, an induction time of 15 minutes is recommended. In case of a paint temperature at 10°C/50°F, an induction time of 25 minutes is recommend. In order to obtain proper application properties, the paint temperature should preferably never be below 10°C/50°F.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR MASTIC 45880/45881.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MASTIC 45880	11480	77	95880	3 : 1	1 h	4 h	35	08450	-10	
HEMPADUR MASTIC 45880	12170	77	95880	3 : 1	1 h	4 h	35	08450	-10	
HEMPATEX HI-BUILD 46330	11480	42				8 h	32	08080		

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BAC-6
Area: BOTTOM

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MASTIC 45880	t/u	Grey	11480	200	150	5,1	(X)		X	.017"-.023"	250 bar
HEMPADUR MASTIC 45880	t/u	Grey	12170	200	150	5,1	(X)		X	.017"-.023"	250 bar
HEMPADUR 45182	t/u	Yellowish grey	25150	100	50	9,2	(X)		X	.023"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			350		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45880	150	45880	5 Hrs	27 Day	8 Hrs	45 Day	16 Hrs	90 Day	40 Hrs	90 Day	N/R	N/R	N/R	N/R
45880	150	45182	5 Hrs	27 Day	8 Hrs	45 Day	16 Hrs	90 Day	40 Hrs	90 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BAC-6**
Area: **BOTTOM**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

HEMPADUR 45182:
If the maximum recoating interval is exceeded, apply a (thin) additional coat of HEMPADUR 45182. A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing. Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advise if in doubt. To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

HEMPADUR MASTIC 45880:
The temperature of the paint itself should be 15°C/59°F or above, but advantageously below approximately 30°C/86°F to secure proper application properties.
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warmer climates, the paint should be stored in a cool place.
In case the paint temperature is 15°C/59°F or below, allow the mixture to pre react before use.
In case of a paint temperature at 15°C/59°F, an induction time of 15 minutes is recommended. In case of a paint temperature at 10°C/50°F, an induction time of 25 minutes is recommend. In order to obtain proper application properties, the paint temperature should preferably never be below 10°C/50°F.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR MASTIC 45880/45881.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MASTIC 45880	11480	77	95880	3 : 1	1 h	4 h	35	08450	-10	
HEMPADUR MASTIC 45880	12170	77	95880	3 : 1	1 h	4 h	35	08450	-10	
HEMPADUR 45182	25150	46	98180	4 : 1	3 h	6 h	23	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BAC-7
Area: BOTTOM

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15570	t/u	Redbrown	50630	200	100	5.4	(X)		X	.019"-.021"	175 bar
HEMPADUR 15570	t/u	Grey	12170	200	100	5.4	(X)		X	.019"-.021"	175 bar
HEMPADUR 15570	t/u	Redbrown	50630	200	100	5.4	(X)		X	.019"-.021"	175 bar
HEMPADUR 45182	t/u	Yellowish grey	25150	100	50	9.2	(X)		X	.023"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			350		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15570	100	15570	N/R	N/R	6 Hrs	23 Day	8 Hrs	30 Day	16 Hrs	60 Day	36 Hrs	90 Day	72 Hrs	90 Day
15570	100	15570	N/R	N/R	6 Hrs	23 Day	8 Hrs	30 Day	16 Hrs	60 Day	36 Hrs	90 Day	72 Hrs	90 Day
15570	100	45182	N/R	N/R	6 Hrs	23 Day	8 Hrs	30 Day	16 Hrs	60 Day	36 Hrs	90 Day	72 Hrs	90 Day

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BAC-7**
Area: **BOTTOM**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 15570.

The temperature of HEMPADUR 15570 should be 15°C/60°F or above to secure proper application properties.

HEMPADUR 15570 is also well suited for damp or moist surfaces.
Damp surfaces: Water is not readily detectable, but the temperature of the surface is below the dew point.
Moist surfaces: Pools of water and droplets have been removed, but there is a noticable film of water.

HEMPADUR 45182:
If the maximum recoating interval is exceeded, apply a (thin) additional coat of HEMPADUR 45182. A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing. Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advise if in doubt. To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BAC-7**
Area: **BOTTOM**

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15570	50630	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	
HEMPADUR 15570	12170	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	
HEMPADUR 15570	50630	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	
HEMPADUR 45182	25150	46	98180	4 : 1	3 h	6 h	23	490	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BAC-8
Area: BOTTOM

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Abrasive blasting to minimum Sa 2½. Grit surface profile Rz minimum 100 micron - maximum 150 micron, corresponding to ISO Comparator Coarse (G).

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MULTI-STRENGTH 45753	t/u	Redbrown	50630	200	150	5.1	(X)		X	.021"-.023"	250 bar
HEMPADUR MULTI-STRENGTH 45753	t/u	Grey	12340	200	150	5.1	(X)		X	.021"-.023"	250 bar
HEMPADUR 45182	t/u	Yellowish grey	25150	100	50	9.2	(X)		X	.023"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			350		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45753	150	45753	N/R	N/R	3 Hrs	23 Day	4 Hrs	30 Day	8 Hrs	60 Day	19 Hrs	90 Day	38 Hrs	90 Day
45753	150	45182	N/R	N/R	3 Hrs	23 Day	4 Hrs	30 Day	8 Hrs	60 Day	19 Hrs	90 Day	38 Hrs	90 Day

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BAC-8**
Area: **BOTTOM**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

If the working procedure calls for a blast primer use HEMPADUR MULTI-STRENGTH 45753 diluted 15-25% with HEMPEL's THINNER 08450 in 40 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

HEMPADUR MULTI-STRENGTH 45753:
The temperature of the paint itself should be above 15°C/59°F, preferably above 20°C/68°F for proper application.
Relative humidity maximium 90 %.

It is recommended to use heavy airless spray equipment with a pump transmission ratio of 60:1 (approximately), and a theoretical output of min. 12 litres per minute.

HEMPADUR 45182:
If the maximum recoating interval is exceeded, apply a (thin) additional coat of HEMPADUR 45182. A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing. Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advise if in doubt. To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MULTI-STRENGTH 45753	50630	76	98750	3 : 1	1 h	4 h	27	255	08450	-10	90
HEMPADUR MULTI-STRENGTH 45753	12340	76	98750	3 : 1	1 h	4 h	27	240	08450	-10	90
HEMPADUR 45182	25150	46	98180	4 : 1	3 h	6 h	23	490	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BAC-9
Area: BOTTOM

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Abrasive blasting to minimum Sa 2½. Grit surface profile Rz minimum 100 micron - maximum 150 micron, corresponding to ISO Comparator Coarse (G).

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MULTI-STRENGTH 45751	t/u	Redbrown	50630	200	150	5.3	(X)		X	.021"-.023"	250 bar
HEMPADUR MULTI-STRENGTH 45751	t/u	Grey	12340	200	150	5.3	(X)		X	.021"-.023"	250 bar
HEMPADUR 45182	t/u	Yellowish grey	25150	100	50	9.2	(X)		X	.023"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			350		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45751	150	45751	80 Min	9 Day	2 Hrs	15 Day	4 Hrs	30 Day	11 Hrs	75 Day	N/R	N/R	N/R	N/R
45751	150	45182	80 Min	9 Day	2 Hrs	15 Day	4 Hrs	30 Day	11 Hrs	75 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BAC-9**
Area: **BOTTOM**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15590 in 40 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

HEMPADUR MULTI-STRENGTH 45751:
The temperature of the paint itself should be above 15°C/59°F, preferably above 20°C/68°F for proper application.
Relative humidity maximium 90 %.

It is recommended to use heavy airless spray equipment with a pump transmission ratio of 60:1 (approximately), and a theoretical output of min. 12 litres per minute.

Do not store HEMPADUR MULTI-STRENGTH 45751 at temperatures above 45°C/113°F.

HEMPADUR 45182:
If the maximum recoating interval is exceeded, apply a (thin) additional coat of HEMPADUR 45182. A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing. Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advise if in doubt. To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MULTI-STRENGTH 45751	50630	79	97652	3 : 1	1 h	7 h	27	255	08450	10	90
HEMPADUR MULTI-STRENGTH 45751	12340	79	97652	3 : 1	1 h	7 h	27	255	08450	10	90
HEMPADUR 45182	25150	46	98180	4 : 1	3 h	6 h	23	490	08450	-10	

GENERAL REMARKS TO THE BOTTOM SPECIFICATION:

1. Vertical bottom includes rounding of bilges to the first longitudinal weld seam on flat bottom each side.

2. Scruppers to be plugged or fitted with special drains to prevent water from running down the ship's sides during cleaning and painting.

3. Echo sounder, anodes, propeller(s), etc. to be effectively protected against paint overspray.

4. Work shall preferably be carried out during daylight hours. If work has to be carried out at night (or in dark weather) the yard shall provide sufficient light for work to be carried out in accordance with the specification.

5. No abrasive blasting to be executed in the neighbourhood of wet paint.

6. Precautions shall be taken to prevent (used) abrasives from contaminating painted surfaces. If such contamination takes place abrasives must be removed and any damage to the coating(s) repaired.

7. Precautions shall be taken to prevent grit from entering rudder and stern tube. The cleanliness of these areas to be approved by the owner's representative.

8. The first coat of paint to be applied before rusting of cleaned surfaces occurs. If dry abrasive blasted surfaces have rusted, re-blasting or abrasive sweep blasting shall be carried out. When wet abrasive blasting is specified, non-powdery flash rusting is acceptable but the surface shall be completely dry.

9. All paints to be applied by airless spray equipment. When necessary - in order to achieve the specified film thickness - cross spray technique shall be utilized. If roller/brush application exceptionally is utilized (e.g. to cut in lines) more coats will be necessary to achieve the recommended film thickness.

10. The proper way of governing the film thickness is by subdividing the areas to be painted and calculating the amount of paint to be applied on each area. The exact amount of paint calculated shall be evenly applied on the sub-area.

11. Paint shall be applied only to surfaces that are completely dry, free from dust, salt, fouling, loose paint, cleaning residues and other impurities.

12. All other paint work shall be completed before a start is made on the first coat of antifouling.

13. Each coat of paint shall be completed before starting on the following coat.

14. The number of coats, the dry film thickness and the manner and sequence in which they are applied shall be in accordance with the specification. Specifications with different antifoulings on vertical and flat bottom require a fixed sequence of application.

    Any other type of antifouling shall be completed before application of GLOBIC, OCEANIC and OLYMPIC. Overlaps between two systems should be kept to a minimum.

15. Antifouling and two component products shall be carefully stirred by mechanical means.

16. To ensure a good result the specified recoating intervals and drying time before undocking, adjusted to the ambient temperature, shall be adhered to.

17. Only the correct type of Hempel Thinner shall be used for thinning and cleaning of the application equipment. Thinning of paints shall be kept at a minimum and may only take place if approved by the owner's and/or Hempel's representative.

18. With certain anticorrosives, tar bleeding may occur. This is solely a cosmetic effect and has no negative influence on neither the anticorrosive nor the antifouling performance.

19. Names, draught marks and possible other areas to be painted in accordance with the owner's instructions.

20. All phases of surface preparation and paint work to be approved by the owners representative.

Note: When in direct contact with seawater some of the antifouling shades will change, viz brown 60600 to grey. Red 51110 and brown 60700 fade during service. This has no negative influence on the performance of the antifouling.

TSD Centre
02/2003

SYSTEM SELECTION

TOPSIDE

RECOMMENDED PAINTING SYSTEMS TOPSIDE

			Surface preparation:
TS-1	HEMPALIN PRIMER 12050 HEMPALIN PRIMER 12050 HEMPALIN ENAMEL 52140 HEMPALIN ENAMEL 52140	40 micron / 1.6 mils 40 micron / 1.6 mils 30 micron / 1.2 mils 30 micron / 1.2 mils	**A**
TS-2	HEMPEL'S UNI-PRIMER 13140 HEMPATEX HI-BUILD 46410 HEMPATEX ENAMEL 56360	50 micron / 2 mils 80 micron / 3.2 mils 35 micron / 1.4 mils	**A**
TS-3	HEMPATEX HI-BUILD 46330 HEMPATEX HI-BUILD 46330 HEMPATEX ENAMEL 56360	80 micron / 3.2 mils 80 micron / 3.2 mils 35 micron / 1.4 mils	**A**
TS-4	HEMPATEX HI-BUILD 46410 HEMPATEX HI-BUILD 46410 HEMPATEX ENAMEL 56360	80 micron / 3.2 mils 80 micron / 3.2 mils 35 micron / 1.4 mils	**A**
TS-5	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880 HEMPATHANE TOPCOAT 55210	150 micron / 6 mils 150 micron / 6 mils 50 micron / 2 mils	**B**
TS-6	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880	150 micron / 6 mils 150 micron / 6 mils	**B**
TS-7	HEMPADUR MULTI-STRENGTH 45753 HEMPADUR MULTI-STRENGTH 45753 HEMPATHANE TOPCOAT 55210	150 micron / 6 mils 150 micron / 6 mils 50 micron / 2 mils	**D**
TS-8	HEMPADUR MULTI-STRENGTH 45751 HEMPADUR MULTI-STRENGTH 45751 HEMPATHANE TOPCOAT 55210	150 micron / 6 mils 150 micron / 6 mils 50 micron / 2 mils	**D**
TS-9	HEMPADUR ZINC 17360 HEMPADUR MASTIC 45880 HEMPATHANE TOPCOAT 55210	40 micron / 1.6 mils 125 micron / 5 mils 50 micron / 2 mils	**E**

GENERAL NOTES: SURFACE PREPARATION

TOPSIDE

Type:	Description:
A	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2 - Sa 2½, alternatively mechanically cleaned to St 2 - St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues.
B	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot repairs) or abrasive blasted to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues. As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/ SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound and intact paint. Dust off residues. On pit-corroded surfaces excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.
D	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Abrasive blasting to minimum Sa 2½. Grit-blasted surfaces: Recommended profile is Rz minimum 100 micron/4 mils - 150 micron/6 mils, corresponding to ISO Comparator Coarse (G).
E	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Abrasive blasting to minimum Sa 2½ with a sharp-edged surface profile corresponding to Rugotest No. 3, BN 9a.

RECOMMENDED PAINTING SPECIFICATIONS TOPSIDE

System numbers			TS-1, TS-2
Surface preparation grade			A
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
TS-1	HEMPALIN PRIMER 12050	12.3	40/1.6
	HEMPALIN PRIMER 12050	12.3	40/1.6
	HEMPALIN ENAMEL 52140	14.3-15.7*	30/1.2
	HEMPALIN ENAMEL 52140	14.3-15.7*	30/1.2
TS-2	HEMPEL'S UNI-PRIMER 13140	8.2-8.4*	50/2
	HEMPATEX HI-BUILD 46410	5.3-5.4*	80/3.2
	HEMPATEX ENAMEL 56360	8.6-9.4*	35/1.4

*Consumption depending on shade chosen.

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPALIN PRIMER 12050:	30-50 micron / 1.2-2 mils
HEMPEL'S UNI-PRIMER 13140:	25-80 micron / 1-3.2 mils
HEMPATEX HI-BULD 46410:	75-125 micron / 3-5 mils
HEMPALIN ENAMEL 52140:	30-40 micron / 1.2-1.6 mils

Temperatures above 120°C/248°F may cause yellowing of alkyd paints.

HEMPALIN ENAMEL 52140 and HEMPATEX ENAMEL 56360:
Certain lead-free red and yellow colours may discolour when exposed to chlorine-containing atmosphere.

Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

HEMPATEX HI-BUILD 46410 and HEMPATEX ENAMEL 56360:
Being thermoplastic products, prolonged, mechanical exposure at temperatures above approximately 40°C/104°F may cause film indentation. When temperature drops below, mechanical strength is recovered.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS TOPSIDE

System numbers		TS-3, TS-4	
Surface preparation grade		A	
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
TS-3	HEMPATEX HI-BUILD 46330 HEMPATEX HI-BUILD 46330 HEMPATEX ENAMEL 56360	5.3 5.3 8.6-9.4*	80/3.2 80/3.2 35/1.4
TS-4	HEMPATEX HI-BUILD 46410 HEMPATEX HI-BUILD 46410 HEMPATEX ENAMEL 56360	5.3-5.4* 5.3-5.4* 8.6-9.4*	80/3.2 80/3.2 35/1.4

*Consumption depending on shade chosen.

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPATEX HI-BUILD 46330: 40-100 micron / 1.6-4 mils
HEMPATEX HI-BUILD 46410: 75-125 micron / 3-5 mils

HEMPATEX ENAMEL 56360:
Certain lead-free red and yellow colours may discolour when exposed to chlorine-containing atmosphere.

Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

HEMPATEX HI-BUILD 46330, HEMPATEX HI-BUILD 46410, and HEMPATEX ENAMEL 56360:
Being thermoplastic products, prolonged, mechanical exposure at temperatures above approximately 40°C/104°F may cause film indentations. When temperature drops below, mechanical strength is recovered.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS TOPSIDE

System numbers			TS-5, TS-6
Surface preparation grade			B
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
TS-5	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880 HEMPATHANE TOPCOAT 55210	5.1 5.1 9.8-10.4*	150/6 150/6 50/2
TS-6	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880	5.1 5.1	150/6 150/6

*Consumption depending on shade chosen.

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR MASTIC 45880:	100-200 micron / 4-8 mils
HEMPATHANE TOPCOAT 55210:	40-60 micron / 1.6-2.4 mils

HEMPADUR MASTIC 45880:
Exposure to high humidity shortly after application, especially at temperatures below 10-15 °C/ 50-59 °F, may cause the surface to yellow.

To facilitate application in tropical areas, an alternative high temperature version with CURING AGENT 95881 may be supplied by some factories/stocks.

The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product. When used as a cosmetic coat light shades may, like for other epoxies, have a tendency to yellow, and to darken when exposed to heat.

HEMPATHANE TOPCOAT 55210:
Certain lead-free red and yellow colours may discolour when exposed to chlorine-containing atmosphere.

Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS TOPSIDE

System numbers			TS-7, TS-8
Surface preparation grade			D
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
TS-7	HEMPADUR MULTI-STRENGTH 45753 HEMPADUR MULTI-STRENGTH 45753 HEMPATHANE TOPCOAT 55210	5.3 5.3 9.8-10.4*	150/6 150/6 50/2
TS-8	HEMPADUR MULTI-STRENGTH 45751 HEMPADUR MULTI-STRENGTH 45751 HEMPATHANE TOPCOAT 55210	5.3 5.3 9.8-10.4*	150/6 150/6 50/2

• Spreading rate depending on shade chosen.

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval Normal range is:

HEMPADUR MULTI-STRENGTH 45751:	150-250 micron / 6-10 mils
HEMPADUR MULTI-STRENGTH 45753:	150-250 micron / 6-10 mils

HEMPADUR MULTI-STRENGTH 45751 AND HEMPADUR MULTI-STRENGTH 45753:
The natural tendency of epoxy coatings to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

HEMPATHANE TOPCOAT 55210:
Certain lead-free red and yellow colours may discolour when exposed to chlorine-containing atmosphere.

Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS TOPSIDE

System numbers			TS-9
Surface preparation grade			E
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
TS-9	HEMPADUR ZINC 17360 HEMPADUR MASTIC 45880 HEMPATHANE TOPCOAT 55210	16.3 6.2 9.8-10.4*	40/1.6 125/5 50/2

*Consumption depending on shade chosen.

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR ZINC 17360:	40-50 micron / 1.6-2 mils
HEMPADUR MASTIC 45880:	100-200 micron / 4-8 mils
HEMPATHANE TOPCOAT 55210:	40-60 micron / 1.6-2.4 mils

HEMPADUR MASTIC 45880:
The natural tendency of epoxy coatings to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Exposure to high humidity shortly after application, especially at temperatures below 10-15 °C/ 50-59 °F, may cause the surface to yellow.

To facilitate application in tropical areas, an alternative high temperature version with CURING AGENT 95881 may be supplied by some factories/stocks.

HEMPATHANE TOPCOAT 55210:
Certain lead-free red and yellow colours may discolour when exposed to chlorine-containing atmosphere.

Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

WORKING SPECIFICATIONS

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification TS-1
Area: TOPSIDES

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPALIN PRIMER 12050	t/u	Green	40760	75	40	12.3	(X)	(X)	X	.018"	150 bar
HEMPALIN PRIMER 12050	t/u	Red	50410	75	40	12.3	(X)	(X)	X	.018"	150 bar
HEMPALIN ENAMEL 52140	t/u	Green	40980	75	30	15.3	(X)	(X)	X	.018"	150 bar
HEMPALIN ENAMEL 52140	f/c	Green	40980	75	30	15.3	(X)	(X)	X	.018"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			140		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
12050	40	12050	4 Hrs	36 Hrs	6 Hrs	54 Hrs	8 Hrs	72 Hrs	16 Hrs	5 Day	N/R	N/R	N/R	N/R
12050	40	52140	4 Hrs	36 Hrs	6 Hrs	54 Hrs	8 Hrs	72 Hrs	16 Hrs	5 Day	N/R	N/R	N/R	N/R
52140	30	52140	4 Hrs	60 Hrs	6 Hrs	4 Day	8 Hrs	5 Day	16 Hrs	9 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification TS-1**
Area: **TOPSIDES**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

THINNER 08080 may be used for spray application, however, with a certain risk of wrinkling of the preceding FRESH coat of HEMPALIN.

A series of maintenance jobs may result in build up of a too high film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended NOT to apply HEMPALIN ENAMEL 52140 in excessive film thickness.

If the enamel is overcoated with antifouling the latter is prone to crack. It is recommended not to apply the enamel below the application line for the antifouling.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion. However, for regular maintenance of old weathered alkyd topcoats thorough cleaning will usually be sufficient to establish acceptable intercoat adhesion. Where many maintenance coats have been applied, internal stresses may weaken the intercoat adhesion. Remove loosely adhering paint untill sound areas have been reached.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPALIN PRIMER 12050	40760	49				2 h	38	410	08230	5	
HEMPALIN PRIMER 12050	50410	49				2 h	38	410	08230	5	
HEMPALIN ENAMEL 52140	40980	46				6 h	38	435	08230	5	
HEMPALIN ENAMEL 52140	40980	46				6 h	38	435	08230	5	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification TS-2
Area: TOPSIDES

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPEL'S UNI-PRIMER 13140	t/u	Grey	12170	125	50	8.4	(X)	(X)	X	.019"-.023"	150 bar
HEMPATEX HI-BUILD 46410	t/u	Grey	11480	200	80	5.3	(X)	(X)	X	.017"-.021"	175 bar
HEMPATEX ENAMEL 56360	f/c	Redbrown	50630	125	35	8.9	(X)	(X)	X	.017"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			165		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
13140	50	46410	3 Hrs	None	5 Hrs	None	6 Hrs	None	12 Hrs	None	N/R	N/R	N/R	N/R
46410	80	56360	95 Min	None	2 Hrs	None	3 Hrs	None	5 Hrs	None	9 Hrs	None	20 Hrs	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification TS-2**
Area: **TOPSIDES**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

A series of maintenance jobs may result in build up of a too high total film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended NOT to apply HEMPATEX in excessive film thickness.

As HEMPATEX are thermoplastic products, prolonged direct contact at temperatures above 40°C/104°F may cause film indentations. When temperature drops below, the mechanical strength is recovered.

If the enamel is overcoated with antifouling the latter is prone to crack. It is recommended not to apply the enamel below the application line for the antifouling.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPEL'S UNI-PRIMER 13140	12170	42				2 h	30	520	08080	5	
HEMPATEX HI-BUILD 46410	11480	42				4 h	24	510	08080		
HEMPATEX ENAMEL 56360	50630	31				3 h	25	605	08080		

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification TS-3
Area: TOPSIDES

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPATEX HI-BUILD 46330	t/u	Redbrown	50630	200	80	5.3	(X)		X	.021"-.023"	150 bar
HEMPATEX HI-BUILD 46330	t/u	Grey	11480	200	80	5.3	(X)		X	.021"-.023"	150 bar
HEMPATEX ENAMEL 56360	f/c	Redbrown	50630	125	35	8.9	(X)	(X)	X	.017"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			195		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
46330	80	46330	4 Hrs	None	6 Hrs	None	8 Hrs	None	14 Hrs	None	24 Hrs	None	52 Hrs	None
46330	80	56360	5 Hrs	None	8 Hrs	None	11 Hrs	None	19 Hrs	None	32 Hrs	None	69 Hrs	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification TS-3**
Area: **TOPSIDES**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

As HEMPATEX are thermoplastic products, prolonged direct contact at temperatures above 40°C/104°F may cause film indentations. When temperature drops below, the mechanical strength is recovered.

A series of maintenance jobs may result in build up of a too high total film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended NOT to apply HEMPATEX in excessive film thickness.

If the enamel is overcoated with antifouling the latter is prone to crack. It is recommended not to apply the enamel below the application line for the antifouling.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C Max. RH%
HEMPATEX HI-BUILD 46330	50630	42				8 h	32	510	08080	
HEMPATEX HI-BUILD 46330	11480	42				8 h	32	510	08080	
HEMPATEX ENAMEL 56360	50630	31				3 h	25	605	08080	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification TS-4
Area: TOPSIDES

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPATEX HI-BUILD 46410	t/u	Grey	12170	200	80	5.3	(X)	(X)	X	.017"-.021"	175 bar
HEMPATEX HI-BUILD 46410	t/u	Grey	11480	200	80	5.3	(X)	(X)	X	.017"-.021"	175 bar
HEMPATEX ENAMEL 56360	f/c	Redbrown	50630	125	35	8.9	(X)	(X)	X	.017"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			195		X: Recommended			(X): Possible	

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
46410	80	46410	95 Min	None	2 Hrs	None	3 Hrs	None	5 Hrs	None	9 Hrs	None	20 Hrs	None
46410	80	56360	2 Hrs	None	3 Hrs	None	4 Hrs	None	8 Hrs	None	13 Hrs	None	28 Hrs	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification TS-4**
Area: **TOPSIDES**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

As HEMPATEX are thermoplastic products, prolonged direct contact at temperatures above 40°C/104°F may cause film indentations. When temperature drops below, the mechanical strength is recovered.

A series of maintenance jobs may result in build up of a too high total film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended NOT to apply HEMPATEX in excessive film thickness.

If the enamel is overcoated with antifouling the latter is prone to crack. It is recommended not to apply the enamel below the application line for the antifouling.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C Max. RH%
HEMPATEX HI-BUILD 46410	12170	42				4 h	24	515	08080	
HEMPATEX HI-BUILD 46410	11480	42				4 h	24	510	08080	
HEMPATEX ENAMEL 56360	50630	31				3 h	25	605	08080	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification TS-5
Area: TOPSIDES

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MASTIC 45880	t/u	Grey	12170	200	150	5.1	(X)		X	.017"-.023"	250 bar
HEMPADUR MASTIC 45880	t/u	Grey	11480	200	150	5.1	(X)		X	.017"-.023"	250 bar
HEMPATHANE TOPCOAT 55210	f/c	White	10000	100	50	10.4	(X)		X	.017"-.019"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			350		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45880	150	45880	N/R	N/R	5 Hrs	None	7 Hrs	None	18 Hrs	None	42 Hrs	None	7 Day	None
45880	150	55210	N/R	N/R	5 Hrs	54 Hrs	7 Hrs	72 Hrs	18 Hrs	8 Day	42 Hrs	18 Day	7 Day	72 Day

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification TS-5**
Area: **TOPSIDES**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR MASTIC 45880:
The temperature of the paint itself should be 15°C/59°F or above, but advantageously below approximately 30°C/86°F to secure proper application properties.
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warmer climates, the paint should be stored in a cool place.
In case the paint temperature is 15°C/59°F or below, allow the mixture to pre react before use.
In case of a paint temperature at 15°C/59°F, an induction time of 15 minutes is recommended. In case of a paint temperature at 10°C/50°F, an induction time of 25 minutes is recommend. In order to obtain proper application properties, the paint temperature should preferably never be below 10°C/50°F.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR MASTIC 45880.

HEMPATHANE TOPCOAT 55210:
The type and amount of thinner depend on application conditions, application method, temperature, ventilation, and substrate. THINNER 08080 is recommended in general. THINNER 08510 may be used alternatively depending on local conditions.

AIRLESS SPRAY: 5-15% thinning is recommended. Under extreme conditions up to more than 20% may be necessary to obtain satisfactory film formation.
The best result is obtained by applying a mist coat of HEMPATHANE TOPCOAT 55210 at first, and then 2-15 minutes later apply to full film thickness giving a uniform film formation. Do not exaggerate the film thickness.

A completely clean surface is mandatory to ensure intercoat adhesion, especially at long recoating intervals. Any dirt, oil, and grease has to be removed, e.g. with suitable detergent. Salts to be removed by fresh water hosing. To check an adequate quality of the surface cleaning a test patch is recommended before actual recoating.

CURING AGENT 95370 is sensitive to moisture. Store in a dry place and keep the can tightly closed until use. Open curing agent cans with caution as overpressure might exist. Even small traces of water in the mixed paint will reduce the pot-life and result in film defects.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification TS-5**
Area: **TOPSIDES**

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MASTIC 45880	12170	77	95880	3 : 1	1 h	4 h	28	220	08450	-10	
HEMPADUR MASTIC 45880	11480	77	95880	3 : 1	1 h	4 h	28	220	08450	-10	
HEMPATHANE TOPCOAT 55210	10000	52	95370	7 : 1	4 h	8 h	33	440	08080	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification TS-6
Area: TOPSIDES

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MASTIC 45880	t/u	Grey	12170	200	150	5.1	(X)		X	.017"-.023"	250 bar
HEMPADUR MASTIC 45880	f/c	Grey	11480	200	150	5.1	(X)		X	.017"-.023"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45880	150	45880	N/R	N/R	5 Hrs	None	7 Hrs	None	18 Hrs	None	42 Hrs	None	7 Day	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification TS-6**
Area: **TOPSIDES**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR MASTIC 45880:
The temperature of the paint itself should be 15°C/59°F or above, but advantageously below approximately 30°C/86°F to secure proper application properties.
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warmer climates, the paint should be stored in a cool place.
In case the paint temperature is 15°C/59°F or below, allow the mixture to pre react before use.
In case of a paint temperature at 15°C/59°F, an induction time of 15 minutes is recommended. In case of a paint temperature at 10°C/50°F, an induction time of 25 minutes is recommend. In order to obtain proper application properties, the paint temperature should preferably never be below 10°C/50°F.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR MASTIC 45880.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MASTIC 45880	12170	77	95880	3 : 1	1 h	4 h	28	220	08450	-10	
HEMPADUR MASTIC 45880	11480	77	95880	3 : 1	1 h	4 h	28	220	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification TS-7
Area: TOPSIDES

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Abrasive blasting to minimum Sa 2½. Grit surface profile Rz minimum 100 micron - maximum 150 micron, corresponding to ISO Comparator Coarse (G).

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MULTI-STRENGTH 45753	t/u	Redbrown	50630	200	150	5.1	(X)		X	.021"-.023"	250 bar
HEMPADUR MULTI-STRENGTH 45753	t/u	Grey	12340	200	150	5.1	(X)		X	.021"-.023"	250 bar
HEMPATHANE TOPCOAT 55210	f/c	White	10000	100	50	10.4	(X)		X	.017"-.019"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			350		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45753	150	45753	N/R	N/R	3 Hrs	23 Day	4 Hrs	30 Day	8 Hrs	60 Day	19 Hrs	90 Day	38 Hrs	90 Day
45753	150	55210	N/R	N/R	3 Hrs	54 Hrs	4 Hrs	72 Hrs	7 Hrs	6 Day	16 Hrs	14 Day	32 Hrs	27 Day

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification TS-7**
Area: **TOPSIDES**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

If the working procedure calls for a blast primer use HEMPADUR MULTI-STRENGTH 45753 diluted 15-25% with HEMPEL's THINNER 08450 in 40 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR MULTI-STRENGTH 45753:
The temperature of the paint itself should be above 15°C/59°F, preferably above 20°C/68°F for proper application.
Relative humidity maximium 90 %.

It is recommended to use heavy airless spray equipment with a pump transmission ratio of 60:1 (approximately), and a theoretical output of min. 12 litres per minute.

HEMPATHANE TOPCOAT 55210:
The type and amount of thinner depend on application conditions, application method, temperature, ventilation, and substrate. THINNER 08080 is recommended in general. THINNER 08510 may be used alternatively depending on local conditions.

AIRLESS SPRAY: 5-15% thinning is recommended. Under extreme conditions up to more than 20% may be necessary to obtain satisfactory film formation.
The best result is obtained by applying a mist coat of HEMPATHANE TOPCOAT 55210 at first, and then 2-15 minutes later apply to full film thickness giving a uniform film formation. Do not exaggerate the film thickness.

A completely clean surface is mandatory to ensure intercoat adhesion, especially at long recoating intervals. Any dirt, oil, and grease has to be removed, e.g. with suitable detergent. Salts to be removed by fresh water hosing. To check an adequate quality of the surface cleaning a test patch is recommended before actual recoating.

CURING AGENT 95370 is sensitive to moisture. Store in a dry place and keep the can tightly closed until use. Open curing agent cans with caution as overpressure might exist. Even small traces of water in the mixed paint will reduce the pot-life and result in film defects.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification TS-7**
Area: **TOPSIDES**

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MULTI-STRENGTH 45753	50630	76	98750	3 : 1	1 h	4 h	27	255	08450	-10	90
HEMPADUR MULTI-STRENGTH 45753	12340	76	98750	3 : 1	1 h	4 h	27	240	08450	-10	90
HEMPATHANE TOPCOAT 55210	10000	52	95370	7 : 1	4 h	8 h	33	440	08080	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification TS-8
Area: TOPSIDES

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Abrasive blasting to minimum Sa 2½. Grit surface profile Rz minimum 100 micron - maximum 150 micron, corresponding to ISO Comparator Coarse (G).

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MULTI-STRENGTH 45751	t/u	Redbrown	50630	200	150	5.3	(X)		X	.021"-.023"	250 bar
HEMPADUR MULTI-STRENGTH 45751	t/u	Grey	12340	200	150	5.3	(X)		X	.021"-.023"	250 bar
HEMPATHANE TOPCOAT 55210	f/c	White	10000	100	50	10.4	(X)		X	.017"-.019"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			350		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45751	150	45751	80 Min	9 Day	2 Hrs	15 Day	4 Hrs	30 Day	11 Hrs	75 Day	N/R	N/R	N/R	N/R
45751	150	55210	65 Min	22 Hrs	110 Min	36 Hrs	4 Hrs	72 Hrs	9 Hrs	8 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification TS-8**
Area: **TOPSIDES**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15590 in 40 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR MULTI-STRENGTH 45751:
The temperature of the paint itself should be above 15°C/59°F, preferably above 20°C/68°F for proper application.
Relative humidity maximium 90 %.

It is recommended to use heavy airless spray equipment with a pump transmission ratio of 60:1 (approximately), and a theoretical output of min. 12 litres per minute.

Do not store HEMPADUR MULTI-STRENGTH 45751 at temperatures above 45°C/113°F.

HEMPATHANE TOPCOAT 55210:
The type and amount of thinner depend on application conditions, application method, temperature, ventilation, and substrate. THINNER 08080 is recommended in general. THINNER 08510 may be used alternatively depending on local conditions.

AIRLESS SPRAY: 5-15% thinning is recommended. Under extreme conditions up to more than 20% may be necessary to obtain satisfactory film formation.
The best result is obtained by applying a mist coat of HEMPATHANE TOPCOAT 55210 at first, and then 2-15 minutes later apply to full film thickness giving a uniform film formation. Do not exaggerate the film thickness.

A completely clean surface is mandatory to ensure intercoat adhesion, especially at long recoating intervals. Any dirt, oil, and grease has to be removed, e.g. with suitable detergent. Salts to be removed by fresh water hosing. To check an adequate quality of the surface cleaning a test patch is recommended before actual recoating.

CURING AGENT 95370 is sensitive to moisture. Store in a dry place and keep the can tightly closed until use. Open curing agent cans with caution as overpressure might exist. Even small traces of water in the mixed paint will reduce the pot-life and result in film defects.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification TS-8**
Area: **TOPSIDES**

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MULTI-STRENGTH 45751	50630	79	97652	3 : 1	1 h	7 h	27	255	08450	10	90
HEMPADUR MULTI-STRENGTH 45751	12340	79	97652	3 : 1	1 h	7 h	27	255	08450	10	90
HEMPATHANE TOPCOAT 55210	10000	52	95370	7 : 1	4 h	8 h	33	440	08080	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification TS-9
Area: TOPSIDES

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Abrasive blasting to minimum Sa 2½ with a sharp-edged surface profile corresponding to Rugotest No. 3, BN 9a.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR ZINC 17360	t/u	Red-grey	19830	75	40	16.3	(X)		X	.017"-.021"	150 bar
HEMPADUR MASTIC 45880	t/u	Grey	12170	175	125	6.2	(X)		X	.017"-.023"	250 bar
HEMPATHANE TOPCOAT 55210	f/c	White	10000	100	50	10.4	(X)		X	.017"-.019"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			215		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
17360	40	45880	N/R	N/R	3 Hrs	23 Day	4 Hrs	30 Day	8 Hrs	60 Day	18 Hrs	90 Day	36 Hrs	90 Day
45880	125	55210	N/R	N/R	4 Hrs	54 Hrs	6 Hrs	72 Hrs	14 Hrs	8 Day	34 Hrs	18 Day	6 Day	72 Day

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification TS-9**
Area: **TOPSIDES**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

Before recoating after exposure to contaminated environment, clean the surface thoroughly by high pressure fresh water hosing and allow to dry. In addition scrubbing of HEMPADUR ZINC 17360 with a stiff brush may be necessary to remove zinc corrosion products (white rust).

The paint itself should be 15°C/ 59°F or above.

HEMPADUR MASTIC 45880:
The temperature of the paint itself should be 15°C/59°F or above, but advantageously below approximately 30°C/86°F to secure proper application properties.
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warmer climates, the paint should be stored in a cool place.
In case the paint temperature is 15°C/59°F or below, allow the mixture to pre react before use.
In case of a paint temperature at 15°C/59°F, an induction time of 15 minutes is recommended. In case of a paint temperature at 10°C/50°F, an induction time of 25 minutes is recommend. In order to obtain proper application properties, the paint temperature should preferably never be below 10°C/50°F.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR MASTIC 45880.

HEMPATHANE TOPCOAT 55210:
The type and amount of thinner depend on application conditions, application method, temperature, ventilation, and substrate. THINNER 08080 is recommended in general. THINNER 08510 may be used alternatively depending on local conditions.

AIRLESS SPRAY: 5-15% thinning is recommended. Under extreme conditions up to more than 20% may be necessary to obtain satisfactory film formation.
The best result is obtained by applying a mist coat of HEMPATHANE TOPCOAT 55210 at first, and then 2-15 minutes later apply to full film thickness giving a uniform film formation. Do not exaggerate the film thickness.

A completely clean surface is mandatory to ensure intercoat adhesion, especially at long recoating intervals. Any dirt, oil, and grease has to be removed, e.g. with suitable detergent. Salts to be removed by fresh water hosing. To check an adequate quality of the surface cleaning a test patch is recommended before actual recoating.

CURING AGENT 95370 is sensitive to moisture. Store in a dry place and keep the can tightly closed until use. Open curing agent cans with caution as overpressure might exist. Even small traces of water in the mixed paint will reduce the pot-life and result in film defects.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification TS-9**
Area: **TOPSIDES**

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR ZINC 17360	19830	65	97040	4 : 1	2 h	1 h	24	335	08450	-10	
HEMPADUR MASTIC 45880	12170	77	95880	3 : 1	1 h	4 h	28	220	08450	-10	
HEMPATHANE TOPCOAT 55210	10000	52	95370	7 : 1	4 h	8 h	33	440	08080	-10	

SYSTEM SELECTION

SUPERSTRUCTURE

RECOMMENDED PAINTING SYSTEMS
SUPERSTRUCTURE

			Surface preparation:
SST-1	HEMPALIN PRIMER 12050 HEMPALIN PRIMER 12050 HEMPALIN ENAMEL 52140 HEMPALIN ENAMEL 52140	40 micron / 1.6 mils 40 micron / 1.6 mils 30 micron / 1.2 mils 30 micron / 1.2 mils	**A**
SST-2	HEMPEL'S UNI-PRIMER 13140 HEMPATEX HI-BUILD 46410 HEMPATEX ENAMEL 56360	50 micron / 2 mils 80 micron / 3.2 mils 35 micron / 1.4 mils	**A**
SST-3	HEMPATEX HI-BUILD 46330 HEMPATEX HI-BUILD 46330 HEMPATEX ENAMEL 56360	80 micron / 3.2 mils 80 micron / 3.2 mils 35 micron / 1.4 mils	**A**
SST-4	HEMPATEX HI-BUILD 46410 HEMPATEX HI-BUILD 46410 HEMPATEX ENAMEL 56360	80 micron / 3.2 mils 80 micron / 3.2 mils 35 micron / 1.4 mils	**A**
SST-5	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880 HEMPATHANE TOPCOAT 55210	150 micron / 6 mils 150 micron / 6 mils 50 micron / 2 mils	**B**
SST-6	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880	150 micron / 6 mils 150 micron / 6 mils	**B**
SST-7	HEMPADUR ZINC 17360 HEMPADUR MASTIC 45880 HEMPATHANE TOPCOAT 55210	40 micron / 1.6 mils 125 micron / 5 mils 50 micron / 2 mils	**E**

GENERAL NOTES: SURFACE PREPARATION

SUPERSTRUCTURE

Type:	Description:
A	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Rusty and damaged areas to be abrasive blasted to min. Sa 2 - Sa 2½, alternatively mechanically cleaned to St 2 - St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues.
B	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues. As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/ SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues. On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.
E	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Abrasive blasting to minimum Sa 2½ with a sharp-edged surface profile corresponding to Rugotest No. 3, BN 9a.

RECOMMENDED PAINTING SPECIFICATIONS SUPERSTRUCTURE

System numbers		SST-1, SST-2	
Surface preparation grade		A	
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
SST-1	HEMPALIN PRIMER 12050	12.3	40/1.6
	HEMPALIN PRIMER 12050	12.3	40/1.6
	HEMPALIN ENAMEL 52140	14.3-15.7*	30/1.2
	HEMPALIN ENAMEL 52140	14.3-15.7*	30/1.2
SST-2	HEMPEL'S UNI-PRIMER 13140	8.2-8.4*	50/2
	HEMPATEX HI-BUILD 46410	5.3-5.4*	80/3.2
	HEMPATEX ENAMEL 56360	8.6-9.4*	35/1.4

*Consumption depending on shade chosen.

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPALIN PRIMER 12050:	30-50 micron / 1.2-2 mils
HEMPEL'S UNI-PRIMER 13140:	50-80 micron / 2-3.2 mils
HEMPATEX HI-BULD 46410:	75-125 micron / 3-5 mils
HEMPALIN ENAMEL 52140:	30-40 micron / 1.2-1.6 mils

Temperatures above 120°C/248°F may cause yellowing of alkyd paints.

HEMPALIN ENAMEL 52140 and HEMPATEX ENAMEL 56360:
Certain lead-free red and yellow colours may discolour when exposed to chlorine-containing atmosphere.

Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

HEMPATEX HI-BUILD 46410 and HEMPATEX ENAMEL 56360:
Being thermoplastic products, prolonged, mechanical exposure at temperatures above approximately 40°C/104°F may cause film indentation. When temperature drops below, mechanical strength is recovered.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS SUPERSTRUCTURE

System numbers		SST-3, SST-4	
Surface preparation grade			A
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
SST-3	HEMPATEX HI-BUILD 46330 HEMPATEX HI-BUILD 46330 HEMPATEX ENAMEL 56360	5.3 5.3 8.6-9.4*	80/3.2 80/3.2 35/1.4
SST-4	HEMPATEX HI-BUILD 46410 HEMPATEX HI-BUILD 46410 HEMPATEX ENAMEL 56360	5.3-5.4* 5.3-5.4* 8.6-9.4*	80/3.2 80/3.2 35/1.4

*Consumption depending on shade chosen.

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPATEX HI-BUILD 46330: 40-100 micron / 1.6-4 mils
HEMPATEX HI-BUILD 46410: 75-125 micron / 3-5 mils

HEMPATEX ENAMEL 56360:
Certain lead-free red and yellow colours may discolour when exposed to chlorine-containing atmosphere.

Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

HEMPATEX HI-BUILD 46330, HEMPATEX HI-BUILD 46410, and HEMPATEX ENAMEL 56360:
Being thermoplastic products, prolonged, mechanical exposure at temperatures above approximately 40°C/104°F may cause film indentations. When temperature drops below, mechanical strength is recovered.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS SUPERSTRUCTURE

System numbers		SST-5, SST-6	
Surface preparation grade		B	
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
SST-5	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880 HEMPATHANE TOPCOAT 55210	5.1 5.1 9.8-10.4*	150/6 150/6 50/2
SST-6	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880	5.1 5.1	150/6 150/6

*Consumption depending on shade chosen.

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR MASTIC 45880:	100-200 micron / 4-8 mils
HEMPATHANE TOPCOAT 55210:	40-60 micron / 1.6-2.4 mils

HEMPADUR MASTIC 45880:
Exposure to high humidity shortly after application, especially at temperatures below 10-15 °C/ 50-59 °F, may cause the surface to yellow.

To facilitate application in tropical areas, an alternative high temperature version with CURING AGENT 95881 may be supplied by some factories/stocks.

The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in these products. When used as a cosmetic coat light shades may, like for other epoxies, have a tendency to yellow, and to darken when exposed to heat.

HEMPATHANE TOPCOAT 55210:
Certain lead-free red and yellow colours may discolour when exposed to chlorine-containing atmosphere.

Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS SUPERSTRUCTURE

System numbers			SST-7
Surface preparation grade			E
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
SST-7	HEMPADUR ZINC 17360 HEMPADUR MASTIC 45880 HEMPATHANE TOPCOAT 55210	16.3 6.2 9.8-10.4*	40/1.6 125/5 50/2

*Consumption depending on shade chosen.

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR ZINC 17360:	40-50 micron / 1.6-2 mils
HEMPADUR MASTIC 45880:	100-200 micron / 4-8 mils
HEMPATHANE TOPCOAT 55210:	40-60 micron / 1.6-2.4 mils

HEMPADUR MASTIC 45880:
To facilitate application in tropical areas, an alternative high temperature version with CURING AGENT 95881 may be supplied by some factories/stocks.

The natural tendency of epoxy coatings to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

Exposure to high humidity shortly after application, especially at temperatures below 10-15 °C/ 50-59 °F, may cause the surface to yellow.

HEMPATHANE TOPCOAT 55210:
Certain lead-free red and yellow colours may discolour when exposed to chlorine-containing atmosphere.

Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

WORKING SPECIFICATIONS

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification SST-1
Area: SUPERSTRUCTURE

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPALIN PRIMER 12050	t/u	Green	40760	75	40	12.3	(X)	(X)	X	.018"	150 bar
HEMPALIN PRIMER 12050	t/u	Red	50410	75	40	12.3	(X)	(X)	X	.018"	150 bar
HEMPALIN ENAMEL 52140	t/u	Green	40980	75	30	15.3	(X)	(X)	X	.018"	150 bar
HEMPALIN ENAMEL 52140	f/c	Green	40980	75	30	15.3	(X)	(X)	X	.018"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			140		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
12050	40	12050	4 Hrs	36 Hrs	6 Hrs	54 Hrs	8 Hrs	72 Hrs	16 Hrs	5 Day	N/R	N/R	N/R	N/R
12050	40	52140	4 Hrs	36 Hrs	6 Hrs	54 Hrs	8 Hrs	72 Hrs	16 Hrs	5 Day	N/R	N/R	N/R	N/R
52140	30	52140	4 Hrs	60 Hrs	6 Hrs	4 Day	8 Hrs	5 Day	16 Hrs	9 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification SST-1**
Area: **SUPERSTRUCTURE**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

THINNER 08080 may be used for spray application, however, with a certain risk of wrinkling of the preceding FRESH coat of HEMPALIN.

A series of maintenance jobs may result in build up of a too high film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended NOT to apply HEMPALIN ENAMEL 52140 in excessive film thickness.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion. However, for regular maintenance of old weathered alkyd topcoats thorough cleaning will usually be sufficient to establish acceptable intercoat adhesion. Where many maintenance coats have been applied, internal stresses may weaken the intercoat adhesion. Remove loosely adhering paint untill sound areas have been reached.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPALIN PRIMER 12050	40760	49				2 h	38	410	08230	5	
HEMPALIN PRIMER 12050	50410	49				2 h	38	410	08230	5	
HEMPALIN ENAMEL 52140	40980	46				6 h	38	435	08230	5	
HEMPALIN ENAMEL 52140	40980	46				6 h	38	435	08230	5	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification SST-2
Area: SUPERSTRUCTURE

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPEL'S UNI-PRIMER 13140	t/u	Grey	12170	125	50	8.4	(X)	(X)	X	.019"-.023"	150 bar
HEMPATEX HI-BUILD 46410	t/u	Grey	11480	200	80	5.3	(X)	(X)	X	.017"-.021"	175 bar
HEMPATEX ENAMEL 56360	f/c	Redbrown	50630	125	35	8.9	(X)	(X)	X	.017"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			165		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
13140	50	46410	3 Hrs	None	5 Hrs	None	6 Hrs	None	12 Hrs	None	N/R	N/R	N/R	N/R
46410	80	56360	95 Min	None	2 Hrs	None	3 Hrs	None	5 Hrs	None	9 Hrs	None	20 Hrs	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification SST-2**
Area: **SUPERSTRUCTURE**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

A series of maintenance jobs may result in build up of a too high total film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended NOT to apply HEMPATEX in excessive film thickness.

As HEMPATEX are thermoplastic products, prolonged direct contact at temperatures above 40°C/104°F may cause film indentations. When temperature drops below, the mechanical strength is recovered.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPEL'S UNI-PRIMER 13140	12170	42				2 h	30	520	08080	5	
HEMPATEX HI-BUILD 46410	11480	42				4 h	24	510	08080		
HEMPATEX ENAMEL 56360	50630	31				3 h	25	605	08080		

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification SST-3
Area: SUPERSTRUCTURE

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPATEX HI-BUILD 46330	t/u	Redbrown	50630	200	80	5.3	(X)		X	.021"-.023"	150 bar
HEMPATEX HI-BUILD 46330	t/u	Grey	11480	200	80	5.3	(X)		X	.021"-.023"	150 bar
HEMPATEX ENAMEL 56360	f/c	Redbrown	50630	125	35	8.9	(X)	(X)	X	.017"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			195		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
46330	80	46330	4 Hrs	None	6 Hrs	None	8 Hrs	None	14 Hrs	None	24 Hrs	None	52 Hrs	None
46330	80	56360	5 Hrs	None	8 Hrs	None	11 Hrs	None	19 Hrs	None	32 Hrs	None	69 Hrs	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification SST-3**
Area: **SUPERSTRUCTURE**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of ice on the surface.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

As HEMPATEX are thermoplastic products, prolonged direct contact at temperatures above 40°C/104°F may cause film indentations. When temperature drops below, the mechanical strength is recovered.

A series of maintenance jobs may result in build up of a too high total film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended NOT to apply HEMPATEX in excessive film thickness.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPATEX HI-BUILD 46330	50630	42				8 h	32	510	08080		
HEMPATEX HI-BUILD 46330	11480	42				8 h	32	510	08080		
HEMPATEX ENAMEL 56360	50630	31				3 h	25	605	08080		

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification SST-4
Area: SUPERSTRUCTURE

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPATEX HI-BUILD 46410	t/u	Grey	12170	200	80	5.3	(X)	(X)	X	.017"-.021"	175 bar
HEMPATEX HI-BUILD 46410	t/u	Grey	11480	200	80	5.3	(X)	(X)	X	.017"-.021"	175 bar
HEMPATEX ENAMEL 56360	f/c	Redbrown	50630	125	35	8.9	(X)	(X)	X	.017"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			195		X: Recommended			(X): Possible	

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
46410	80	46410	95 Min	None	2 Hrs	None	3 Hrs	None	5 Hrs	None	9 Hrs	None	20 Hrs	None
46410	80	56360	2 Hrs	None	3 Hrs	None	4 Hrs	None	8 Hrs	None	13 Hrs	None	28 Hrs	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification SST-4**
Area: **SUPERSTRUCTURE**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of ice on the surface.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

As HEMPATEX are thermoplastic products, prolonged direct contact at temperatures above 40°C/104°F may cause film indentations. When temperature drops below, the mechanical strength is recovered.

A series of maintenance jobs may result in build up of a too high total film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended NOT to apply HEMPATEX in excessive film thickness.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPATEX HI-BUILD 46410	12170	42				4 h	24	515	08080		
HEMPATEX HI-BUILD 46410	11480	42				4 h	24	510	08080		
HEMPATEX ENAMEL 56360	50630	31				3 h	25	605	08080		

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification SST-5
Area: SUPERSTRUCTURE

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MASTIC 45880	t/u	Grey	12170	200	150	5.1	(X)		X	.017"-.023"	250 bar
HEMPADUR MASTIC 45880	t/u	Grey	11480	200	150	5.1	(X)		X	.017"-.023"	250 bar
HEMPATHANE TOPCOAT 55210	f/c	White	10000	100	50	10.4	(X)		X	.017"-.019"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			350		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45880	150	45880	N/R	N/R	4 Hrs	None	5 Hrs	None	13 Hrs	None	30 Hrs	None	5 Day	None
45880	150	55210	N/R	N/R	4 Hrs	16 Day	5 Hrs	21 Day	13 Hrs	53 Day	30 Hrs	90 Day	5 Day	90 Day

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification SST-5**
Area: **SUPERSTRUCTURE**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR MASTIC 45880:
The temperature of the paint itself should be 15°C/59°F or above, but advantageously below approximately 30°C/86°F to secure proper application properties.
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warmer climates, the paint should be stored in a cool place.
In case the paint temperature is 15°C/59°F or below, allow the mixture to pre react before use.
In case of a paint temperature at 15°C/59°F, an induction time of 15 minutes is recommended. In case of a paint temperature at 10°C/50°F, an induction time of 25 minutes is recommend. In order to obtain proper application properties, the paint temperature should preferably never be below 10°C/50°F.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR MASTIC 45880.

HEMPATHANE TOPCOAT 55210:
The type and amount of thinner depend on application conditions, application method, temperature, ventilation, and substrate. THINNER 08080 is recommended in general. THINNER 08510 may be used alternatively depending on local conditions.

AIRLESS SPRAY: 5-15% thinning is recommended. Under extreme conditions up to more than 20% may be necessary to obtain satisfactory film formation.
The best result is obtained by applying a mist coat of HEMPATHANE TOPCOAT 55210 at first, and then 2-15 minutes later apply to full film thickness giving a uniform film formation. Do not exaggerate the film thickness.

A completely clean surface is mandatory to ensure intercoat adhesion, especially at long recoating intervals. Any dirt, oil, and grease has to be removed, e.g. with suitable detergent. Salts to be removed by fresh water hosing. To check an adequate quality of the surface cleaning a test patch is recommended before actual recoating.

CURING AGENT 95370 is sensitive to moisture. Store in a dry place and keep the can tightly closed until use. Open curing agent cans with caution as overpressure might exist. Even small traces of water in the mixed paint will reduce the pot-life and result in film defects.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification SST-5**
Area: **SUPERSTRUCTURE**

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MASTIC 45880	12170	77	95880	3 : 1	1 h	4 h	28	220	08450	-10	
HEMPADUR MASTIC 45880	11480	77	95880	3 : 1	1 h	4 h	28	220	08450	-10	
HEMPATHANE TOPCOAT 55210	10000	52	95370	7 : 1	4 h	8 h	33	440	08080	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification SST-6
Area: SUPERSTRUCTURE

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MASTIC 45880	t/u	Grey	12170	200	150	5.1	(X)		X	.017"-.023"	250 bar
HEMPADUR MASTIC 45880	f/c	Grey	11480	200	150	5.1	(X)		X	.017"-.023"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45880	150	45880	N/R	N/R	4 Hrs	None	5 Hrs	None	13 Hrs	None	30 Hrs	None	5 Day	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification SST-6**
Area: **SUPERSTRUCTURE**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

When the working procedure calls for a blast primer HEMPADUR 15570 in 50 micron dry must be used.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR MASTIC 45880:
The temperature of the paint itself should be 15°C/59°F or above, but advantageously below approximately 30°C/86°F to secure proper application properties.
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warmer climates, the paint should be stored in a cool place.
In case the paint temperature is 15°C/59°F or below, allow the mixture to pre react before use.
In case of a paint temperature at 15°C/59°F, an induction time of 15 minutes is recommended. In case of a paint temperature at 10°C/50°F, an induction time of 25 minutes is recommend. In order to obtain proper application properties, the paint temperature should preferably never be below 10°C/50°F.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR MASTIC 45880.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MASTIC 45880	12170	77	95880	3 : 1	1 h	4 h	28	220	08450	-10	
HEMPADUR MASTIC 45880	11480	77	95880	3 : 1	1 h	4 h	28	220	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification SST-7
Area: SUPERSTRUCTURE

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Abrasive blasting to minimum Sa 2½ with a sharp-edged surface profile corresponding to Rugotest No. 3, BN 9a.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR ZINC 17360	t/u	Red-grey	19830	75	40	16.3	(X)		X	.017"-.021"	150 bar
HEMPADUR MASTIC 45880	t/u	Grey	12170	175	125	6.2	(X)		X	.017"-.023"	250 bar
HEMPATHANE TOPCOAT 55210	f/c	White	10000	100	50	10.4	(X)		X	.017"-.019"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			215		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
17360	40	45880	N/R	N/R	90 Min	None	2 Hrs	None	4 Hrs	None	9 Hrs	None	18 Hrs	None
45880	125	55210	N/R	N/R	3 Hrs	16 Day	4 Hrs	21 Day	10 Hrs	53 Day	24 Hrs	90 Day	4 Day	90 Day

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification SST-7**
Area: **SUPERSTRUCTURE**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Before recoating after exposure to contaminated environment, clean the surface thoroughly by high pressure fresh water hosing and allow to dry. In addition scrubbing of HEMPADUR ZINC 17360 with a stiff brush may be necessary to remove zinc corrosion products (white rust).

The paint itself should be 15°C/ 59°F or above.

HEMPADUR MASTIC 45880:
The temperature of the paint itself should be 15°C/59°F or above, but advantageously below approximately 30°C/86°F to secure proper application properties.
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warmer climates, the paint should be stored in a cool place.
In case the paint temperature is 15°C/59°F or below, allow the mixture to pre react before use.
In case of a paint temperature at 15°C/59°F, an induction time of 15 minutes is recommended. In case of a paint temperature at 10°C/50°F, an induction time of 25 minutes is recommend. In order to obtain proper application properties, the paint temperature should preferably never be below 10°C/50°F.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR MASTIC 45880.

HEMPATHANE TOPCOAT 55210:
The type and amount of thinner depend on application conditions, application method, temperature, ventilation, and substrate. THINNER 08080 is recommended in general. THINNER 08510 may be used alternatively depending on local conditions.

AIRLESS SPRAY: 5-15% thinning is recommended. Under extreme conditions up to more than 20% may be necessary to obtain satisfactory film formation.
The best result is obtained by applying a mist coat of HEMPATHANE TOPCOAT 55210 at first, and then 2-15 minutes later apply to full film thickness giving a uniform film formation. Do not exaggerate the film thickness.

A completely clean surface is mandatory to ensure intercoat adhesion, especially at long recoating intervals. Any dirt, oil, and grease has to be removed, e.g. with suitable detergent. Salts to be removed by fresh water hosing. To check an adequate quality of the surface cleaning a test patch is recommended before actual recoating.

CURING AGENT 95370 is sensitive to moisture. Store in a dry place and keep the can tightly closed until use. Open curing agent cans with caution as overpressure might exist. Even small traces of water in the mixed paint will reduce the pot-life and result in film defects.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification SST-7**
Area: **SUPERSTRUCTURE**

Remarks:

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C Max. RH%
HEMPADUR ZINC 17360	19830	65	97040	4 : 1	2 h	1 h	24	335	08450	-10
HEMPADUR MASTIC 45880	12170	77	95880	3 : 1	1 h	4 h	28	220	08450	-10
HEMPATHANE TOPCOAT 55210	10000	52	95370	7 : 1	4 h	8 h	33	440	08080	-10

SYSTEM SELECTION

EXPOSED STEEL DECKS

RECOMMENDED PAINTING SYSTEMS
EXPOSED STEEL DECKS

			Surface preparation:
DC-1	HEMPALIN PRIMER 12050 HEMPALIN PRIMER 12050 HEMPALIN DECKPAINT 53240 HEMPALIN DECKPAINT 53240	40 micron / 1.6 mils 40 micron / 1.6 mils 30 micron / 1.2 mils 30 micron / 1,2 mils	**A**
DC-2	HEMPEL'S UNI-PRIMER 13140 HEMPEL'S UNI-PRIMER 13140 HEMPALIN DECKPAINT 53240 HEMPALIN DECKPAINT 53240	50 micron / 2 mils 50 micron / 2 mils 30 micron / 1.2 mils 30 micron / 1.2 mils	**A**
DC-3	HEMPATEX HI-BUILD 46410 HEMPATEX HI-BUILD 46410 HEMPATEX ENAMEL 56360	80 micron / 3.2 mils 80 micron / 3.2 mils 35 micron / 1.4 mils	**A**
DC-4	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880	150 micron / 6 mils 150 micron / 6 mils	**B**
DC-5	HEMPADUR 15570 HEMPADUR 15570	150 micron / 6 mils 150 micron / 6 mils	**B**
DC-6	HEMPADUR 15570 HEMPADUR 15570 HEMPATHANE TOPCOAT 55210	100 micron / 4 mils 100 micron / 4 mils 50 micron / 2 mils	**B**

GENERAL NOTES: SURFACE PREPARATION

EXPOSED STEEL DECKS

Type:	Description:
A	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Rusty and damaged areas to be abrasive blasted to min. Sa 2 - Sa 2½, alternatively mechanically cleaned to St 2 - St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues.
B	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues. As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/ SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues. On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

RECOMMENDED PAINTING SPECIFICATIONS
EXPOSED STEEL DECKS

System numbers			DC-1, DC-2, DC-3
Surface preparation grade			A
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
DC-1	HEMPALIN PRIMER 12050	12.3	40/1.6
	HEMPALIN PRIMER 12050	12.3	40/1.6
	HEMPALIN DECKPAINT 53240	13.7-14.0*	30/1.2
	HEMPALIN DECKPAINT 53240	13.7-14.0*	30/1.2
DC-2	HEMPEL'S UNI-PRIMER 13140	8.2-8.4*	50/2
	HEMPEL'S UNI-PRIMER 13140	8.2-8.4*	50/2
	HEMPALIN DECKPAINT 53240	13.7-14.0*	30/1.2
	HEMPALIN DECKPAINT 53240	13.7-14-0*	30/1.2
DC-3	HEMPATEX HI-BUILD 46410	5.3-5.4*	80/3.2
	HEMPATEX HI-BUILD 46410	5.3-5.4*	80/3.2
	HEMPATEX ENAMEL 56360	8.6-9.4*	35/1.4

*Consumption depending on shade chosen.

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPALIN PRIMER 12050:	30-50 micron/1.2-2 mils
HEMPEL'S UNI-PRIMER 13140:	25-80 micron/1-3.2 mils
HEMPATEX HI-BUILD 46410:	75-125 micron/3-5 mils

Temperatures above 120°C/248°F may cause yellowing of alkyd paints.

Alkyds (DC-1, DC-2) have limited resistance to splashes and spillage of aromatic hydrocarbons and other strong solvents. This includes many gasolines, especially the non-leaded types.

HEMPATEX ENAMEL 56360:
Certain lead-free red and yellow colours may discolour when exposed to chlorine-containing atmosphere.

Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

HEMPATEX HI-BUILD 46410 and HEMPATEX ENAMEL 56360:
Being thermoplastic products, prolonged, mechanical exposure at temperatures above approximately 40°C/104°F may cause film indentation. When temperature drops below, mechanical strength is recovered.

[1)] For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS
EXPOSED STEEL DECKS

System numbers			DC-4
Surface preparation grade			B
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
DC-4	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880	5.1 5.1	150/6 150/6

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR MASTIC 45880: 100-200 micron/4-8 mils

The natural tendency of epoxy coatings to chalk in outdoor exposure and to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product. When used as a cosmetic coat light shades may, like for other epoxies, have a tendency to yellow when exposed to sunshine and darken when exposed to heat.

Exposure to high humidity shortly after application, especially at temperatures below 10-15 °C/50-59 °F may lead to yellowing of the surface.

To facilitate application in tropical areas, an alternative high temperature version with CURING AGENT 95881 may be supplied by some factories/stocks.

[1)] For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS EXPOSED STEEL DECKS

System numbers		DC-5, DC-6	
Surface preparation grade		B	
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
DC-5	HEMPADUR 15570 HEMPADUR 15570	5.4 5.4	100/4 100/4
DC-6	HEMPADUR 15570 HEMPADUR 15570 HEMPATHANE TOPCOAT 55210	5.4 5.4 9.8-10.4*	100/4 100/4 50/2

*Consumption depending on shade chosen.

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 15570:	50-125 micron/2-5 mils
HEMPATHANE TOPCOAT 55210:	40-60 micron/1.6-2.4 mils

HEMPADUR 15570:
Light shades will have a tendency to yellow when exposed to sunshine and darken when exposed to heat.

The natural tendency of epoxy coatings to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

HEMPATHANE TOPCOAT 55210:
Certain lead-free red and yellow colours may discolour when exposed to chlorine-containing atmosphere.

Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

[1)] For conversion to sq.ft./US gallon please multiply by 40.74

WORKING SPECIFICATIONS

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification DC-1
Area: EXPOSED STEEL DECKS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPALIN PRIMER 12050	t/u	Green	40760	75	40	12.3	(X)	(X)	X	.018"	150 bar
HEMPALIN PRIMER 12050	t/u	Red	50410	75	40	12.3	(X)	(X)	X	.018"	150 bar
HEMPALIN DECKPAINT 53240	t/u	Red	50800	75	30	14.3	(X)		X	.018"-.021"	150 bar
HEMPALIN DECKPAINT 53240	f/c	Red	50800	75	30	14.3	(X)		X	.018"-.021"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			140		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
12050	40	12050	4 Hrs	36 Hrs	6 Hrs	54 Hrs	8 Hrs	72 Hrs	16 Hrs	5 Day	N/R	N/R	N/R	N/R
12050	40	53240	24 Hrs	4 Day	36 Hrs	5 Day	48 Hrs	7 Day	4 Day	13 Day	N/R	N/R	N/R	N/R
53240	30	53240	1 Hrs	2 Hrs	90 Min	3 Hrs	2 Hrs	4 Hrs	4 Hrs	7 Hrs	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification DC-1**
Area: **EXPOSED STEEL DECKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

Recoating of HEMPALIN DECKPAINT 53240 should take place when the first coat is dry and within 4 hours. If this interval is exceeded, do not recoat until after two weeks. No maximum interval for adhesion.

If a skid-proof surface is desired, sprinkle HEMPEL'S ANTI-SLINT 67500 evenly over the first coat of HEMPALIN DECKPAINT 53240 while still wet. (Consumption: approximately 7,5 kg 67500 to 20 litres of paint). When the paint is dry, sweep up surplus grit and apply a second coat of HEMPALIN DECKPAINT 53240. Anti-skid properties can also be attained by mixing 1.0 kg of HEMPEL'S ANTI-SLIP BEADS 67420 into 20 litres of HEMPALIN DECKPAINT 53240.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion. However, for regular maintenance of old weathered alkyd topcoats thorough cleaning will usually be sufficient to establish acceptable intercoat adhesion. Where many maintenance coats have been applied, internal stresses may weaken the intercoat adhesion. Remove loosely adhering paint untill sound areas have been reached.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C Max. RH%
HEMPALIN PRIMER 12050	40760	49				2 h	38	410	08230	5
HEMPALIN PRIMER 12050	50410	49				2 h	38	410	08230	5
HEMPALIN DECKPAINT 53240	50800	43				1 h	28	495	08080	5
HEMPALIN DECKPAINT 53240	50800	43				1 h	28	495	08080	5

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification DC-2
Area: EXPOSED STEEL DECKS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPEL'S UNI-PRIMER 13140	t/u	Grey	12170	125	50	8.4	(X)	(X)	X	.019"-.023"	150 bar
HEMPEL'S UNI-PRIMER 13140	t/u	Red	51320	125	50	8.4	(X)	(X)	X	.019"-.023"	150 bar
HEMPALIN DECKPAINT 53240	t/u	Red	50800	75	30	14.3	(X)		X	.018"-.021"	150 bar
HEMPALIN DECKPAINT 53240	f/c	Red	50800	75	30	14.3	(X)		X	.018"-.021"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			160		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
13140	50	13140	3 Hrs	None	5 Hrs	None	6 Hrs	None	12 Hrs	None	N/R	N/R	N/R	N/R
13140	50	53240	3 Hrs	None	5 Hrs	None	6 Hrs	None	12 Hrs	None	N/R	N/R	N/R	N/R
53240	30	53240	1 Hrs	2 Hrs	90 Min	3 Hrs	2 Hrs	4 Hrs	4 Hrs	7 Hrs	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification DC-2**
Area: **EXPOSED STEEL DECKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

Recoating of HEMPALIN DECKPAINT 53240 should take place when the first coat is dry and within 4 hours. If this interval is exceeded, do not recoat until after two weeks. No maximum interval for adhesion.

If a skid-proof surface is desired, sprinkle HEMPEL'S ANTI-SLINT 67500 evenly over the first coat of HEMPALIN DECKPAINT 53240 while still wet. (Consumption: approximately 7,5 kg 67500 to 20 litres of paint). When the paint is dry, sweep up surplus grit and apply a second coat of HEMPALIN DECKPAINT 53240. Anti-skid properties can also be attained by mixing 1.0 kg of HEMPEL'S ANTI-SLIP BEADS 67420 into 20 litres of HEMPALIN DECKPAINT 53240.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion. However, for regular maintenance of old weathered alkyd topcoats thorough cleaning will usually be sufficient to establish acceptable intercoat adhesion. Where many maintenance coats have been applied, internal stresses may weaken the intercoat adhesion. Remove loosely adhering paint untill sound areas have been reached.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C Max. RH%
HEMPEL'S UNI-PRIMER 13140	12170	42				2 h	30	520	08080	5
HEMPEL'S UNI-PRIMER 13140	51320	42				2 h	30	515	08080	5
HEMPALIN DECKPAINT 53240	50800	43				1 h	28	495	08080	5
HEMPALIN DECKPAINT 53240	50800	43				1 h	28	495	08080	5

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification DC-3
Area: EXPOSED STEEL DECKS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPATEX HI-BUILD 46410	t/u	Grey	12170	200	80	5.3	(X)	(X)	X	.017"-.021"	175 bar
HEMPATEX HI-BUILD 46410	t/u	Grey	11480	200	80	5.3	(X)	(X)	X	.017"-.021"	175 bar
HEMPATEX ENAMEL 56360	f/c	Redbrown	50630	125	35	8.9	(X)	(X)	X	.017"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			195		X: Recommended			(X): Possible	

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
46410	80	46410	95 Min	None	2 Hrs	None	3 Hrs	None	5 Hrs	None	9 Hrs	None	20 Hrs	None
46410	80	56360	2 Hrs	None	3 Hrs	None	4 Hrs	None	8 Hrs	None	13 Hrs	None	28 Hrs	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification DC-3**
Area: **EXPOSED STEEL DECKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

As HEMPATEX are thermoplastic products, prolonged direct contact at temperatures above 40°C/104°F may cause film indentations. When temperature drops below, the mechanical strength is recovered.

A series of maintenance jobs may result in build up of a too high total film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended NOT to apply HEMPATEX in excessive film thickness.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPATEX HI-BUILD 46410	12170	42				4 h	24	515	08080		
HEMPATEX HI-BUILD 46410	11480	42				4 h	24	510	08080		
HEMPATEX ENAMEL 56360	50630	31				3 h	25	605	08080		

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification DC-4
Area: EXPOSED STEEL DECKS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MASTIC 45880	t/u	Grey	12170	200	150	5.1	(X)		X	.017"-.023"	250 bar
HEMPADUR MASTIC 45880	f/c	Grey	11480	200	150	5.1	(X)		X	.017"-.023"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended			(X): Possible	

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45880	150	45880	N/R	N/R	5 Hrs	None	7 Hrs	None	18 Hrs	None	42 Hrs	None	7 Day	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification DC-4**
Area: **EXPOSED STEEL DECKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR MASTIC 45880:
The temperature of the paint itself should be 15°C/59°F or above, but advantageously below approximately 30°C/86°F to secure proper application properties.
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warmer climates, the paint should be stored in a cool place.
In case the paint temperature is 15°C/59°F or below, allow the mixture to pre react before use.
In case of a paint temperature at 15°C/59°F, an induction time of 15 minutes is recommended. In case of a paint temperature at 10°C/50°F, an induction time of 25 minutes is recommend. In order to obtain proper application properties, the paint temperature should preferably never be below 10°C/50°F.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR MASTIC 45880.

Pit-corroded areas may call for an extra coat to fill out pittings.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MASTIC 45880	12170	77	95880	3 : 1	1 h	4 h	28	220	08450	-10	
HEMPADUR MASTIC 45880	11480	77	95880	3 : 1	1 h	4 h	28	220	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification DC-5
Area: EXPOSED STEEL DECKS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15570	t/u	Grey	12170	200	100	5.4	(X)		X	.019"-.021"	175 bar
HEMPADUR 15570	t/u	Redbrown	50630	200	100	5.4	(X)		X	.019"-.021"	175 bar
t/u: touch up	f/c: full coat	Total d.f.t.			200		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15570	100	15570	N/R	N/R	3 Hrs	None	4 Hrs	None	8 Hrs	None	18 Hrs	None	36 Hrs	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification DC-5**
Area: **EXPOSED STEEL DECKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 15570.

The temperature of the paint itself should be 15°C/59°F or above.

Pit-corroded areas may call for an extra coat to fill out pittings.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

HEMPADUR 15570 is also well suited for damp or moist surfaces.
Damp surfaces: Water is not readily detectable, but the temperature of the surface is below the dew point.
Moist surfaces: Pools of water and droplets have been removed, but there is a noticable film of water.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15570	12170	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	
HEMPADUR 15570	50630	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification DC-6
Area: EXPOSED STEEL DECKS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15570	t/u	Grey	12170	200	100	5.4	(X)		X	.019"-.021"	175 bar
HEMPADUR 15570	t/u	Redbrown	50630	200	100	5.4	(X)		X	.019"-.021"	175 bar
HEMPATHANE TOPCOAT 55210	f/c	Redbrown	50630	100	50	10.0	(X)		X	.017"-.019"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			250		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15570	100	15570	N/R	N/R	3 Hrs	None	4 Hrs	None	8 Hrs	None	18 Hrs	None	36 Hrs	None
15570	100	55210	N/R	N/R	3 Hrs	54 Hrs	4 Hrs	72 Hrs	8 Hrs	6 Day	18 Hrs	14 Day	36 Hrs	27 Day

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification DC-6**
Area: **EXPOSED STEEL DECKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 15570.

The temperature of the paint itself should be 15°C/59°F or above.

HEMPADUR 15570 is also well suited for damp or moist surfaces.
Damp surfaces: Water is not readily detectable, but the temperature of the surface is below the dew point.
Moist surfaces: Pools of water and droplets have been removed, but there is a noticable film of water.

HEMPATHANE TOPCOAT 55210:
The type and amount of thinner depend on application conditions, application method, temperature, ventilation, and substrate. THINNER 08080 is recommended in general. THINNER 08510 may be used alternatively depending on local conditions.

AIRLESS SPRAY: 5-15% thinning is recommended. Under extreme conditions up to more than 20% may be necessary to obtain satisfactory film formation.
The best result is obtained by applying a mist coat of HEMPATHANE ENAMEL 55210 at first, and then 2-15 minutes later apply to full film thickness giving a uniform film formation. Do not exaggerate the film thickness.

A completely clean surface is mandatory to ensure intercoat adhesion, especially at long recoating intervals. Any dirt, oil, and grease has to be removed, e.g. with suitable detergent. Salts to be removed by fresh water hosing. To check an adequate quality of the surface cleaning a test patch is recommended before actual recoating.

CURING AGENT 95370 is sensitive to moisture. Store in a dry place and keep the can tightly closed until use. Open curing agent cans with caution as overpressure might exist. Even small traces of water in the mixed paint will reduce the pot-life and result in film defects.

On areas where a non-skid surface (medium high textured) is required it is advisable to use HEMPEL'S ANTI-SLINT 67500 on the "wet" HEMPATHANE TOPCOAT 55210 surface. Apply an additional coat of HEMPATHANE TOPCOAT 55210 when the surplus of HEMPEL'S ANTI-SLINT 67500 has been removed.

Pit-corroded areas may call for an extra coat to fill out pittings.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification DC-6**
Area: **EXPOSED STEEL DECKS**

Remarks:

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15570	12170	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	
HEMPADUR 15570	50630	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	
HEMPATHANE TOPCOAT 55210	50630	50	95370	7 : 1	4 h	8 h	33	455	08080	-10	

SYSTEM SELECTION

CARGO HOLDS

RECOMMENDED PAINTING SYSTEMS
CARGO HOLDS

			Surface preparation:
CH-1	HEMPALIN PRIMER 12050 HEMPALIN PRIMER 12050 HEMPEL'S SILVIUM 51570	40 micron / 1.6 mils 40 micron / 1.6 mils 25 micron / 1 mil	**A**
CH-2	HEMPEL'S UNI-PRIMER 13140 HEMPEL'S UNI-PRIMER 13140 HEMPALIN DANREX 52360	50 micron / 2 mils 50 micron / 2 mils 35 micron / 1.4 mils	**A**
CH-3	HEMPALIN PRIMER 12050 HEMPALIN PRIMER 12050 HEMPALIN DANREX 52360	40 micron / 1.6 mils 40 micron / 1.6 mils 35 micron / 1.4 mils	**A**
CH-4	HEMPADUR 15130 HEMPADUR 15130	125 micron / 5 mils 125 micron / 5 mils	**B**
CH-5	HEMPADUR 45141/45143 HEMPADUR 45141/45143	125 micron / 5 mils 125 micron / 5 mils	**B**
CH-6	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880	150 micron / 6 mils 150 micron / 6 mils	**B**
CH-7	HEMPADUR MULTI-STRENGTH 45753 HEMPADUR MULTI-STRENGTH 45753	150 micron / 6 mils 150 micron / 6 mils	**D**
CH-8	HEMPADUR MULTI-STRENGTH 45751 HEMPADUR MULTI-STRENGTH 45751	150 micron / 6 mils 150 micron / 6 mils	**D**

GENERAL NOTES: SURFACE PREPARATION

CARGO HOLDS

Type:	Description:
A	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2 - Sa 2½, alternatively mechanically cleaned to St 2 - St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues.
B	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot repairs) or abrasive blasted to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues. As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/ SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound and intact paint. Dust off residues. On pit-corroded surfaces excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.
M	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Abrasive blasting to minimum Sa 2½. Grit-blasted surfaces: Recommended surface profile corresponding to Rugotest No. 3, BN 10. Dust off residues.

RECOMMENDED PAINTING SPECIFICATIONS
CARGO HOLDS

System numbers		CH-1, CH-2, CH-3	
Surface preparation grade		A	
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
CH-1	HEMPALIN PRIMER 12050	12.3	40/1.6
	HEMPALIN PRIMER 12050	12.3	40/1.6
	HEMPEL'S SILVIUM 51570	15.2	25/1
CH-2	HEMPEL'S UNI-PRIMER 13140	8.2-8.4*	50/2
	HEMPEL'S UNI-PRIMER 13140	8.2-8.4*	50/2
	HEMPALIN DANREX 52360	16.0-16.3*	35/1.4
CH-3	HEMPALIN PRIMER 12050	12.3	40/1.6
	HEMPALIN PRIMER 12050	12.3	40/1.6
	HEMPALIN DANREX 52360	16.0-16.3*	35/1.4

*Consumption depending on shade chosen.

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPALIN PRIMER 12050:	30-50 micron / 1.2-2 mils
HEMPEL'S UNI-PRIMER 13140:	25-80 micron / 1-3.2 mils

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS CARGO HOLDS

System numbers		CH-4, CH-5, CH-6	
Surface preparation grade		B	
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
CH-4	HEMPADUR 15130 HEMPADUR 15130	5.6 5.6	125/5 125/5
CH-5	HEMPADUR 45141/45143 HEMPADUR 45141/45143	4.8 4.8	125/5 125/5
CH-6	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880	5.1 5.1	150/6 150/6

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 15130:	125-200 micron / 5-8 mils
HEMPADUR 45141/45143:	125-175 micron / 5-7 mils
HEMPADUR MASTIC 45880:	100-200 micron / 4-8 mils

The natural tendency of epoxy coatings to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in these products.

HEMPADUR MASTIC 45880:
Light shades may, like for other epoxies, have a tendency to yellow and to darken when exposed to heat.

To facilitate application in tropical areas, an alternative high temperature version with CURING AGENT 95881 may be supplied by some factories/stocks.

HEMPADUR 45141/45143:
HEMPADUR 45143 is intended for curing conditions down to -10°C/14°F, HEMPADUR 45141 is to be selected in warmer climates. A shift from HEMPADUR 45143 to HEMPADUR 45141 is most convinient to take place when the temperature is between 15°C/59°F and 25°C/77°F.

Specification CH-4 and CH-5:
Minimum dry film thickness for ballast holds is 2 x 150 micron/6 mils.

Specification CH-6:
Not recommended for cargo holds of bulk carriers.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS CARGO HOLDS

System numbers			CH-7, CH-8
Surface preparation grade			M
System description		**Theoretical**	
		Spreading rate m^2/litre[1)]	**Dry film thickness micron/mils**
CH-7	HEMPADUR MULTI-STRENGTH 45753 HEMPADUR MULTI-STRENGTH 45753	5.3 5.3	150/6 150/6
CH-8	HEMPADUR MULTI-STRENGTH 45751 HEMPADUR MULTI-STRENGTH 45751	5.3 5.3	150/6 150/6

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR MULTI-STRENGTH 45751:	150-250 micron / 6-10 mils
HEMPADUR MULTI-STRENGTH 45753:	150-250 micron / 6-10 mils

HEMPADUR MULTI-STRENGTH 45751, HEMPADUR MULTI-STRENGTH 45753:
The natural tendency of epoxy coatings to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is to a certain extent also reflected in this product.

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

WORKING SPECIFICATIONS

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification CH-1
Area: CARGO HOLDS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPALIN PRIMER 12050	t/u	Green	40760	75	40	12.3	(X)	(X)	X	.018"	150 bar
HEMPALIN PRIMER 12050	t/u	Red	50410	75	40	12.3	(X)	(X)	X	.018"	150 bar
HEMPEL'S SILVIUM 51570	f/c	Light alu	19000	75	25	15.2	(X)	(X)	X	.017"	100 bar
t/u: touch up	f/c: full coat	Total d.f.t.			105		X: Recommended			(X): Possible	

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
12050	40	12050	4 Hrs	36 Hrs	6 Hrs	54 Hrs	8 Hrs	72 Hrs	16 Hrs	5 Day	N/R	N/R	N/R	N/R
12050	40	51570	4 Hrs	36 Hrs	6 Hrs	54 Hrs	8 Hrs	72 Hrs	16 Hrs	5 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification CH-1**
Area: **CARGO HOLDS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

HEMPEL'S SILVIUM 51570:
Spray application is recommended.
For brush application use a flat brush not more than 10 cm/4" wide. Do not dilute. After the paint has been laid on, it shold be distributed with light strokes and in one direction only. If the paint is worked too much with brush or roller, it will become streaky and greyish and loose its lustre. The effect is cosmetic only and has no influence on the protective properties.
Finish: At high temperatures HEMPEL'S SILVIUM 51570 will become greyish and loose its lustre. This effect is cosmetic only and has no influence on the protective properties.

Stripe coating before spray application of each coat is to be done on areas difficult to reach such as e.g. edges, corners, flanges and reverse sides. After lastl coat a "stipe coat" by spray (small, narrow angled nozzles) is to be given to all welds and free edges.

With this cargo hold coating system it is especially important that the specified film thickness is achieved all over and that a uniform film formation free of any pinholes and other defects is obtained for each coat applied.

Pit-corroded areas may call for an extra coat to fill out pittings.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion. However, for regular maintenance of old weathered alkyd topcoats thorough cleaning will usually be sufficient to establish acceptable intercoat adhesion. Where many maintenance coats have been applied, internal stresses may weaken the intercoat adhesion. Remove loosely adhering paint untill sound areas have been reached.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking cargo hold into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C Max. RH%
HEMPALIN PRIMER 12050	40760	49				2 h	38	410	08230	5
HEMPALIN PRIMER 12050	50410	49				2 h	38	410	08230	5
HEMPEL'S SILVIUM 51570	19000	38				5 h	38	500		5

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification CH-2
Area: CARGO HOLDS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPEL'S UNI-PRIMER 13140	t/u	Grey	12170	125	50	8.4	(X)	(X)	X	.019"-.023"	150 bar
HEMPEL'S UNI-PRIMER 13140	t/u	Red	51320	125	50	8.4	(X)	(X)	X	.019"-.023"	150 bar
HEMPALIN DANREX 52360	f/c	Red	50610	75	35	16.3	(X)	(X)	X	.018"-.021"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			135		X: Recommended			(X): Possible	

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
13140	50	13140	3 Hrs	None	5 Hrs	None	6 Hrs	None	12 Hrs	None	N/R	N/R	N/R	N/R
13140	50	52360	1 Hrs	36 Hrs	90 Min	54 Hrs	2 Hrs	72 Hrs	4 Hrs	5 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: MARINE MAINTENANCE Specification CH-2
Area: CARGO HOLDS

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

HEMPALIN DANREX 52360 may be thinned with THINNER 08080 for spray application, however with the risk of wrinkling of a preceeding fresh HEMPALIN coat.

Stripe coating before spray application of each coat is to be done on areas difficult to reach such as e.g. edges, corners, flanges and reverse sides. After lastl coat a "stipe coat" by spray (small, narrow angled nozzles) is to be given to all welds and free edges.

With this cargo hold coating system it is especially important that the specified film thickness is achieved all over and that a uniform film formation free of any pinholes and other defects is obtained for each coat applied.

Pit-corroded areas may call for an extra coat to fill out pittings.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion. However, for regular maintenance of old weathered alkyd topcoats thorough cleaning will usually be sufficient to establish acceptable intercoat adhesion. Where many maintenance coats have been applied, internal stresses may weaken the intercoat adhesion. Remove loosely adhering paint untill sound areas have been reached.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking cargo hold into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPEL'S UNI-PRIMER 13140	12170	42				2 h	30	520	08080	5	
HEMPEL'S UNI-PRIMER 13140	51320	42				2 h	30	515	08080	5	
HEMPALIN DANREX 52360	50610	57				6 h	38	360	08230	5	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification CH-3
Area: CARGO HOLDS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPALIN PRIMER 12050	t/u	Green	40760	75	40	12.3	(X)	(X)	X	.018"	150 bar
HEMPALIN PRIMER 12050	t/u	Red	50410	75	40	12.3	(X)	(X)	X	.018"	150 bar
HEMPALIN DANREX 52360	f/c	Red	50610	75	35	16.3	(X)	(X)	X	.018"-.021"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			115		X: Recommended			(X): Possible	

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
12050	40	12050	4 Hrs	36 Hrs	6 Hrs	54 Hrs	8 Hrs	72 Hrs	16 Hrs	5 Day	N/R	N/R	N/R	N/R
12050	40	52360	4 Hrs	36 Hrs	6 Hrs	54 Hrs	8 Hrs	72 Hrs	16 Hrs	5 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: MARINE MAINTENANCE Specification CH-3
Area: CARGO HOLDS

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

HEMPALIN DANREX 52360 may be thinned with THINNER 08080 for spray application, however with the risk of wrinkling of a preceeding fresh HEMPALIN coat.

Stripe coating before spray application of each coat is to be done on areas difficult to reach such as e.g. edges, corners, flanges and reverse sides. After lastl coat a "stipe coat" by spray (small, narrow angled nozzles) is to be given to all welds and free edges.

Pit-corroded areas may call for an extra coat to fill out pittings.

With this cargo hold coating system it is especially important that the specified film thickness is achieved all over and that a uniform film formation free of any pinholes and other defects is obtained for each coat applied.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion. However, for regular maintenance of old weathered alkyd topcoats thorough cleaning will usually be sufficient to establish acceptable intercoat adhesion. Where many maintenance coats have been applied, internal stresses may weaken the intercoat adhesion. Remove loosely adhering paint untill sound areas have been reached.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking cargo hold into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPALIN PRIMER 12050	40760	49				2 h	38	410	08230	5	
HEMPALIN PRIMER 12050	50410	49				2 h	38	410	08230	5	
HEMPALIN DANREX 52360	50610	57				6 h	38	360	08230	5	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification CH-4
Area: CARGO HOLDS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15130	t/u	Black	19990	175	125	5,6	(X)		X	.023"	200 bar
HEMPADUR 15130	t/u	Brown	60430	175	125	5,6	(X)		X	.023"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			250		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15130	125	15130	2 Hrs	19 Hrs	4 Hrs	32 Hrs	6 Hrs	48 Hrs	14 Hrs	5 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: MARINE MAINTENANCE Specification CH-4
Area: CARGO HOLDS

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Minimum dry film thickness for ballast holds is 2 x 150 micron/6 mils.

HEMPADUR 15130:
The temperature of the paint itself should preferably be above 15°C/59°F. Best results are obtained at surface and paint temperatures of 15-25°C/59-77°F.

The maximum recoating interval between layers of HEMPADUR 15130 can be doubled on the condition that the coating has not been exposed to sunlight, water/condensation, or to (other) contamination before recoating. Furthermore the surface of the first layer of HEMPADUR 15130 must be free of any exudations. This is secured by keeping the conditions of application, drying and curing, i.e. such as ventilation, temperature, film thickness and thinning within the described limits. Note that excessive temperatures also must be avoided.

Stripe coating before spray application of each coat is to be done on areas difficult to reach such as e.g. edges, corners, flanges and reverse sides. After last coat a "stripe coat" by spray (small, narrow angled nozzles) is to be given to all welds and free edges.

Pit-corroded areas may call for an extra coat to fill out pittings.

With this cargo hold coating system it is especially important that the specified film thickness is achieved all over and that a uniform film formation free of any pinholes and other defects is obtained for each coat applied.
However the maximum dry film thickness should not exceed two times the specified film thickness.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking cargo hold into use, allow paint film to dry and cure completely (including several days by strong ventilation).

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification CH-4**
Area: **CARGO HOLDS**

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15130	19990	70	95140	4 : 1	2 h	7 h	25	295	08450	5	
HEMPADUR 15130	60430	70	95140	4 : 1	2 h	7 h	25	300	08450	5	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification CH-5, summer version
Area: CARGO HOLDS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 45141	t/u	Redbrown	50630	200	125	4,8	(X)		X	.019"-.023"	250 bar
HEMPADUR 45141	t/u	Grey	12170	200	125	4,8	(X)		X	.019"-.023"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			250		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45141	125	45141	2 Hrs	None	4 Hrs	None	7 Hrs	None	18 Hrs	None	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification CH-5, summer version**
Area: **CARGO HOLDS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Minimum dry film thickness for ballast holds is 2 x 150 micron/6 mils.

HEMPADUR 45141:
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warm climates, the paint should be stored in a cool place. At paint temperatures below 15°C/59°F or in case of very long spray hoses, thinning may be necessary. This will cause lower film build and longer drying time. MIx the components thoroughly.
If the paint temperature, as an exception, is below approx. 10°C/50°F, allow the mixture to prereact 30 minutes before use.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 45141/3.

Stripe coating before spray application of each coat is to be done on areas difficult to reach such as e.g. edges, corners, flanges and reverse sides. After last coat a "stripe coat" by spray (small, narrow angled nozzles) is to be given to all welds and free edges.

With this cargo hold coating system it is especially important that the specified film thickness is achieved all over and that a uniform film formation free of any pinholes and other defects is obtained for each coat applied.
However the maximum dry film thickness should not exceed two times the specified film thickness.

Before taking cargo hold into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Pit-corroded areas may call for an extra coat to fill out pittings.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

In confined spaces provide adequate ventilation during application and drying.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 45141	50630	60	97820	3 : 1	2 h	7 h	25	385	08450	10	
HEMPADUR 45141	12170	60	97820	3 : 1	2 h	7 h	25	385	08450	10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification CH-5, winter version
Area: CARGO HOLDS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 45143	t/u	Redbrown	50630	200	125	4,8	(X)		X	.019"-.023"	250 bar
HEMPADUR 45143	t/u	Grey	12170	200	125	4,8	(X)		X	.019"-.023"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			250		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45143	125	45143	N/R	N/R	3 Hrs	None	4 Hrs	None	8 Hrs	None	18 Hrs	None	36 Hrs	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification CH-5, winter version**
Area: **CARGO HOLDS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Minimum dry film thickness for ballast holds is 2 x 150 micron/6 mils.

HEMPADUR 45143:
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. At paint temperatures below 15°C/59°F or in case of very long spray hoses, thinning may be necessary. This will cause lower film build and longer drying time. MIx the components thoroughly.
If the paint temperature, as an exception, is below approx. 10°C/50°F, allow the mixture to prereact 30 minutes before use.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 45141/3.

Pit-corroded areas may call for an extra coat to fill out pittings.

Stripe coating before spray application of each coat is to be done on areas difficult to reach such as e.g. edges, corners, flanges and reverse sides. After last coat a "stripe coat" by spray (small, narrow angled nozzles) is to be given to all welds and free edges.

With this cargo hold coating system it is especially important that the specified film thickness is achieved all over and that a uniform film formation free of any pinholes and other defects is obtained for each coat applied.
However the maximum dry film thickness should not exceed two times the specified film thickness.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking cargo hold into use, allow paint film to dry and cure completely (including several days by strong ventilation).

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification CH-5, winter version**
Area: **CARGO HOLDS**

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 45143	50630	60	97430	3 : 1	1 h	4 h	25	385	08450	-10	
HEMPADUR 45143	12170	60	97430	3 : 1	1 h	4 h	25	385	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification CH-6
Area: CARGO HOLDS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MASTIC 45880	t/u	Grey	12170	200	150	5,1	(X)	(X)	X	.017"-.023"	250 bar
HEMPADUR MASTIC 45880	t/u	Grey	11480	200	150	5,1	(X)	(X)	X	.017"-.023"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45880	150	45880	N/R	N/R	5 Hrs	None	7 Hrs	None	18 Hrs	None	42 Hrs	None	7 Day	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: MARINE MAINTENANCE Specification CH-6
Area: CARGO HOLDS

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR MASTIC 45880:
The temperature of the paint itself should be 15°C/59°F or above, but advantageously below approximately 30°C/86°F to secure proper application properties.
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warmer climates, the paint should be stored in a cool place.
In case the paint temperature is 15°C/59°F or below, allow the mixture to pre react before use.
In case of a paint temperature at 15°C/59°F, an induction time of 15 minutes is recommended. In case of a paint temperature at 10°C/50°F, an induction time of 25 minutes is recommend. In order to obtain proper application properties, the paint temperature should preferably never be below 10°C/50°F.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR MASTIC 45880.

Stripe coating before spray application of each coat is to be done on areas difficult to reach such as e.g. edges, corners, flanges and reverse sides. After last coat a "stripe coat" by spray (small, narrow angled nozzles) is to be given to all welds and free edges.

Pit-corroded areas may call for an extra coat to fill out pittings.

With this cargo hold coating system it is especially important that the specified film thickness is achieved all over and that a uniform film formation free of any pinholes and other defects is obtained for each coat applied.
However the maximum dry film thickness should not exceed two times the specified film thickness.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Not recommended for cargo holds of bulk carriers

Before taking cargo hold into use, allow paint film to dry and cure completely (including several days by strong ventilation).

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification CH-6**
Area: **CARGO HOLDS**

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MASTIC 45880	12170	77	95880	3 : 1	1 h	4 h	35	220	08450	-10	
HEMPADUR MASTIC 45880	11480	77	95880	3 : 1	1 h	4 h	35	220	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification CH-7
Area: CARGO HOLDS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Abrasive blasting to minimum Sa 2½. Grit blasted surface: Recommended surface profile corresponding to Rugotest No. 3, BN 10. Dust off residues..

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MULTI-STRENGTH 45753	t/u	Redbrown	50630	200	150	5,3	(X)		X	.021"-.023"	250 bar
HEMPADUR MULTI-STRENGTH 45753	t/u		12340	200	150	5,3	(X)		X	.021"-.023"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45753	150	45753	N/R	N/R	3 Hrs	23 Day	4 Hrs	30 Day	8 Hrs	60 Day	19 Hrs	90 Day	38 Hrs	90 Day

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification CH-7**
Area: **CARGO HOLDS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

If the working procedure calls for a blast primer use HEMPADUR 15591 in 40 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR MULTI-STRENGTH 45753:
The temperature of the paint itself should be above 15°C/59°F, preferably above 20°C/68°F for proper application.
Relative humidity maximium 90 %.

It is recommended to use heavy airless spray equipment with a pump transmission ratio of 60:1 (approximately), and a theoretical output of min. 12 litres per minute.

With this cargo hold coating system it is especially important that the specified film thickness is achieved all over and that a uniform film formation free of any pinholes and other defects is obtained for each coat applied.
However the maximum dry film thickness should not exceed two times the specified film thickness.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Stripe coating before spray application of each coat is to be done on areas difficult to reach such as e.g. edges, corners, flanges and reverse sides. After last coat a "stripe coat" by spray (small, narrow angled nozzles) is to be given to all welds and free edges.

Pit-corroded areas may call for an extra coat to fill out pittings.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking cargo hold into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MULTI-STRENGTH 45753	50630	79	98750	3 : 1	1 h	4 h	27	235	08450	-10	90
HEMPADUR MULTI-STRENGTH 45753	12340	79	98750	3 : 1	1 h	4 h	27	235	08450	-10	90

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification CH-8
Area: CARGO HOLDS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Abrasive blasting to minimum Sa 2½. Grit blasted surface: Recommended surface profile corresponding to Rugotest No. 3, BN 10. Dust off residues..

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MULTI-STRENGTH 45751	t/u	Redbrown	50630	200	150	5,3	X		X	.021"-.023"	250 bar
HEMPADUR MULTI-STRENGTH 45751	t/u		12340	200	150	5,3	X		X	.021"-.023"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45751	150	45751	80 Min	9 Day	2 Hrs	15 Day	4 Hrs	30 Day	11 Hrs	75 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification CH-8**
Area: **CARGO HOLDS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15590 in 40 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR MULTI-STRENGTH 45751:
The temperature of the paint itself should be above 15°C/59°F, preferably above 20°C/68°F for proper application.
Relative humidity maximium 90 %.

It is recommended to use heavy airless spray equipment with a pump transmission ratio of 60:1 (approximately), and a theoretical output of min. 12 litres per minute.

Do not store HEMPADUR MULTI-STRENGTH 45751 at temperatures above 45°C/113°F.

Stripe coating before spray application of each coat is to be done on areas difficult to reach such as e.g. edges, corners, flanges and reverse sides. After last coat a "stripe coat" by spray (small, narrow angled nozzles) is to be given to all welds and free edges.

Pit-corroded areas may call for an extra coat to fill out pittings.

With this cargo hold coating system it is especially important that the specified film thickness is achieved all over and that a uniform film formation free of any pinholes and other defects is obtained for each coat applied.
However the maximum dry film thickness should not exceed two times the specified film thickness.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking cargo hold into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MULTI-STRENGTH 45751	50630	79	97652	3 : 1	1 h	7 h	27	250	08450	10	90
HEMPADUR MULTI-STRENGTH 45751	12340	79	97652	3 : 1	1 h	7 h	27	250	08450	10	90

SYSTEM SELECTION

BALLAST TANKS

RECOMMENDED PAINTING SYSTEMS
BALLAST TANKS

			Surface preparation:
BT-1	HEMPEL'S BALLAST COAT SH 10880 HEMPEL'S BALLAST COAT SH 10880	175 micron / 7 mils 175 micron / 7 mils	**G**
BT-2	HEMPADUR 15130 HEMPADUR 15130	150 micron / 6 mils 150 micron / 6 mils	**C**
BT-3	HEMPADUR 17630 HEMPADUR 17630	150 micron / 6 mils 150 micron / 6 mils	**C**
BT-4	HEMPADUR 17630 HEMPADUR 17630 HEMPADUR 17630	150 micron / 6 mils 150 micron / 6 mils 150 micron / 6 mils	**C**
BT-5	HEMPADUR 45141/45143 HEMPADUR 45141/45143	150 micron / 6 mils 150 micron / 6 mils	**C**
BT-6	HEMPADUR 15570 HEMPADUR 15570 HEMPADUR 15570	100 micron / 4 mils 100 micron / 4 mils 100 micron / 4 mils	**C**

GENERAL NOTES: SURFACE PREPARATION

BALLAST TANKS

Type:	Description:
C	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot repairs) or abrasive blasted to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues. As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound and intact paint. Dust off residues. On pit-corroded surfaces excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.
G	Remove all oil and grease, mud and similar contaminants with suitable detergent followed by (high pressure) fresh water cleaning. Remove rust scale and loose coating material by abrasive blasting, power tool cleaning or water jetting to minimum Sa 1, St 2 or WJ-4 (NACE No. 5/SSPC-SP 12). Existing epoxy or coal tar epoxy system to be uniformly matted by grinding or abrasive sweep blasting. Dust off residues and allow the surface to dry. The durability of the system depends on the achieved degree of surface preparation. Insufficient removal of scale will result in later flaking.

RECOMMENDED PAINTING SPECIFICATIONS
BALLAST TANKS

System numbers			BT-1
Surface preparation grade			G
System description		**Theoretical**	
		Consumption m²/litre[1)]	**Dry film thickness micron/mils**
BT-1	HEMPEL'S BALLAST COAT SH 10880 HEMPEL'S BALLAST COAT SH 10880	3.0 3.0	175/7 175/7

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPEL'S BALLAST COAT SH 10880: 125-200 micron / 5-8 mils

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS
BALLAST TANKS

System numbers		BT-2, BT-3, BT-4	
Surface preparation grade		C	
System description		**Theoretical**	
		Consumption m²/litre[1)]	**Dry film thickness micron/mils**
BT-2	HEMPADUR 15130 HEMPADUR 15130	4.7 4.7	150/6 150/6
BT-3	HEMPADUR 17630 HEMPADUR 17630	4.5 4.5	150/6 150/6
BT-4	HEMPADUR 17630 HEMPADUR 17630 HEMPADUR 17630	4.5 4.5 4.5	150/6 150/6 150/6

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 15130:	125-200 micron / 5-8 mils
HEMPADUR 17630:	125-200 micron / 5-8 mils

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS
BALLAST TANKS

System numbers			BT-5, BT-6
Surface preparation grade			C
System description		**Theoretical**	
		Consumption m^2/litre[1)]	**Dry film thickness micron/mils**
BT-5	HEMPADUR 45141/45143	4.0	150/6
	HEMPADUR 45141/45143	4.0	150/6
BT-6	HEMPADUR 15570	5.4	100/4
	HEMPADUR 15570	5.4	100/4
	HEMPADUR 15570	5.4	100/4

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 15570:	50-125 micron / 2-5 mils
HEMPADUR 45141/45143:	125-175 micron / 5-7 mils

[1)]For conversion to sq.ft./US gallon please multiply by 40.74

WORKING SPECIFICATIONS

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BT-1
Area: BALLAST TANKS

Surface preparation:

Remove all oil and grease, mud and similar contaminants with suitable detergent followed by (high pressure) fresh water cleaning. Remove rust scale and loose coating material by abrasive blasting, power tool cleaning or water jetting to minimum Sa 1, St 2 or WJ-4 (NACE No. 5/SSPC-SP 12). Existing epoxy or coal tar epoxy system to be uniformly matted by grinding or abrasive sweep blasting. Dust off residues and allow the surface to dry. The durability of the system depends on the achieved degree of surface preparation. Insufficient removal of scale will result in later flaking.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPEL'S BALLAST COAT SH 10880	f/c	Black	19990	325	175	3.0	(X)		X	.021"-.025"	200 bar
HEMPEL'S BALLAST COAT SH 10880	f/c	Alu-bronze	19820	350	175	3.0	(X)		X	.021"-.025"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			350		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
10880	175	10880	8 Hrs	None	12 Hrs	None	16 Hrs	None	29 Hrs	None	48 Hrs	None	4 Day	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BT-1**
Area: **BALLAST TANKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

Ballast tanks may be filled when all painted surfaces are dry. It is recommended to ascertain the drying condition by a thorough inspection before filling.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPEL'S BALLAST COAT SH 10880	19990	53				16 h	38	375	08080		
HEMPEL'S BALLAST COAT SH 10880	19820	52				16 h	38	375	08080		

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BT-2
Area: BALLAST TANKS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15130	t/u	Black	19990	225	150	4.7	(X)		X	.023"	200 bar
HEMPADUR 15130	t/u	Brown	60430	225	150	4.7	(X)		X	.023"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15130	150	15130	3 Hrs	19 Hrs	5 Hrs	32 Hrs	8 Hrs	48 Hrs	17 Hrs	5 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BT-2**
Area: **BALLAST TANKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR 15130:
The temperature of the paint itself should preferably be above 15°C/59°F. Best results are obtained at surface and paint temperatures of 15-25°C/59-77°F.

The maximum recoating interval between layers of HEMPADUR 15130 can be doubled on the condition that the coating has not been exposed to sunlight, water/condensation, or to (other) contamination before recoating. Furthermore the surface of the first layer of HEMPADUR 15130 must be free of any exudations. This is secured by keeping the conditions of application, drying and curing, i.e. such as ventilation, temperature, film thickness and thinning within the described limits. Note that excessive temperatures also must be avoided.

Pit-corroded areas may call for an extra coat to fill out pittings.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking tank into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Reference is furthermore made to Hempel's Technical Standard for Ballast-tankcoating work and inspection.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15130	19990	70	95140	4 : 1	2 h	7 h	25	295	08450	5	
HEMPADUR 15130	60430	70	95140	4 : 1	2 h	7 h	25	300	08450	5	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BT-3
Area: BALLAST TANKS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 17630	t/u	Cream	20320	225	150	4,6	(X)		X	.019"-.023"	250 bar
HEMPADUR 17630	t/u	Grey	12170	225	150	4,6	(X)		X	.019"-.023"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
17630	150	17630	4 Hrs	15 Day	6 Hrs	21 Day	8 Hrs	30 Day	17 Hrs	65 Day	40 Hrs	90 Day	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BT-3**
Area: **BALLAST TANKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point be aware of ice on the surface.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 17630.

To facilitate proper application properties at steel temperatures below 5°C/41°F it is recommended to allow the thoroughly mixed BASE and CURING AGENT to prereact before application. In case two-component spray-equipment is used, paint material is to be heated. Consult separate APPLICATION INSTRUCTIONS.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking tank into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Reference is furthermore made to Hempel's Technical Standard for Ballast-tankcoating work and inspection.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 17630	20320	69	97330	4 : 1	2 h	7 h	32	08450	0	
HEMPADUR 17630	12170	69	97330	4 : 1	2 h	7 h	32	08450	0	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BT-4
Area: BALLAST TANKS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 17630	t/u	Cream	20320	225	150	4,6	(X)		X	.019"-.023"	250 bar
HEMPADUR 17630	t/u	Grey	12170	225	150	4,6	(X)		X	.019"-.023"	250 bar
HEMPADUR 17630	t/u	Cream	20320	225	150	4,6	(X)		X	.019"-.023"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			450		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
17630	150	17630	4 Hrs	15 Day	6 Hrs	21 Day	8 Hrs	30 Day	17 Hrs	65 Day	40 Hrs	90 Day	N/R	N/R
17630	150	17630	4 Hrs	15 Day	6 Hrs	21 Day	8 Hrs	30 Day	17 Hrs	65 Day	40 Hrs	90 Day	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BT-4**
Area: **BALLAST TANKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point be aware of ice on the surface.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 17630.

To facilitate proper application properties at steel temperatures below 5°C/41°F it is recommended to allow the thoroughly mixed BASE and CURING AGENT to prereact before application. In case two-component spray-equipment is used, paint material is to be heated. Consult separate APPLICATION INSTRUCTIONS.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking tank into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Reference is furthermore made to Hempel's Technical Standard for Ballast-tankcoating work and inspection.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 17630	20320	69	97330	4 : 1	2 h	7 h	32	08450	0	
HEMPADUR 17630	12170	69	97330	4 : 1	2 h	7 h	32	08450	0	
HEMPADUR 17630	20320	69	97330	4 : 1	2 h	7 h	32	08450	0	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BT-5, summer version
Area: BALLAST TANKS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 45141	t/u	Redbrown	50630	250	150	4.0	(X)		X	.019"-.023"	250 bar
HEMPADUR 45141	t/u	Grey	12170	250	150	4.0	(X)		X	.019"-.023"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended			(X): Possible	

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45141	150	45141	4 Hrs	9 Day	6 Hrs	15 Day	12 Hrs	30 Day	30 Hrs	75 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: MARINE MAINTENANCE Specification BT-5, summer version
Area: BALLAST TANKS

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR 45141:
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warm climates, the paint should be stored in a cool place. At paint temperatures below 15°C/59°F or in case of very long spray hoses, thinning may be necessary. This will cause lower film build and longer drying time. MIx the components thoroughly.
If the paint temperature, as an exception, is below approx. 10°C/50°F, allow the mixture to prereact 30 minutes before use.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 45141/3.

Pit-corroded areas may call for an extra coat to fill out pittings.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking tank into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Reference is furthermore made to Hempel's Technical Standard for Ballast-tankcoating work and inspection.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 45141	50630	60	97820	3 : 1	2 h	7 h	25	385	08450	10	
HEMPADUR 45141	12170	60	97820	3 : 1	2 h	7 h	25	385	08450	10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BT-5, winter version
Area: BALLAST TANKS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 45143	t/u	Redbrown	50630	250	150	4.0	(X)		X	.019"-.023"	250 bar
HEMPADUR 45143	t/u	Grey	12170	250	150	4.0	(X)		X	.019"-.023"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended			(X): Possible	

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45143	150	45143	N/R	N/R	5 Hrs	23 Day	6 Hrs	30 Day	12 Hrs	60 Day	27 Hrs	90 Day	54 Hrs	90 Day

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BT-5, winter version**
Area: **BALLAST TANKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR 45143:
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. At paint temperatures below 15°C/59°F or in case of very long spray hoses, thinning may be necessary. This will cause lower film build and longer drying time. MIx the components thoroughly.
If the paint temperature, as an exception, is below approx. 10°C/50°F, allow the mixture to prereact 30 minutes before use.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 45141/3.

Pit-corroded areas may call for an extra coat to fill out pittings.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking tank into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Reference is furthermore made to Hempel's Technical Standard for Ballast-tankcoating work and inspection.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 45143	50630	60	97430	3 : 1	1 h	4 h	25	385	08450	-10	
HEMPADUR 45143	12170	60	97430	3 : 1	1 h	4 h	25	385	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification BT-6
Area: BALLAST TANKS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15570	t/u	Grey	12170	200	100	5.4	(X)		X	.019"-.021"	175 bar
HEMPADUR 15570	t/u	Redbrown	50630	200	100	5.4	(X)		X	.019"-.021"	175 bar
HEMPADUR 15570	t/u	Grey	12170	200	100	5.4	(X)		X	.019"-.021"	175 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15570	100	15570	N/R	N/R	6 Hrs	23 Day	8 Hrs	30 Day	16 Hrs	60 Day	36 Hrs	90 Day	72 Hrs	90 Day
15570	100	15570	N/R	N/R	6 Hrs	23 Day	8 Hrs	30 Day	16 Hrs	60 Day	36 Hrs	90 Day	72 Hrs	90 Day

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification BT-6**
Area: **BALLAST TANKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 15570.

The temperature of the paint itself should be 15°C/59°F or above.

HEMPADUR 15570 is also well suited for damp or moist surfaces.
Damp surfaces: Water is not readily detectable, but the temperature of the surface is below the dew point.
Moist surfaces: Pools of water and droplets have been removed, but there is a noticable film of water.

Pit-corroded areas may call for an extra coat to fill out pittings.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking tank into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Reference is furthermore made to Hempel's Technical Standard for Ballast-tankcoating work and inspection.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15570	12170	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	
HEMPADUR 15570	50630	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	
HEMPADUR 15570	12170	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	

SYSTEM SELECTION

FRESH WATER TANKS

RECOMMENDED PAINTING SYSTEMS
FRESH WATER TANKS

			Surface preparation:
FW-1	HEMPADUR 15100 HEMPADUR 15100	150 micron / 6 mils 150 micron / 6 mils	**H**
FW-2	HEMPADUR MULTI-STRENGTH 35530 HEMPADUR MULTI-STRENGTH 35530	300 micron / 12 mils 200 micron / 8 mils	**I**
FW-3	HEMPADUR 85671 HEMPADUR 85671 HEMPADUR 85671	100 micron / 4 mils 100 micron / 4 mils 100 micron / 4 mils	**J**

GENERAL NOTES: SURFACE PREPARATION

FRESH WATER TANKS

Type:	Description:
H	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot repairs) or abrasive blasted to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues.
I	Abrasive blasting to min. Sa 2½. Surface profile corresponding to Rugotest No. 3, BN 11, Keane-Tator Comparator, 5.5 G/S, or ISO Comparator Coarse (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust. On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasivbe blasting again, alternatively water jetting followed by abrasive blasting
J	Abrasive blasting to very near metal Sa 2½ - Sa 3. Surface profile corresponding to Rugotest No. 3, BN 10a, Keane-Tator Comparator, 3.0 G/S, or ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust. On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again, alternatively water jetting followed by abrasive blasting.

RECOMMENDED PAINTING SPECIFICATIONS
FRESH WATER TANKS

System numbers		FW-1, FW-2	
Surface preparation grade		H	I
System description		**Theoretical**	
		Consumption m²/litre[1)]	**Dry film thickness micron/mils**
FW-1	HEMPADUR 15100 HEMPADUR 15100	3.8 3.8	150/6 150/6
FW-2	HEMPADUR MULTI-STRENGTH 35530 HEMPADUR MULTI-STRENGTH 35530	3.3 5.0	300/12 200/8

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 15100:	125-200 micron/5-8 mils
HEMPADUR MULTI-STRENGTH 35530:	200-300 micron/8-12 mils

HEMPADUR 15100:
Not suited for potable water tanks.

[1)] For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS
FRESH WATER TANKS

System numbers			FW-3
Surface preparation grade			J
System description		**Theoretical**	
		Consumption m²/litre[1)]	**Dry film thickness micron/mils**
FW-3	HEMPADUR 85671 HEMPADUR 85671 HEMPADUR 85671	6.8 6.8 6.8	100/4 100/4 100/4

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 85671: 100-125 micron/4-5 mils

[1)] For conversion to sq.ft./US gallon please multiply by 40.74

WORKING SPECIFICATIONS

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification FW-1
Area: FRESH WATER TANKS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15100	t/u	Black	19990	275	150	3.7	(X)		X	.023"	200 bar
HEMPADUR 15100	t/u	Brown	60420	275	150	3.7	(X)		X	.023"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15100	150	15100	80 Min	11 Hrs	2 Hrs	18 Hrs	4 Hrs	36 Hrs	11 Hrs	4 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification FW-1**
Area: **FRESH WATER TANKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

With this few coat paint system it is especially important that the specified minimum film thickness is achieved all over for each coat applied..

Pit-corroded areas may call for an extra coat to fill out pittings.

The maximum recoating interval can be prolonged to 4 days at 20°C/68°F on the condition that the coating has not been exposed to sunlight, water/condensation or to (other) contamination before recoating. Furthermore, the surface of the first coat of HEMPADUR 15100 must be free of any exudations. This is secured by keeping the conditions of application, drying and curing, ie such as ventilation, temperature, film thickness and thinning within the described limits. Note that excessive temperature during application/curing also must be avoided.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking tank into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15100	19990	55	95100	4 : 1	2 h	6 h	13	390	08450	10	
HEMPADUR 15100	60420	55	95100	4 : 1	2 h	6 h	13	390	08450	10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification FW-2
Area: FRESH WATER TANKS

Surface preparation:

Abrasive blasting to min. Sa. 2½. Surface profile corresponding to Rugotest No. 3, BN 11, Keane-Tator Comparator, 5.5 G/S, or ISO Comparator Coarse (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust.
On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again, alternatively water jetting followed by abrasive blasting.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MULTI-STRENGTH 35530	t/u	Red	51320	300	300	3.3	(X)		X	.019"-.031"	250 bar
HEMPADUR MULTI-STRENGTH 35530	t/u	Grey	10500	200	200	5.0	(X)		X	.019"-.031"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			500		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
35530	300	35530	7 Hrs	36 Hrs	12 Hrs	60 Hrs	24 Hrs	5 Day	60 Hrs	13 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification FW-2**
Area: **FRESH WATER TANKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

With this few coat paint system it is especially important that the specified minimum film thickness is achieved all over for each coat applied..

Pit-corroded areas may call for an extra coat to fill out pittings.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR MULTI-STRENGTH 35530.

Mix and stir the two components until an even colour is achieved, whenafter the paint is ready for use.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Do not put tank into service before the coating is properly cured. When cured but before taking tank into use for potable water, fill twice with water, each time for a period of not less than 24 hours, and finally flush with fresh water. Alternatively hose down with warm fresh water (max. 50°C/122°F). Such cleaning may be subject to local/individual specification or regulation.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MULTI-STRENGTH 35530	51320	100	95530	3 : 1	1 h	24 h	100	0		10	85
HEMPADUR MULTI-STRENGTH 35530	10500	100	95530	3 : 1	1 h	24 h	100	0		10	85

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification FW-3
Area: FRESH WATER TANKS

Surface preparation:

Abrasive blasting to very near to white metal Sa 2½ - Sa 3. Surface profile corresponding to Rugotest No. 3, BN 10a, Keane-Tator Comparator, 3.0 G/S, or ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust.
On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again, alternatively water jetting followed by abrasive blasting.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 85671	t/u	Off-white	11630	150	100	6.8	(X)		X	.018"-.021"	200 bar
HEMPADUR 85671	t/u	Light red	50900	150	100	6.8	(X)		X	.018"-.021"	200 bar
HEMPADUR 85671	t/u	Off-white	11630	150	100	6.8	(X)		X	.018"-.021"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
85671	100	85671	22 Hrs	6 Day	36 Hrs	11 Day	72 Hrs	21 Day	8 Day	53 Day	N/R	N/R	N/R	N/R
85671	100	85671	22 Hrs	6 Day	36 Hrs	11 Day	72 Hrs	21 Day	8 Day	53 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification FW-3**
Area: **FRESH WATER TANKS**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

The steel temperature must never drop below the limit until full curing has taken place.
The temperature of the paint itself must be above 15°C/59°F, best results are obtained at 17-23°C/62-73°F.

Relative humidity max. 80 %, preferably 40-60%.

The thoroughly mixed BASE and CURING AGENT must be prereacted before application (15 minutes at 20°C/68°F), at other temperatures, please see APPLICATION INSTRUCTIONS.

Keep thinnnig at an absolute minimum. Do not dilute the components separately - only the mixture.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 85671.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 85671	11630	68	97371	8.8 : 1.2	3 h	6 h	24	320	08450	10	80
HEMPADUR 85671	50900	68	97371	8.8 : 1.2	3 h	6 h	24	320	08450	10	80
HEMPADUR 85671	11630	68	97371	8.8 : 1.2	3 h	6 h	24	320	08450	10	80

SYSTEM SELECTION

CARGO TANKS

RECOMMENDED PAINTING SYSTEMS
CARGO TANKS

			Surface preparation:
CT-1	HEMPADUR 15130 HEMPADUR 15130	175 micron / 7 mils 175 micron / 7 mils	**C**
CT-2	HEMPADUR 15400 HEMPADUR 15400 HEMPADUR 15400	80 micron / 3.2 mils 80 micron / 3.2 mils 80 micron / 3.2 mils	**L**
CT-3	HEMPADUR 15500 HEMPADUR 15500 HEMPADUR 15500	100 micron / 4 mils 100 micron / 4 mils 100 micron / 4 mils	**J**
CT-4	HEMPEL'S GALVOSIL 15700	100 micron / 4 mils	**J**

GENERAL NOTES: SURFACE PREPARATION

CARGO TANKS

Type:	Description:
C	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot repairs) or abrasive blasted to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues. As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/ SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound and intact paint. Dust off residues. On pit-corroded surfaces excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternativelý dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.
L	Abrasive blasting to minimum Sa 2½. Surface profile corresponding to Rugotest No. 3, BN 10, Keane-Tator Comparator, 3.0 G/S, or ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust. On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again, alternatively water jetting followed by abrasive blasting.
J	Abrasive blasting to very near metal Sa 2½ - Sa 3. Surface profile corresponding to Rugotest No. 3, BN 10a, Keane-Tator Comparator, 3.0 G/S, or ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust. On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again, alternatively water jetting followed by abrasive blasting.

RECOMMENDED PAINTING SPECIFICATIONS CARGO TANKS

System numbers			CT-1
Surface preparation grade			C
System description		**Theoretical**	
		Consumption m²/litre[1)]	**Dry film thickness micron/mils**
CT-1	HEMPADUR 15130 HEMPADUR 15130	4.0 4.0	175/7 mils 175/7 mils

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 15130: 125-200 micron/5-8 mils

The natural tendency of epoxy coatings to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in this product.

[1)] For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS CARGO TANKS

System numbers		CT-2, CT-3, CT-4	
Surface preparation grade		L J J	
System description		**Theoretical**	
		Consumption m²/litre[1)]	**Dry film thickness micron/mils**
CT-2	HEMPADUR 15400 HEMPADUR 15400 HEMPADUR 15400	6.0 6.0 6.0	80/3.2 80/3.2 80/3.2
CT-3	HEMPADUR 15500 HEMPADUR 15500 HEMPADUR 15500	6.8 6.8 6.8	100/4 100/4 100/4
CT-4	HEMPEL'S GALVOSIL 15700	6.4	100/4

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 15400:	80-125 micron/3.2-5 mils
HEMPADUR 15500:	100-125 micron/4-5 mils
HEMPEL'S GALVOSIL 15700:	100-125 micron/4-5 mils

HEMPADUR 15400, HEMPADUR 15500:
The natural tendency of epoxy coatings to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in these products.

[1)] For conversion to sq.ft./US gallon please multiply by 40.74

WORKING SPECIFICATIONS

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification CT-1
Area: CARGO TANKS

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15130	t/u	Black	19990	250	175	4.0	(X)		X	.023"	200 bar
HEMPADUR 15130	t/u	Brown	60430	250	175	4.0	(X)		X	.023"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			350		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15130	175	15130	4 Hrs	19 Hrs	6 Hrs	32 Hrs	9 Hrs	48 Hrs	21 Hrs	5 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification CT-1**
Area: **CARGO TANKS**

Remarks:

The surface must be completely clean and dry with a temperature above to dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR 15130:
The temperature of the paint itself should preferably be above 15°C/59°F. Best results are obtained at surface and paint temperatures of 15-25°C/59-77°F.

The maximum recoating interval between layers of HEMPADUR 15130 can be doubled on the condition that the coating has not been exposed to sunlight, water/condensation, or to (other) contamination before recoating. Furthermore the surface of the first layer of HEMPADUR 15130 must be free of any exudations. This is secured by keeping the conditions of application, drying and curing, i.e. such as ventilation, temperature, film thickness and thinning within the described limits. Note that excessive temperatures also must be avoided.

Pit-corroded areas may call for an extra coat to fill out pittings.

In confined spaces provide adequate ventilation during application and drying.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking tank into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15130	19990	70	95140	4 : 1	2 h	7 h	25	295	08450	5	
HEMPADUR 15130	60430	70	95140	4 : 1	2 h	7 h	25	300	08450	5	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification CT-2
Area: CARGO TANKS

Surface preparation:

Abrasive blasting to min. Sa 2½. Surface profile corresponding to Rugotest No. 3, BN 10, Keane-Tator Comparator, 3.0 G/S, or ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust.
On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again, alternatively water jetting followed by abrasive blasting.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15400	f/c	White	10000	175	80	6.0	(X)		X	.021"	200 bar
HEMPADUR 15400	f/c	Light red	50900	175	80	6.0	(X)		X	.021"	200 bar
HEMPADUR 15400	f/c	White	10000	175	80	6.0	(X)		X	.021"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			240		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15400	80	15400	3 Hrs	6 Day	5 Hrs	11 Day	10 Hrs	21 Day	25 Hrs	53 Day	N/R	N/R	N/R	N/R
15400	80	15400	3 Hrs	6 Day	5 Hrs	11 Day	10 Hrs	21 Day	25 Hrs	53 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification CT-2**
Area: **CARGO TANKS**

Remarks:

The surface must be completely clean and dry with a temperature above to dew point to avoid condensation.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

The temperature of the surface and of the paint itself must be above 10°C/50 °F.
Optimal spraying properties are obtained at paint temperatures of 15-25°C/59-76°F.

Relative humidity max. 80 %, preferably 40-60%.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 15400.

Do not put tank into service until the paint system is completely cured - consult the corresponding CARGO PROTECTION GUIDE and APPLICATION INSTRUCTIONS.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15400	10000	48	95100	4 : 1	2 h	8 h	26	465	08450	10	80
HEMPADUR 15400	50900	48	95100	4 : 1	2 h	8 h	26	465	08450	10	80
HEMPADUR 15400	10000	48	95100	4 : 1	2 h	8 h	26	465	08450	10	80

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification CT-3
Area: CARGO TANKS

Surface preparation:

Abrasive blasting to very near to white metal Sa 2½ - Sa 3. Surface profile corresponding to Rugotest No. 3, BN 10a, Keane-Tator Comparator, 3.0 G/S, or ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust.
On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again, alternatively water jetting followed by abrasive blasting.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15500	f/c	Off-white	11630	150	100	6.8	(X)		X	.018"-.021"	200 bar
HEMPADUR 15500	f/c	Light red	50900	150	100	6.8	(X)		X	.018"-.021"	200 bar
HEMPADUR 15500	f/c	Off-white	11630	150	100	6.8	(X)		X	.018"-.021"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended			(X): Possible	

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15500	100	15500	11 Hrs	6 Day	18 Hrs	11 Day	36 Hrs	21 Day	4 Day	53 Day	N/R	N/R	N/R	N/R
15500	100	15500	7 Hrs	6 Day	12 Hrs	11 Day	24 Hrs	21 Day	60 Hrs	53 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: MARINE MAINTENANCE Specification CT-3
Area: CARGO TANKS

Remarks:

The surface must be completely clean and dry with a temperature above to dew point to avoid condensation.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

The steel temperature must never drop below the limit until full curing has taken place.
The temperature of the paint itself must be above 15°C/59°F, best results are obtained at 17-23°C/62-73°F.

Relative humidity max. 80 %, preferably 40-60%.

The thoroughly mixed BASE and CURING AGENT must be prereacted before application (15 minutes at 20°C/68°F), at other temperatures, please see APPLICATION INSTRUCTIONS.

Keep thinnnig at an absolute minimum. Do not dilute the components separately - only the mixture.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 15500.

Resistance to the widest range of cargoes is provided by additional heat curing, see APPLICATION INSTRUCTIONS and CARGO PROTECTION GUIDE.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15500	11630	68	97580	8.9 : 1.1	3 h	6 h	26	325	08450	10	80
HEMPADUR 15500	50900	68	97580	8.9 : 1.1	3 h	6 h	26	325	08450	10	80
HEMPADUR 15500	11630	68	97580	8.9 : 1.1	3 h	6 h	26	325	08450	10	80

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: **MARINE MAINTENANCE Specification CT-4**
Area: **CARGO TANKS**

Surface preparation:

Abrasive blasting to very near to white metal Sa 2½ - Sa 3. Surface profile corresponding to Rugotest No. 3, BN 10a, Keane-Tator Comparator, 3.0 G/S, or ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust.
On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again, alternatively water jetting followed by abrasive blasting.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPEL'S GALVOSIL 15700	f/c	Metal grey	19840	150	100	6.4	(X)		X	.019"-.023"	100 bar
t/u: touch up	f/c: full coat	Total d.f.t.			100		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification CT-4**
Area: **CARGO TANKS**

Remarks:

The surface must be completely clean and dry with a temperature above to dew point to avoid condensation.
At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.
Curing needs minimum 65% relative humidity.
Consult the separate APPLICATION INSTRUCTION for HEMPEL'S GALVOSIL 15700.
In confined spaces provide adequate ventilation during application and drying.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPEL'S GALVOSIL 15700	19840	64	97170	7.4 : 2.6	8 h	30 min	14	535	08700	-10	

SYSTEM SELECTION

FUEL OIL TANKS, BILGES & WELLS, ETC.

RECOMMENDED PAINTING SYSTEMS
FUEL OIL TANKS, BILGES & WELLS, ETC.

			Surface preparation:
FT-1	HEMPADUR 15130 HEMPADUR 15130	125 micron / 5 mils 125 micron / 5 mils	**C**
FT-2	HEMPADUR 15570 HEMPADUR 15570 HEMPADUR 15570	80 micron / 3.2 mils 80 micron / 3.2 mils 80 micron / 3.2 mils	**C**
FT-3	HEMPADUR 15400 HEMPADUR 15400 HEMPADUR 15400	80 micron / 3.2 mils 80 micron / 3.2 mils 80 micron / 3.2 mils	**L**
FT-4	HEMPADUR 15500 HEMPADUR 15500 HEMPADUR 15500	100 micron / 4 mils 100 micron / 4 mils 100 micron / 4 mils	**J**

GENERAL NOTES: SURFACE PREPARATION

FUEL OIL TANKS, BILGES & WELLS, ETC.

Type:	Description:
C	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot repairs) or abrasive blasted to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues. As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/ SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound and intact paint. Dust off residues. On pit-corroded surfaces excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternativelý dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.
L	Abrasive blasting to minimum Sa 2½. Surface profile corresponding to Rugotest No. 3, BN 10, Keane-Tator Comparator, 3.0 G/S, or ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust. On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again, alternatively water jetting followed by abrasive blasting.
J	Abrasive blasting to very near metal Sa 2½ - Sa 3. Surface profile corresponding to Rugotest No. 3, BN 10a, Keane-Tator Comparator, 3.0 G/S, or ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust. On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again, alternatively water jetting followed by abrasive blasting.

RECOMMENDED PAINTING SPECIFICATIONS
FUEL OIL TANKS, BILGES & WELLS, ETC.

System numbers			FT-1, FT-2
Surface preparation grade			C
System description		**Theoretical**	
		Consumption m²/litre[1)]	**Dry film thickness micron/mils**
FT-1	HEMPADUR 15130 HEMPADUR 15130	5.6 5.6	125/5 125/5
FT-2	HEMPADUR 15570 HEMPADUR 15570 HEMPADUR 15570	6.8 6.8 6.8	80/3.2 80/3.2 80/3.2

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 15130:	125-200 micron/5-8 mils
HEMPADUR 15570:	50-125 micron/2-5 mils

The natural tendency of epoxy coatings to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in these products.

HEMPADUR 15570:
Only suited for a limited number of hydralic oils. Before specifying for hydralic oil tanks obtain specification of the hydralic oil and check with nearest Hempel office.

[1)] For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS FUEL OIL TANKS, BILGES AND WELLS, ETC.

System numbers			FT-3, FT-4
Surface preparation grade			L J
System description		**Theoretical**	
		Consumption m²/litre[1)]	**Dry film thickness micron/mils**
FT-3	HEMPADUR 15400 HEMPADUR 15400 HEMPADUR 15400	6.0 6.0 6.0	80/3.2 80/3,2 80/3.2
FT-4	HEMPADUR 15500 HEMPADUR 15500 HEMPADUR 15500	6.8 6.8 6.8	100/4 100/4 100/4

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 15400: 80-125 micron/3.2-5 mils
HEMPADUR 15500: 100-125 micron/4-5 mils

HEMPADUR 15400 and HEMPADUR 15500:
The natural tendency of epoxy coatings to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in these products.

[1)] For conversion to sq.ft./US gallon please multiply by 40.74

WORKING SPECIFICATIONS

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification FT-1
Area: FUEL OIL TANKS, BILGES & WELLS, ETC.

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15130	t/u	Black	19990	175	125	5.6	(X)		X	.023"	200 bar
HEMPADUR 15130	t/u	Brown	60430	175	125	5.6	(X)		X	.023"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			250		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15130	125	15130	2 Hrs	19 Hrs	4 Hrs	32 Hrs	6 Hrs	48 Hrs	14 Hrs	5 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification FT-1**
Area: **FUEL OIL TANKS, BILGES & WELLS, ETC.**

Remarks:

The surface must be completely clean and dry with a temperature above to dew point to avoid condensation.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR 15130:
The temperature of the paint itself should preferably be above 15°C/59°F. Best results are obtained at surface and paint temperatures of 15-25°C/59-77°F.

The maximum recoating interval between layers of HEMPADUR 15130 can be doubled on the condition that the coating has not been exposed to sunlight, water/condensation, or to (other) contamination before recoating. Furthermore the surface of the first layer of HEMPADUR 15130 must be free of any exudations. This is secured by keeping the conditions of application, drying and curing, i.e. such as ventilation, temperature, film thickness and thinning within the described limits. Note that excessive temperatures also must be avoided.

Pit-corroded areas may call for an extra coat to fill out pittings.

In confined spaces provide adequate ventilation during application and drying.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking tank into use, allow paint film to dry and cure completely (including several days by strong ventilation).

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15130	19990	70	95140	4 : 1	2 h	7 h	25	295	08450	5	
HEMPADUR 15130	60430	70	95140	4 : 1	2 h	7 h	25	300	08450	5	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification FT-2
Area: FUEL OIL TANKS, BILGES & WELLS, ETC.

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of FR-2, preferably FR-1 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15570	f/c	Grey	12170	150	80	6.8	(X)		X	.019"-.021"	175 bar
HEMPADUR 15570	f/c	Redbrown	50630	150	80	6.8	(X)		X	.019"-.021"	175 bar
HEMPADUR 15570	f/c	Grey	12170	150	80	6.8	(X)		X	.019"-.021"	175 bar
t/u: touch up	f/c: full coat	Total d.f.t.			240		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15570	80	15570	N/R	N/R	5 Hrs	23 Day	6 Hrs	30 Day	12 Hrs	60 Day	27 Hrs	90 Day	55 Hrs	90 Day
15570	80	15570	N/R	N/R	5 Hrs	23 Day	6 Hrs	30 Day	12 Hrs	60 Day	27 Hrs	90 Day	55 Hrs	90 Day

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification FT-2**
Area: **FUEL OIL TANKS, BILGES & WELLS, ETC.**

Remarks:

The surface must be completely clean and dry with a temperature above to dew point to avoid condensation.

At the freezing point and below be aware of the risk of ice on the surface, which will hinder the adhesion.

If the working procedure calls for a blast primer use HEMPADUR 15570 in 50 micron dry.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 15570.

The temperature of HEMPADUR 15570 should be 15°C/60°F or above to secure proper application properties.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

In confined spaces provide adequate ventilation during application and drying.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Before taking tank into use, allow paint film to dry and cure completely (including several days by strong ventilation).

HEMPADUR 15570 is also well suited for damp or moist surfaces.
Damp surfaces: Water is not readily detectable, but the temperature of the surface is below the dew point.
Moist surfaces: Pools of water and droplets have been removed, but there is a noticable film of water.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15570	12170	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	
HEMPADUR 15570	50630	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	
HEMPADUR 15570	12170	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification FT-3
Area: FUEL OIL TANKS, BILGES & WELLS, ETC.

Surface preparation:

Abrasive blasting to min. Sa 2½. Surface profile corresponding to Rugotest No. 3, BN 10, Keane-Tator Comparator, 3.0 G/S, or ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust.
On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again, alternatively water jetting followed by abrasive blasting.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15400	f/c	White	10000	175	80	6.0	(X)		X	.021"	200 bar
HEMPADUR 15400	f/c	Light red	50900	175	80	6.0	(X)		X	.021"	200 bar
HEMPADUR 15400	f/c	White	10000	175	80	6.0	(X)		X	.021"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			240		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15400	80	15400	3 Hrs	6 Day	5 Hrs	11 Day	10 Hrs	21 Day	25 Hrs	53 Day	N/R	N/R	N/R	N/R
15400	80	15400	3 Hrs	6 Day	5 Hrs	11 Day	10 Hrs	21 Day	25 Hrs	53 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification FT-3**
Area: **FUEL OIL TANKS, BILGES & WELLS, ETC.**

Remarks:

The surface must be completely clean and dry with a temperature above to dew point to avoid condensation.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

The temperature of the surface and of the paint itself must be above 10°C/50 °F.
Optimal spraying properties are obtained at paint temperatures of 15-25°C/59-76°F.

Relative humidity max. 80 %, preferably 40-60%.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 15400.

Do not put tank into service until the paint system is completely cured - consult the corresponding CARGO PROTECTION GUIDE and APPLICATION INSTRUCTIONS.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15400	10000	48	95100	4 : 1	2 h	8 h	26	465	08450	10	80
HEMPADUR 15400	50900	48	95100	4 : 1	2 h	8 h	26	465	08450	10	80
HEMPADUR 15400	10000	48	95100	4 : 1	2 h	8 h	26	465	08450	10	80

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification FT-4
Area: FUEL OIL TANKS, BILGES & WELLS, ETC.

Surface preparation:

Abrasive blasting to very near to white metal Sa 2½ - Sa 3. Surface profile corresponding to Rugotest No. 3, BN 10a, Keane-Tator Comparator, 3.0 G/S, or ISO Comparator Rough Medium (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust.
On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again, alternatively water jetting followed by abrasive blasting.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15500	f/c	Off-white	11630	150	100	6.8	(X)		X	.018"-.021"	200 bar
HEMPADUR 15500	f/c	Light red	50900	150	100	6.8	(X)		X	.018"-.021"	200 bar
HEMPADUR 15500	f/c	Off-white	11630	150	100	6.8	(X)		X	.018"-.021"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			300		X: Recommended			(X): Possible	

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15500	100	15500	11 Hrs	6 Day	18 Hrs	11 Day	36 Hrs	21 Day	4 Day	53 Day	N/R	N/R	N/R	N/R
15500	100	15500	7 Hrs	6 Day	12 Hrs	11 Day	24 Hrs	21 Day	60 Hrs	53 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification FT-4**
Area: **FUEL OIL TANKS, BILGES & WELLS, ETC.**

Remarks:

The surface must be completely clean and dry with a temperature above to dew point to avoid condensation.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

The steel temperature must never drop below the limit until full curing has taken place.
The temperature of the paint itself must be above 15°C/59°F, best results are obtained at 17-23°C/62-73°F.

Relative humidity max. 80 %, preferably 40-60%.

The thoroughly mixed BASE and CURING AGENT must be prereacted before application (15 minutes at 20°C/68°F), at other temperatures, please see APPLICATION INSTRUCTIONS.

Keep thinnnig at an absolute minimum. Do not dilute the components separately - only the mixture.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 15500.

Resistance to the widest range of cargoes is provided by additional heat curing, see APPLICATION INSTRUCTIONS and CARGO PROTECTION GUIDE.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15500	11630	68	97580	8.9 : 1.1	3 h	6 h	26	325	08450	10	80
HEMPADUR 15500	50900	68	97580	8.9 : 1.1	3 h	6 h	26	325	08450	10	80
HEMPADUR 15500	11630	68	97580	8.9 : 1.1	3 h	6 h	26	325	08450	10	80

SYSTEM SELECTION

DECKHEADS, BULKHEADS IN ENGINE ROOMS, ETC.

RECOMMENDED PAINTING SYSTEMS
DECKHEADS, BULKHEADS IN ENGINE ROOMS, ETC.

			Surface preparation:
ER-1	HEMPALIN PRIMER 12050 HEMPALIN ENAMEL 52140 HEMPALIN ENAMEL 52140	40 micron / 1.6 mils 30 micron / 1.2 mils 30 micron / 1.2 mils	**A**
ER-2	HEMPADUR 15130 HEMPADUR 15130	125 micron / 5 mils 125 micron / 5 mils	**B**
ER-3	HEMPADUR 15570 HEMPADUR 15570	100 micron / 4 mils 100 micron / 4 mils	**B**
ER-4	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880	125 micron / 5 mils 125 micron / 5 mils	**B**

GENERAL NOTES: SURFACE PREPARATION

DECKHEADS, BULKHEADS IN ENGINE ROOMS, ETC.

Type:	Description:
A	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2 - Sa 2½, alternatively mechanically cleaned to St 2 - St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues.
B	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot repairs) or abrasive blasted to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues. As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/ SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound and intact paint. Dust off residues. On pit-corroded surfaces excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

RECOMMENDED PAINTING SPECIFICATIONS DECKHEADS, BULKHEADS IN ENGINE ROOMS, ETC.

System numbers			ER-1
Surface preparation grade			A
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
ER-1	HEMPALIN PRIMER 12050 HEMPALIN ENAMEL 52140 HEMPALIN ENAMEL 52140	12.3 14.3-15.7* 14.3-15.7*	40/1.6 30/1.2 30/1.2

* Consumption depending on shade chosen.

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPALIN PRIMER 12050:	30-50 micron/1.2-2 mils
HEMPALIN ENAMEL 52140:	30-40 micron/1.2-1.6 mils

Temperatures above 120°C/248°F may cause yellowing of alkyd paints.

HEMPALIN ENAMEL 52140:
Certain lead-free red and yellow colours may discolour when exposed to chlorine-containing atmosphere.

Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

[1)] For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS DECKHEADS, BULKHEADS IN ENGINE ROOMS, ETC.

System numbers		ER-2, ER-3, ER-4	
Surface preparation grade		B	
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
ER-2	HEMPADUR 15130 HEMPADUR 15130	5.6 5.6	125/5 125/5
ER-3	HEMPADUR 15570 HEMPADUR 15570	5.4 5.4	100/4 100/4
ER-4	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880	6.2 6.2	125/5 125/5

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 15130:	125-200 micron/5-8 mils
HEMPADUR 15570:	50-125 micron/2-5 mils
HEMPADUR MASTIC 45880:	100-200 micron/4-8 mils

HEMPADUR 15130, HEMPADUR 15570, and HEMPADUR MASTIC 45880:
The natural tendency of epoxy coatings to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in these products.

HEMPADUR MASTIC 45880:
When used as a cosmetic coat light shades may, like for other epoxies, have a tendency to yellow, and to darken when exposed to heat.

To facilitate application in tropical areas, an alternative high temperature version with CURING AGENT 95881 may be supplied by some factories/stocks.

ER-2 and ER-3 are typical tanktop specifications.

[1)] For conversion to sq.ft./US gallon please multiply by 40.74

WORKING SPECIFICATIONS

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification ER-1
Area: DECKHEADS, BULKHEADS IN ENGINE ROOMS, ETC.

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPALIN PRIMER 12050	t/u	Green	40760	75	40	12.3	(X)	(X)	X	.018"	150 bar
HEMPALIN ENAMEL 52140	t/u	Green	40980	75	30	15.3	(X)	(X)	X	.018"	150 bar
HEMPALIN ENAMEL 52140	f/c	Green	40980	75	30	15.3	(X)	(X)	X	.018"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			100		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
12050	40	52140	3 Hrs	None	4 Hrs	None	5 Hrs	None	10 Hrs	None	N/R	N/R	N/R	N/R
52140	30	52140	4 Hrs	None	6 Hrs	None	8 Hrs	None	16 Hrs	None	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification ER-1**
Area: **DECKHEADS, BULKHEADS IN ENGINE ROOMS, ETC.**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

THINNER 08080 may be used for spray application, however, with a certain risk of wrinkling of the preceding FRESH coat of HEMPALIN.

A series of maintenance jobs may result in build up of a too high film thickness which may cause blister formation due to "entrapped" solvents. As each coat may also retain solvents, it is generally recommended NOT to apply HEMPALIN ENAMEL 52140 in excessive film thickness.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPALIN PRIMER 12050	40760	49				2 h	38	410	08230	5	
HEMPALIN ENAMEL 52140	40980	46				6 h	38	435	08230	5	
HEMPALIN ENAMEL 52140	40980	46				6 h	38	435	08230	5	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification ER-2
Area: DECKHEADS, BULKHEADS IN ENGINE ROOMS, ETC.

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15130	t/u	Black	19990	175	125	5.6	(X)		X	.023"	200 bar
HEMPADUR 15130	t/u	Brown	60430	175	125	5.6	(X)		X	.023"	200 bar
t/u: touch up	f/c: full coat	Total d.f.t.			250		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15130	125	15130	2 Hrs	19 Hrs	4 Hrs	32 Hrs	6 Hrs	48 Hrs	14 Hrs	5 Day	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: MARINE MAINTENANCE Specification ER-2
Area: DECKHEADS, BULKHEADS IN ENGINE ROOMS, ETC.

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR 15130:
The temperature of the paint itself should preferably be above 15°C/59°F. Best results are obtained at surface and paint temperatures of 15-25°C/59-77°F.

The maximum recoating interval between layers of HEMPADUR 15130 can be doubled on the condition that the coating has not been exposed to sunlight, water/condensation, or to (other) contamination before recoating. Furthermore the surface of the first layer of HEMPADUR 15130 must be free of any exudations. This is secured by keeping the conditions of application, drying and curing, i.e. such as ventilation, temperature, film thickness and thinning within the described limits. Note that excessive temperatures also must be avoided.

Pit-corroded areas may call for an extra coat to fill out pittings.

If the maximum recoating interval is exceeded, roughening of the surface is necessary to ensure intercoat adhesion.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15130	19990	70	95140	4 : 1	2 h	7 h	25	295	08450	5	
HEMPADUR 15130	60430	70	95140	4 : 1	2 h	7 h	25	300	08450	5	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification ER-3
Area: DECKHEADS, BULKHEADS IN ENGINE ROOMS, ETC.

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15570	t/u	Grey	12170	200	100	5.4	(X)		X	.019"-.021"	175 bar
HEMPADUR 15570	t/u	Redbrown	50630	200	100	5.4	(X)		X	.019"-.021"	175 bar
t/u: touch up	f/c: full coat	Total d.f.t.			200		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15570	100	15570	N/R	N/R	3 Hrs	None	4 Hrs	None	8 Hrs	None	18 Hrs	None	36 Hrs	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification ER-3**
Area: **DECKHEADS, BULKHEADS IN ENGINE ROOMS, ETC.**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 15570.

The temperature of the paint itself should be 15°C/59°F or above.

Pit-corroded areas may call for an extra coat to fill out pittings.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

HEMPADUR 15570 is also well suited for damp or moist surfaces.
Damp surfaces: Water is not readily detectable, but the temperature of the surface is below the dew point.
Moist surfaces: Pools of water and droplets have been removed, but there is a noticable film of water.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15570	12170	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	
HEMPADUR 15570	50630	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification ER-4
Area: DECKHEADS, BULKHEADS IN ENGINE ROOMS, ETC.

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MASTIC 45880	t/u	Grey	12170	175	125	6.2	(X)		X	.017"-.023"	250 bar
HEMPADUR MASTIC 45880	t/u	Grey	11480	175	125	6.2	(X)		X	.017"-.023"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			250		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45880	125	45880	N/R	N/R	3 Hrs	None	4 Hrs	None	10 Hrs	None	24 Hrs	None	4 Day	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification ER-4**
Area: **DECKHEADS, BULKHEADS IN ENGINE ROOMS, ETC.**

Remarks:

The surface must be completely clean and dry with a temperature above the dew point to avoid condensation.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

Pit-corroded areas may call for an extra coat to fill out pittings.

HEMPADUR MASTIC 45880:
The temperature of the paint itself should be 15°C/59°F or above, but advantageously below approximately 30°C/86°F to secure proper application properties.
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warmer climates, the paint should be stored in a cool place.
In case the paint temperature is 15°C/59°F or below, allow the mixture to pre react before use.
In case of a paint temperature at 15°C/59°F, an induction time of 15 minutes is recommended. In case of a paint temperature at 10°C/50°F, an induction time of 25 minutes is recommend. In order to obtain proper application properties, the paint temperature should preferably never be below 10°C/50°F.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR MASTIC 45880.

In confined spaces provide adequate ventilation during application and drying.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR MASTIC 45880	12170	77	95880	3 : 1	1 h	4 h	28	220	08450	-10	
HEMPADUR MASTIC 45880	11480	77	95880	3 : 1	1 h	4 h	28	220	08450	-10	

SYSTEM SELECTION

INTERIOR STEEL DECKS, ETC.

RECOMMENDED PAINTING SYSTEMS
INTERIOR STEEL DECKS, ETC.

			Surface preparation:
ID-1	HEMPALIN PRIMER 12050 HEMPALIN PRIMER 12050 HEMPALIN DECKPAINT 53240	40 micron / 1.6 mils 40 micron / 1.6 mils 30 micron / 1.2 mils	**A**
ID-2	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880	125 micron / 5 mils 125 micron / 5 mils	**B**
ID-3	HEMPADUR 15570 HEMPADUR 15570	125 micron / 5 mils 125 micron / 5 mils	**B**

GENERAL NOTES: SURFACE PREPARATION

INTERIOR STEEL DECKS, ETC.

Type:	Description:
A	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Rusty and damaged areas to be abrasive blasted to min. Sa 2 - Sa 2½, alternatively mechanically cleaned to St 2 - St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues.
B	Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salt and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot repairs) or abrasive blasted to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact paint. Dust off residues. As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/ SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound and intact paint. Dust off residues. On pit-corroded surfaces excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

RECOMMENDED PAINTING SPECIFICATIONS INTERIOR STEEL DECKS, ETC.

System numbers			ID-1
Surface preparation grade			A
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
ID-1	HEMPALIN PRIMER 12050 HEMPALIN PRIMER 12050 HEMPALIN DECKPAINT 53240	12.3 12.3 13.7-14.0*	40/1.6 40/1.6 30/1.2

*Consumption depending on shade chosen.

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPALIN PRIMER 12050: 30-50 micron/1.2-2 mils

Temperatures above 120°C/248°F may cause yellowing of alkyd paints.

[1)] For conversion to sq.ft./US gallon please multiply by 40.74

RECOMMENDED PAINTING SPECIFICATIONS INTERIOR STEEL DECKS, ETC.

System numbers			ID-2, ID-3
Surface preparation grade			B
System description		**Theoretical**	
		Spreading rate m²/litre[1)]	**Dry film thickness micron/mils**
ID-2	HEMPADUR MASTIC 45880 HEMPADUR MASTIC 45880	6.2 6.2	125/5 125/5
ID-3	HEMPADUR 15570 HEMPADUR 15570	4.3 4.3	125/5 125/5

May be specified in another film thickness than indicated depending on purpose and area of use. This will alter spreading rate and may influence drying time and recoating interval. Normal range is:

HEMPADUR 15570:	50-125 micron/2-5 mils
HEMPADUR MASTIC 45880:	100-200 micron/4-8 mils

Light shades will have a tendency to darken when exposed to heat.

The natural tendency of epoxy coatings to become more sensitive to mechanical damage and chemical exposure at elevated temperatures is also reflected in these products.

HEMPADUR MASTIC 45880:
To facilitate application in tropical areas, an alternative high temperature version with CURING AGENT 95881 may be supplied by some factories/stocks.

When used as a cosmetic coat light shades may, like for other epoxies, have a tendency to yellow, and to darken when exposed to heat.

Certain lead-free red and yellow colours may discolour when exposed to chlorine-containing atmosphere.

Leaded colours may become discoloured when exposed to sulphide-containing atmosphere.

[1)] For conversion to sq.ft./US gallon please multiply by 40.74

WORKING SPECIFICATIONS

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification ID-1
Area: INTERIOR STEEL DECKS, ETC.

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Rusty and damaged areas to be abrasive blasted to Sa 2-Sa 2½, alternatively mechanically cleaned to St 2-St 3. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

Old intact, but exposed surface to be carefully cleaned.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m^2/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPALIN PRIMER 12050	t/u	Green	40760	75	40	12.3	(X)	(X)	X	.018"	150 bar
HEMPALIN PRIMER 12050	t/u	Red	50410	75	40	12.3	(X)	(X)	X	.018"	150 bar
HEMPALIN DECKPAINT 53240	f/c	Red	50800	75	30	14.3	(X)		X	.018"-.021"	150 bar
t/u: touch up	f/c: full coat	Total d.f.t.			110		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
12050	40	12050	3 Hrs	None	4 Hrs	None	5 Hrs	None	10 Hrs	None	N/R	N/R	N/R	N/R
12050	40	53240	24 Hrs	None	36 Hrs	None	48 Hrs	None	4 Day	None	N/R	N/R	N/R	N/R

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification ID-1**
Area: **INTERIOR STEEL DECKS, ETC.**

Remarks:

The surface must be completely clean and dry with a temperature above to dew point to avoid condensation.

If a skid-proof surface is desired, sprinkle HEMPEL'S ANTI-SLINT 67500 evenly over the first coat of HEMPALIN DECKPAINT 53240 while still wet. (Consumption: approximately 7,5 kg 67500 to 20 litres of paint). When the paint is dry, sweep up surplus grit and apply a second coat of HEMPALIN DECKPAINT 53240.
Anti-skid properties can also be attained by mixing 1.0 kg of HEMPEL'S ANTI-SLIP BEADS 67420 into 20 litres of HEMPALIN DECKPAINT 53240.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPALIN PRIMER 12050	40760	49				2 h	38	410	08230	5	
HEMPALIN PRIMER 12050	50410	49				2 h	38	410	08230	5	
HEMPALIN DECKPAINT 53240	50800	43				1 h	28	495	08080	5	

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification ID-2
Area: INTERIOR STEEL DECKS, ETC.

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR MASTIC 45880	t/u	Grey	12170	175	125	6.2	(X)		X	.017"-.023"	250 bar
HEMPADUR MASTIC 45880	f/c	Grey	11480	175	125	6.2	(X)		X	.017"-.023"	250 bar
t/u: touch up	f/c: full coat	Total d.f.t.			250		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
45880	125	45880	N/R	N/R	3 Hrs	None	4 Hrs	None	10 Hrs	None	24 Hrs	None	4 Day	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification ID-2**
Area: **INTERIOR STEEL DECKS, ETC.**

Remarks:

The surface must be completely clean and dry with a temperature above to dew point to avoid condensation.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR MASTIC 45880:
The temperature of the paint itself should be 15°C/59°F or above, but advantageously below approximately 30°C/86°F to secure proper application properties.
Optimal spraying properties are obtained at paint temperatures of 18-22°C/64-72°F. In warmer climates, the paint should be stored in a cool place.
In case the paint temperature is 15°C/59°F or below, allow the mixture to pre react before use.
In case of a paint temperature at 15°C/59°F, an induction time of 15 minutes is recommended. In case of a paint temperature at 10°C/50°F, an induction time of 25 minutes is recommend. In order to obtain proper application properties, the paint temperature should preferably never be below 10°C/50°F.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR MASTIC 45880.

If a skid-proof surface is desired, sprinkle HEMPEL'S ANTI-SLINT 67500 evenly over the first coat of HEMPADUR MASTIC 45880 while still wet. (Consumption: approximately 7,5 kg 67500 to 20 litres of paint). When the paint is dry, sweep up surplus grit and apply a second coat of HEMPADUR MASTIC 45880.
Anti-skid properties can also be attained by mixing approximately 1.0 kg of HEMPEL'S ANTI-SLIP BEADS 67420 into 20 litres of HEMPADUR MASTIC 45880.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C Max. RH%
HEMPADUR MASTIC 45880	12170	77	95880	3 : 1	1 h	4 h	28	220	08450	-10
HEMPADUR MASTIC 45880	11480	77	95880	3 : 1	1 h	4 h	28	220	08450	-10

HEMPEL'S MARINE PAINTS A/S SPECIFICATION SHEET

Project: MARINE MAINTENANCE Specification ID-3
Area: INTERIOR STEEL DECKS, ETC.

Surface preparation:

Oil and grease etc. to be removed by emulsion cleaning. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. Damaged areas to be cleaned thoroughly by power tool cleaning to St 3 (spot-repairs) or abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of the paint system. Feather edges to sound and intact areas. Dust off residues.

As an alternative to dry cleaning, water jetting to WJ-3 to WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues.

On pit-corroded surfaces, excessive amounts of salt residues may call for water jetting or wet abrasive blasting, alternatively dry abrasive blasting followed by high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Product name (including quality number)	Treated area %	Shade	Shade no.	Film thickness (micron) Wet	Dry	Theoretical spreading rate (m²/ltr)	Application methods Brush	Roller	Spray	Recommended Nozzle orifice	Nozzle pressure
HEMPADUR 15570	t/u	Grey	12170	225	125	4.3	(X)		X	.019"-.021"	175 bar
HEMPADUR 15570	t/u	Redbrown	50630	225	125	4.3	(X)		X	.019"-.021"	175 bar
t/u: touch up	f/c: full coat	Total d.f.t.			250		X: Recommended		(X): Possible		

Recoating intervals. Ample ventilation Hrs=Hour(s) Mth=Month(s) N/R=Not Recommended

Quality no	D.F.T. (micron)	Recoated with quality no	40°C Min.	40°C Max.	30°C Min.	30°C Max.	20°C Min.	20°C Max.	10°C Min.	10°C Max.	0°C Min.	0°C Max.	-10°C Min.	-10°C Max.
15570	125	15570	N/R	N/R	4 Hrs	None	5 Hrs	None	11 Hrs	None	24 Hrs	None	48 Hrs	None

Remarks and Product information see next page.

HEMPEL'S MARINE PAINTS A/S

Project: **MARINE MAINTENANCE Specification ID-3**
Area: **INTERIOR STEEL DECKS, ETC.**

Remarks:

The surface must be completely clean and dry with a temperature above to dew point to avoid condensation.

The specified high film thickness can best be obtained by airless spray application. If another application method is used more applications are necessary to achieve the specified dry film thickness.

HEMPADUR 15570 is also well suited for damp or moist surfaces.
Damp surfaces: Water is not readily detectable, but the temperature of the surface is below the dew point.
Moist surfaces: Pools of water and droplets have been removed, but there is a noticable film of water.

Consult the separate APPLICATION INSTRUCTION for HEMPADUR 15570.

The temperature of the paint itself should be 15°C/59°F or above.

Before recoating after exposure in contaminated environments, clean the surface thoroughly by (high pressure) fresh water hosing and allow to dry.

Product information:	Shade no.	Volume solids %	Curing agent	Mixing ratio volume	Pot life 20°C	Dry to touch 20°C	Flash point °C	VOC g/ltr	Thinner	Application restrictions Min. temp. °C	Max. RH%
HEMPADUR 15570	12170	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	
HEMPADUR 15570	50630	54	95570	3 : 1	2 h	3 h	25	430	08450	-10	

PRODUCT DATA SHEETS

PRODUCT DATA SHEETS NUMERICAL INDEX

March 2003

Product Data

HEMPEL'S BALLAST COAT SH 10880

Description:

HEMPEL'S BALLAST COAT SH 10880 is a semi-hard, one-component, surface-tolerant, high-build coating. It is flexible, water resistant and corrosion-preventing.

Recommended use:

For short to medium-term repair and maintenance of ballast tanks, cofferdams and void spaces under conditions where abrasive blast cleaning is not feasible. Resistant to cathodic protection by sacrificial anodes. Resistant to foot traffic during survey of tanks, but not to continuous mechanical stress.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

Certificates/Approvals:

Classification C1 by Marintek, Norway.
Accepted by Lloyd's Register of Shipping as a Maintenance Coating, Class 2.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Alu-bronze/19820
Finish:	Flat
Volume solids, %:	52 ± 1
Theoretical spreading rate:	3.0 m^2/liter - 175 micron 119 sq.ft./US gallon - 7 mils
Flash point:	38°C/100°F
Specific gravity:	1.1 kg/litre - 9.2 lbs/US gallon
Surface dry:	10 (approx.) hours at 20°C/68°F *(ISO 1517)*
Dry to touch:	16 (approx.) hours at 20°C/68°F
V.O.C.:	375 g/litre - 3.1 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:	*Segment:*	*Specification no.:*
	Marine maintenance	BT-1

Note: **HEMPEL'S BALLAST COAT SH 10880 is for professional use only.**

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

August 2000 - 1088019820CR001
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPALIN® PRIMER 12050

Description:
HEMPALIN PRIMER 12050 is a relatively quick-drying, zinc phosphate primer, based on long oil alkyd and urethane alkyd.

Recommended use:
General purpose primer for HEMPALIN systems for protection of steel in mild to medium atmospheric corrosive environments.

Service temperatures:
Maximum, dry: 120°C/248°F.

Certificates/Approvals:
Approved as a low flame spread material by the Danish and German authorities according to the Solas Convention, IMO 61 (67).
Has a Danish and German EC-type Examination Certificate.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Green/40760 - Red/50410
Finish:	Flat
Volume solids, %:	49 ± 1
Theoretical spreading rate:	12.3 m^2/litre - 40 micron 491 sq.ft./US gallon - 1.6 mils
Flash point:	38°C/100°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Dry to touch:	2-4 hours at 20°C/68°F
V.O.C.:	410 g/litre - 3.4 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification nos:*
Marine maintenance	CH-1, CH-3, DC-1. ER-1, ID-1, SST-1, TS-1

Note:
HEMPALIN PRIMER 12050 is for professional use only.

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:
August 2000 - 1205040760C0016
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPEL'S UNI-PRIMER® 13140

Description:

HEMPEL'S UNI-PRIMER 13140 is a quick-drying, versatile, one-component, modified epoxy ester primer with zinc phosphate rust-inhibiting pigments.

Recommended use:

As a versatile primer on steel and metal surfaces for HEMPALIN or HEMPATEX in mild to medium corrosive atmospheric environment. It provides the possibility of reducing the number of primers for maintenance.

Service temperature:

Maximum, dry: 140°C/284°F (or as dictated by subsequent HEMPATEX topcoats).

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Light grey/12170	Red/51320
Finish:	Flat	Flat
Volume solids, %:	41 ± 1	42 ± 1
Theoretical spreading rate:	8.2 m^2/litre - 50 micron 329 sq.ft./US gallon - 2 mils	8.4 m^2/litre - 50 micron 337 sq.ft./US gallon - 2 mils
Flash point:	30°C/86°F	30°C/86°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon	1.4 kg/litre - 11.7 lbs/US gallon
Surface dry:	¾ (approx.) hr at 20°C/68°F (ISO 1517)	¾ (approx.) hr at 20°C/68°F (ISO 1517)
Dry to touch:	2 (approx.) hours at 20°C/68°F	2 (approx.) hours at 20°C/68°F
V.O.C.:	520 g/litre - 4.3 lbs/US gallon	515 g/litre - 4.3 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification nos:*
Marine maintenance	DC-2, CH-2, SST-2, TS-2
Marine newbuilding	DC-1, DC-3, SST-2, TS-2

Note:

HEMPEL'S UNI-PRIMER 13140 is for professional use only.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

October 2001 - 13140121700003
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPADUR® 15100

CURING AGENT 95100

Description:

HEMPADUR 15100 is a two-component, amine-adduct cured high build coal tar epoxy. It has excellent resistance to wear and impact as well as to sea water, waste water, fuel oil and to aliphatic solvents and it resists spillage of mineral acids and aromatic hydrocarbon solvents.
It has a higher resistance to elevated temperature and temperature gradients than polyamide cured coal tar epoxies.

Recommended use:

HEMPADUR 15100 is recommended for long time corrosion protection of structural steel and concrete in severe corrosive and immersed environments. Typical areas are steel buried in aggressive soil, pipelines of steel and concrete, tanks containing fuel or lubrication oil, drill water, drill mud, warm water (see below) or steel and concrete in sewage treatment plants.

Service temperatures:	Dry:	In water (maximum temperature gradient 35°C/63°F):
Maximum:	100°C/212°F	90°C/194°F

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Black/19990	Brown/60420
Finish:	Semi-gloss	Semi-gloss
Volume Solids, %:	55 ± 1	55 ± 1
Theoretical spreading rate:	2.8 m^2/litre - 200 micron 110 sq.ft./US gallon - 8 mils	2.8 m^2/litre - 200 micron 110 sq.ft./US gallon - 8 mils
Flash point:	13°C/56°F	13°C/56°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon	1.4 kg/litre - 11.4 lbs/US gallon
Surface dry:	4 (approx.) hrs at 20°C/68°F (ISO 1517)	4 (approx.) hrs at 20°C/68°F (ISO 1517)
Dry to touch:	6 (approx.) hours at 20°C/68°F	6 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F	7 days at 20°C/68°F
V.O.C.:	390 g/litre - 3.2 lbs/US gallon	390 - 3.2 lbs US gallon
Min. curing temperature:	10°C/50°F	10°C/50°F

Shelf life:

1 year (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification References:	*Segment:*	*Specification no.:*
	Marine maintenance	FW-1
	Marine newbuilding	FW-1

Note:

HEMPADUR 15100 is for professional use only.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

January 2001 - 1510019990C0005
HEMPEL'S MARINE PAINTS A/S

This Product Data Sheet supersedes those previously issued. For definition and scope, see explanatory notes to applicable Product Data Sheets.

Product data are subject to change without notice and become void five years from the date of issue.

Product Data

HEMPADUR® 15130

CURING AGENT 95140

Description:
HEMPADUR 15130 is a two-component, polyamide cured coal tar epoxy which provides a very hardwearing coating, highly resistant to seawater and mineral oils. Limited resistance to a number of solvents. Aliphatic hydrocarbons may be discoloured.

Recommended use:
As a self-priming coating system for long-term protection of steel and concrete in severely corrosive environment, eg surfaces submerged in fresh water or seawater or exposed in tidal and splash zones.
It provides excellent protection as a lining in crude and fuel oil tanks. If the exposure is acidic or a temperature gradient is developed, it is recommended to use HEMPADUR 15100. For application at lower temperatures, ie in the interval from -10°C/14°F to +10°C/50°F, it is recommended to use HEMPADUR LTC 15030.

Service temperatures:

Dry:	Maximum 90°C/194°F
Ballast water service:	Resists normal ambient temperatures at sea*
Other water service:	45°C/113°F (no temperature gradient)
Other liquids:	Contact HEMPEL

**Avoid long-term exposure to negative temperature gradients.*

Certificates/Approvals:
Approved by Lloyd's Register of Shipping, American Bureau of Shipping, Bureau Veritas and Maritime Register of Shipping, Russia, as a recognized corrosion control coating. Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.Approved as a ballast tank coating by Germanischer Lloyd, Germany. "B1" classification by Marintek, Norway.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Black /19990	Brown/60430*
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	70 ± 1	70 ± 1
Theoretical spreading rate:	5.6 m^2/litre - 125 micron 225 sq.ft./US gallon - 5 mils	5.6 m^2/litre - 125 micron 225 sq.ft./US gallon - 5 mils
Flash point:	25°C/77°F	25°C/77°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon	1.3 kg/litre - 10.8 lbs/US gallon
Surface dry:	6 (approx) hrs at 20°C/68°F *(ISO 1517)*	5 (approx) hrs at 20°C/68°F *(ISO 1517)*
Dry to touch:	7-8 hours at 20°C/68°F	6-7 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F	7 days at 20°C/68°F
V.O.C.:	295 g/litre - 2.4 lbs/US gallon	300 g/litre - 2.4 lbs/US gallon
Min. curing temperature:	5°C/41°F	5°C/41°F

Shelf life: 1 year (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage.

**Shade 60730 may replace shade 60430. Consult assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification nos:*
Marine maintenance	BAC-2, BAC-3, BT-2, CH-4, CT-1, ER-2, FT-1
Marine newbuilding	BT-1, -2, BAC-2, -3, CH-3, CT-1, ER-3, FT-1, -2

Note: **HEMPADUR 15130 is for professional use only.**

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:
February 2001 - 1513019990CO014
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPADUR® 15400

CURING AGENT 95100

Description:
HEMPADUR 15400 is a two-component, amine adduct cured epoxy paint, which cures to a coating with excellent resistance to a wide range of chemicals as tabulated in separate CARGO PROTECTION GUIDE.

Recommended use:
As a tank lining.

Service temperatures:

	Dry:	In water (no temperature gradient):
Maximum:	140°C/284°F	50°C/122°F

Wet service temperatures, other liquids:
Consult the corresponding CARGO PROTECTION GUIDE.

Certificates/Approvals:
Complies with Section 175.300 of U.S. Federal Regulations in respect of carriage of dry and wet foodstuffs.
Approved by Lloyd's Register of Shipping as a recognized corrosion control coating.
Approved by Kuwaiti, Chinese and Norwegian authorities for fresh water tanks.
Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.
Tested for non-toxicity of welding fumes by the Danish Welding Institute.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000 - Light red/50900
Finish:	Semi-flat
Volume solids, %:	48 ± 1
Theoretical spreading rate:	6.0 m²/litre - 80 micron 241 sq.ft./US gallon - 3.2 mils
Flash point:	26°C/79°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon
Surface dry:	3 (approx.) hrs at 20°C/68°F (ISO 1517)
Dry to touch:	8-10 hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	465 g/litre - 3.9 lbs/US gallon
Min. curing temperature:	10°C/50°F
Shelf life:	1 year (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification no.:*
Marine maintenance	CT-2, FT-3
Marine newbuilding	CT-2, FT-4

Note:
HEMPADUR 15400 is for professional use only.

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:
February 2001 - 1540010000CO012
HEMPEL'S MARINE PAINTS A/S

APPLICATION INSTRUCTIONS

For product description refer to the product data sheet

HEMPADUR® 15400

15400: BASE 15409 with CURING AGENT 95100
15402: BASE 15409 with CURING AGENT 95990

Scope:

These application instructions cover surface preparation, application equipment, and application of HEMPADUR 15400 as a tank coating.

The following are general rules, which may be supplemented with more detailed descriptions when needed, for instance for major newbuildings/new constructions or extensive repair jobs.

Steel work:

All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in weldings seams, undercuts, cracks, etc. should be avoided. If found, they must be remedied by welding and/or grinding.

All weld spatters must be removed.

All sharp edges must be removed or rounded off in such a way that the specified film thickness can be build-up on all surfaces. The radius of the rounding should be approximately 1-2 mm.

The steel must be of first class quality and should not have been allowed to rust more than corresponding to grade B of ISO 8501-1:1988. Any laminations must be removed.

All steel work (including welding, flamecutting, grinding) must be finished before the surface preparation starts.

Surface preparation:

Prior to abrasive blast cleaning of the steel, remove oil, grease, salts and other contamination with a suitable detergent followed by (high pressure) fresh water hosing. Alkali deposits on new welding seams as well as soap traces from pressure testing of tanks to be removed by fresh water and scrubbing with stiff brushes. Control for absence of contamination according to separate guidelines.

On repair jobs, a rough blasting to remove all loosely adhering materials may be required before degreasing/washing is carried out.

Old steel: Even after a very thorough tank cleanings, pits may typically contain contamination in the form of remnants of old cargoes as well as water soluble salts. For this reason, repeated detergent washing plus abrasive blasting may be necessary:

After the first blasting, a very thorough vacuum cleaning is carried out in order to see if any "cargo bleeding" occurs as well as controls for water soluble salts are made. Reference is made to separate instructions. Special care should be taken in evaluating pitted areas.

To obtain full chemical resistance according to the CARGO PROTECTION GUIDE, the steel surface must be abrasive blast cleaned according to ISO 8501-1: 1988, Sa 2½.

The resulting surface profile must be equivalent to Rugotest No. 3, min. BN 10, Keane-Tator Surface Comparator, G/S min. 3.0 or ISO/DIS 8503/1 rough MEDIUM (G).

Use steel grit, aluminium silicate or similar sharp-edged abrasives of a good quality free of foreign matters, soft particles, and the like. Control for possible contamination according to separate guidelines.

Steel grit with particle sizes of 0.2 - 1.2 mm or aluminium silicate of 0.4 - 1.8 mm will usually create the desired surface profile when the air pressure measured at the nozzle is 6 - 7 bar/85 -100 psi.

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The compressed air must be dry and clean. The compressor must be fitted with suitable oil and water traps.

When the abrasive blasting is completed, remove residual grit and dust by vacuum cleaning. Abrasive particles not removed by vacuum cleaning are to be removed by brushing with clean brushes followed by vacuum cleaning.

The importance of systematic working must be stressed when blasting. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

Shopprimed and previously painted surfaces: Existing coating materials to be completely removed. Depending on the type of shopprimer and the requested chemical resistance, the shopprimer should be removed completely or partly. Reference is made to HEMPEL's CARGO PROTECTION GUIDE/tank coating specification.

Note: Degree of steelwork finish and surface preparation are more detailed described in HEMPEL's Technical Standard for Tank Coating Work.

Application equipment:

HEMPADUR 15400 is to be applied by airless spray equipment. Stripe coating and minor repairs can be carried out by brushing.

Airless spray equipment: A large pump is preferred, with a pump capacity of 8-12 litres/minute.

Pump ratio:	Min. 45:1
Nozzle orifice:	.018"-.021"
Nozzle pressure:	200 bar (2900 psi)
Hoses:	To avoid excessive loss of pressure in long hoses, hoses with an internal diameter of up to 0.5" can be used

(Spray data are indicative and subject to adjustment).

Thinning:

If required: max. 10% of THINNER 08450, possibly higher if tendency to dust-spray will require more thinning eg at higher temperatures. Thinning should only be at the required level to avoid possible risk of solvent entrapment.

Only add thinner to the mixed paint.

Cleaning of equipment:

The whole equipment to be cleaned thoroughly with HEMPEL'S TOOL CLEANER 99610 after use.

Mixing, pot life:

a. Mix the entire content of corresponding base and curing agent packings. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 87 parts by weight of base and 13 parts by weight of curing agent or by volume: 4.0 parts by volume base and 1.0 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. **Allow the mixed paint to pre-react before application, see table below**.

d. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

CURING AGENT 95100:

Temperature of mixed paint	(10°C/50°F[1])	15°C/59°F[1]	20°C/68°F	25°C/77°F	30°C/86°F[2]
Induction time, minutes	(30)	25	15	10	5
Pot life, hours, airless spray	(4)	3	2	1½	1
Pot life, hours, brush	6	5	4	3	2

1) At paint temperatures below 15°C/59°F the viscosity can be too high for airless spray application.

2) Temperatures at 30°C/86°F and above should be avoided due to an enhanced risk of dry-spray and poor film formation.

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HEMPADUR 15400

CURING AGENT 95990:

Temperature of mixed paint	(5°C/41°F[1])	(10°C/50°F[1])	15°C/59°F[1])
Induction time, minutes	(35)	(30)	25
Pot life, hours, airless	(3)	(2)	1½
spray	4	4	4
Pot life, hours, brush			

1) At painttemperatures below 15°C/59°F the viscosity can be too high for airless spray application.

Application procedure:

The first full coat is usually applied immediately after vacuum cleaning. The first stripe coat afterwards. The final dry film thickness of the three coat system must be between 240-500 micron.

The wet film thickness must be 175-200 micron and must be measured regularly.

Film-build/continuity: With this tank coating, it is of special importance that a continuous, pinhole-free paint film is obtained at application of each coat. An application technique must be adopted to ensure good film formation on **all** surfaces and **no** dust spray. It is very important to use nozzles of the correct size, ie not too big. Select small nozzles for spray application of complicated structures, while bigger nozzles may be used for regular surfaces. A proper, uniform distance of the spray gun to the surface, 30-50 cm, should be aimed at. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.

The paint layer must be applied homogeneously and as close to the specification as possible. The consumption of paint must be controlled and heavy layers must be avoided because of the risk of sags and cracks and solvent retention.

Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripecoat will usually be necessary.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, must be remedied.

Note: In the case of old, pit-corroded steel, application of a diluted, extra first coat is recommended to obtain better "penetration" in the fine pits. For this purpose, it is relevant to dilute approximately 10%. Application by brush is recommended and film thickness so low that the surface is "saturated" only.

Stripe coating:

All places difficult to cover properly by spray application should be stripe coated twice by brushing. The first stripe coat is applied either before or after the first full coat. The second stripe coat is most typically applied after the second full coat. Which procedure to follow depends on the actual working conditions. A sprayed coat using small spray nozzles with a narrow angle may substitute the second brush-applied stripe coat, however, lightening holes and similar, plus possible undercuts and similar will still demand brush- applied stripe coating.

Micro climate:

The actual climate conditions at the substrate during application:

The minimum surface temperature is 10°C/50°F when using CURING AGENT 95100, 5°C/41°F when using CURING AGENT 95990.

The maximum surface temperature should preferably be below approximately 30°C/86°F. In a warm climate it is recommended to carry out application during night-time. Application at high temperatures, up to approximately 40°C/104°F, is possible, but extra care must be taken to avoid poor film formation and excessive spraydust. Extra thinning may also be necessary.

The steel temperature must be above the dew point. As a rule of thumb, a steel temperature which is 3°C/5°F above the dew point can be considered safe.

In confined spaces, supply an adequate amount of fresh air during application and drying to assist the evaporation of solvent.

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HEMPADUR 15400

Drying and curing, ventilation:

In a dry film thickness of 80 micron, with a steel temperature of 20°C/68°F, a relative air humidity of maximum 80% and adequate ventilation, HEMPADUR 15400 will be dry to touch after 8-10 hours. For similar drying conditions, the paint film will accept light traffic after approximately 24 hours.

Correct film formation depends on an adequate ventilation during drying.

A good guideline for tank coating work is to ventilate to a calculated 10% of LEL during application and until the coating is dry.

One litre undiluted HEMPADUR 15400 gives off in total 123 litres solvent **vapour** until it is completely dry.

The lower explosive limit, LEL, is 0.5%.

To reach a common safety requirement of 10% LEL, the theoretical ventilation requirement is 250 m^3 per litre paint.

Because solvent vapours are heavier than atmospheric air, effective ventilation requires forced ventilation with exhaust from the lowest part of the tank.

During the following period until full curing a few air shifts per hour will suffice. Take actions to avoid "pockets" of stagnant air.

Please contact HEMPEL for further advice.

Actual safety precautions may require stronger ventilation.

Curing time:

Provided that adequate ventilation, recommended relative humidity, specified film thickness, and recommended minimum recoating interval are kept, the following curing times are valid:

CURING AGENT 95100:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	(35°C/95°F)*
Curing time	18 days	11 days	7 days	5 days	3½ days	(2½ days)
Filling of tanks with water can be tolerated after	18 days	11 days	7 days	5 days	3½ days	(2½ days)

*Avoid application at elevated temperatures to avoid dry-spray and poor film formation.

CURING AGENT 95990:

Steel temperature	5°C/41°F	10°C/50°F	15°C/59°F
Curing time	25 days	18 days	11 days
Filling of tanks with water can be tolerated after	25 days	18 days	11 days

Recoating intervals:

Provided observance of the above stated ventilation and relative humidity the following recoating intervals in relation to the (steel) temperature are valid:

CURING AGENT 95100:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	35°C/95°F
Minimum	30 hours	14 hours	10 hours	7 hours	5 hours	4 hours
Maximum	28 days	25 days	21 days	18 days	14 days	10 days

CURING AGENT 95990:

Steel temperature	5°C/41°F	10°C/50°F	15°C/59°F
Minimum	45 hours	30 hours	14 hours
Maximum	35 days	28 days	25 days

Issued: March 2002

HEMPADUR 15400

The maximum relative humidity before and between the coats should not exceed 80% and the steel temperature should always be above the dew point, in practice minimum 3°C/5°F above the dew point.

The maximum intervals assume that the film formation is of good quality and without dry spray and that no kind of surface contamination exists except contamination which can be removed completely by vacuum cleaning. Furthermore, the coating must not have been exposed to direct sunlight for more than maximum 2 days.

Conditions for paint application work:

Dry spray is not acceptable as this will reduce the protective characteristics of the paint and make later tank cleaning difficult. Dry spray can be avoided by using adequate stagings, spraying equipment and methods.

Hold the spray gun at a right angle to and about 30-50 cm/1-1½ foot from the surface making even parallel passes at a rate to produce the specified wet film thickness as per specification.

Avoid dry spray (overspray creating excessive paint mist), e.g. by using a smaller fan angle, and the lowest possible pressure. A small fan angle should also be used, if spray application is used, for "stripe coating" of for instance reverse sides of stiffeners. Each layer must be applied homogeneously and as near above the specification of 80 micron dry film thickness as possible. The consumption of paint must be controlled, and heavy layers must be avoided because of the risk of sagging, cracks and solvent retention.

Surface irregularities such as dry spray, sagging, exaggerated thickness or embedded dust or abrasives will have to be remedied.

If sandpapering between layers, for instance on the bottom, is needed, great care must be taken to avoid damage of otherwise intact surfaces. When using mechanical means only lightweight equipment should be used, orbital sander is recommended. Yet, avoid sandpapering on top of welds or irregularities or near to vertical surfaces.

The finished coating must appear as a homogeneous surface without pores, runners or contamination of any kind.

For the standard specification following applies to the dry film thickness:

The minimum dry film thickness is 240 micron, the maximum thickness to be aimed at is approximately 500 micron. The minimum dry film thickness is evaluated according to the "80-20" rule, i.e. no more than 20% of the total number of individual measurements must be lower than the minimum dry film thickness, and the lowest individual measurement must be at least 80% of the minimum dry film thickness, ie 192 micron. Dry film thickness control is not to be carried out within the first 24 hours after application of final coat (20°C, sufficient ventilation). The measurement must be carried out using an electromagnetic dry film thickness gauge calibrated with shims placed on a smooth steel substrate. The maximum dry film thickness can be evaluated according to the "80-20" rule.

Repairs:

It is of great importance that all damage to the coating is repaired.

Repair shall be started up as soon as possible. Repair of mountings for stagings, etc. must take place in connection with the dismantling of the stagings, the tempo of which shall be adjusted to the touch-up procedure.

It is important that the repaired areas, as well as the rest of the coated areas, are fully cured before the tank is taken into use or washed by the tank cleaning system.

The extent of damage to the coating can be evaluated by a sea water test. Wash the tanks with clean sea water by means of the tank cleaning machines until profiles and/or heating coils on tanktop is covered. Allow the water to stay for minimum 3 days, after which period the tank is emptied and cleaned with clean fresh water to remove salts.

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The repair process:

General: Before mechanical treatment is started, surfaces to be repaired have to be cleaned for any salts and other contamination.

Areas less than 5 x 5 cm.
The surface preparation can be executed by grinding to a clean rough metal surface, feathering edges of intact coating and slightly sanding the adjacent surface.

Clean and wash with HEMPEL'S THINNER 08450.

Touch-up by brush to full film thickness with minimum 4 coats of HEMPADUR 15400.

Areas up to 1 square metre
The surface preparation must be executed by vacuum blasting or open nozzle blasting so that the steel has a proper roughness and a cleanliness to Sa 2½-3 according to ISO 8501-1:1988. The overlapping zone must be sanded or sweep blasted to ensure a good adhesion of the new paint.

Clean and wash with HEMPEL'S THINNER 08450.

Touch-up by brush to full film thickness with minimum 4 coats or by spray 3 coats HEMPADUR 15400.

Areas more than 1 square metre or areas where several damaged spots are concentrated.
Treatment: Repeat the original specification.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

March 2002 - 1540010000CO012
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPADUR® 15500

CURING AGENT 97580

Description:
HEMPADUR 15500 is a two-component, amine adduct cured phenolic epoxy (novolac) paint, which cures to a coating with excellent resistance to a wide range of chemicals as tabulated in separate CARGO PROTECTION GUIDE.

Recommended use:
As a tank lining.

Service temperatures:

	Dry:	In seawater (no temperature gradient):
Maximum:	160°C/320°F	50°C/122°F

Wet service temperatures, other liquids:
Consult the corresponding CARGO PROTECTION GUIDE.

Certificates/Approvals:
Approved by Lloyd's Register of Shipping and Maritime Register of Shipping, Russia, as a recognized corrosion control coating.
Approved for potable water by Water Research Centre, Great Britain and by Italian authorities.
Complies with Section 175.300 of the Code of Federal Regulations in respect of carriage of foodstuffs (FDA) for tanks larger than 2006 m³/530,000 US gallon.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Off-white/11630 - Light red/50900
Finish:	Flat
Volume solids, %:	68 ± 1
Theoretical spreading rate:	6.8 m²/litre - 100 micron 273 sq.ft./US gallon - 4 mils
Flash point:	26°C/79°F
Specific gravity:	1.7 kg/litre - 14.2 lbs/US gallon
Surface dry:	2-3 hrs at 20°C/68°F *(ISO 1517)*
Dry to touch:	6 (approx.) hours at 20°C/68°F
Fully cured:	10 days at 20°C/68°F
V.O.C.:	325 g/litre - 2.7 lbs/US gallon
Min. curing temperature:	10°C/50°F
Shelf life:	1 year (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification no.:*
Marine maintenance	CT-3, FT-4
Marine newbuilding	CT-3

Note:
HEMPADUR 15500 is for professional use only.

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:
October 2001 - 1550011630CR006

APPLICATION INSTRUCTIONS

For product description refer to the product data sheet

HEMPADUR® 15500

CURING AGENT 97580

Scope:

These application instructions cover surface preparation, application equipment, and application of HEMPADUR 15500 as a tank coating.

The following are general rules, which may be supplemented with more detailed descriptions when needed, for instance for major newbuildings/new constructions or extensive repair jobs.

Steel work:

All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in weldings seams, undercuts, cracks, etc. should be avoided. If found, they must be remedied by welding and/or grinding.

All weld spatters must be removed.

All sharp edges must be removed or rounded off in such a way that the specified film thickness can be build-up on all surfaces. The radius of the rounding should be minimum 2 mm.

The steel must be of first class quality and should not have been allowed to rust more than corresponding to grade B of ISO 8501-1:1988. Any laminations must be removed.

All steel work (including welding, flamecutting, grinding) must be finished before the surface preparation starts.

Surface preparation:

Prior to abrasive blast cleaning of the steel, remove oil, grease, salts and other contamination with a suitable detergent followed by high pressure fresh water hosing. Alkali deposits on new welding seams as well as soap traces from pressure testing of tanks to be removed by fresh water and scrubbing with stiff brushes.

Control for absence of contamination according to separate guidelines.

On repair jobs, a rough blasting to remove all loosely adhering materials may be required before degreasing/washing is carried out.

Old steel: Even after a very thorough tank cleanings, pits may typically contain contamination in the form of remnants of old cargoes as well as water soluble salts. For this reason, repeated detergent washing plus abrasive blasting may be necessary. After the first blasting, a very thorough vacuum cleaning is carried out in order to see if any "cargo bleeding" occurs as well as controls for water soluble salts (reference is made to separate instructions) are made. Special care should be taken in evaluating pitted areas - ask for special guidelines.

Grit blast to min Sa 2½, ISO 8501-1:1988.

To obtain full chemical resistance according to the CARGO PROTECTION GUIDE, the steel surface must be abrasive blast cleaned according to ISO 8501-1:1988, very near to white metal Sa 2½-Sa 3. In practice, this requirement is to be understood as white metal Sa 3 at the moment of abrasive blasting, but allows a slight reduction at the moment of paint application.

The resulting surface profile must be equivalent to Rugotest No. 3, min. BN 10, Keane-Tator Surface Comparator, G/S min. 3.0 or ISO/DIS 8503/1 rough MEDIUM (G).

Use steel grit, aluminium silicate, or similar sharp edged abrasives of a good quality free of foreign matters, soft particles, and the like. Control for possible contamination according to separate guidelines.

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In case steel grit is used this must furthermore be controlled so that a proper grain size distribution is maintained.

Steel grit with particle sizes of 0.2 - 1.2 mm or aluminium silicate of 0.4 - 1.8 mm will usually create the desired surface profile when the air pressure measured at the nozzle is 6 - 7 bar/85 -100 psi.

The compressed air must be dry and clean. The compressor must be fitted with suitable oil and water traps.

When the abrasive blasting is completed, remove residual grit and dust by vacuum cleaning. Abrasive particles not removed by vacuum cleaning are to be removed by brushing with clean brushes followed by vacuum cleaning.

The importance of systematic working must be stressed when blasting. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

Shopprimed and previously painted surfaces: All shopprimer or existing coating materials to be completely removed. Avoid the use of zinc shopprimer whenever possible.

However, if the steel is shopprimed with zinc, it is very important that **all** zinc is removed by abrasive blast cleaning. Separate check procedures will be necessary to demonstrate the effectiveness of removal. More blast cleaning may be deemed necessary! Use of a red zinc shopprimer will facilitate the visual check of the blast cleaning and is considered necessary in order to obtain an acceptable surface preparation.

Note: Degree of steelwork finish and surface preparation are more detailed described in HEMPEL's Technical Standard for Tank Coating Work.

Application equipment:

HEMPADUR 15500 is to be applied by airless spray equipment. Stripe coating and minor repairs can be carried out by brushing.

Airless spray equipment: A large pump is preferred, with a pump capacity of 8-12 litres/minute.

Pump ratio:	Min. 45:1
Nozzle orifice:	.018"-.021"
Nozzle pressure:	200 bar (2900 psi)
Hoses:	To avoid excessive loss of pressure in long hoses, hoses with an internal diameter of up to 0.5" can be used

(Spray data are indicative and subject to adjustment).

Thinning:

If required: max. 10% of THINNER 08450, possibly higher if tendency to dry-spray will require more thinning eg at higher temperatures. Thinning should only be at the required level to avoid possible risk of solvent entrapment.

Only add thinner to the mixed paint.

Cleaning of equipment:

The whole equipment to be cleaned thoroughly with HEMPEL'S TOOL CLEANER 99610 after use.

Mixing, pot life:

a. Mix the entire content of corresponding base and curing agent packings. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 93.8 parts by weight of base and 6.2 parts by weight of curing agent or by volume: 8.9 parts by volume base and 1.1 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Allow the mixed paint to prereact before application, see table below.

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d. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	(15°C/59°F[1])	20°C/68°F	25°C/77°F	(30°C/86°F[2])
Induction time Pot life	(25 minutes) (4 hours)	15 minutes 3 hours	10 minutes 2 hours	(5 minutes) (1 hour)

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures at 30°C/86°F and above should be avoided due to a risk of dry-spray.

Application procedure:

The first full coat is usually applied immediately after vacuum cleaning. The first stripe coat afterwards.

Film-build/continuity: With this tank coating intended for aggressive cargoes, it is of special importance that a continuous, pinhole-free paint film is obtained at application of each coat. An application technique which will ensure good film formation and no dry-spray on **all** surfaces must be adopted.

It is very important to use nozzles of the correct size, ie not too big. Select small nozzles for spray application of complicated structures, while bigger nozzles may be used for regular surfaces.

A proper, uniform distance of the spray gun to the surface, 30-50 cm, should be aimed at. To obtain good and steady atomizing, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dry-spray.

The paint layer must be applied homogenously and as close to the specification as possible. The consumption of paint must be controlled and heavy layers must be avoided because of the risk of sags and cracks and solvent retention.

Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripecoat will usually be necessary.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, must be remedied.

Note: In the case of old, pit corroded steel, application of a diluted, extra first coat is recommended to obtain better "penetration" in the fine pits. For this purpose, it is relevant to dilute 5-10%. Application by brush is recommended and film thickness so low that the surface is "saturated" only.

Stripe coating:

All places difficult to cover properly by spray application should be stripe coated twice by brushing immediately before the spray application. Typically, first stripe coat is applied after the first full coat and the second stripe coat after the second full coat.

The second stripe coat with brush can be replaced with spray application with a small narrow nozzle, but still air slots and similar and possible undercuts (welds) and the like will require brush application.

Film thicknesses:

The final dry film thickness of the three coat system must be between 300-600 micron (max. 450 micron below 15°C)/12-24 mils (max. 18 mils below 59°F).

Corresponding to 100 micron/4 mils dry film thickness, the wet film thickness must be 150-175 micron/6-7 mils and must be measured regularly.

Normally up to 200 micron/8 mils per coat may be accepted for 100 micron/4 mils specifications, but **at temperatures below 15°C/59°F, it is important not to exceed a dry film thickness of 150 micron/6 mils in any area**.

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Micro climate:

The actual climate conditions at the substrate during application:

The minimum surface temperature until full cure is 10°C/50°F.

To ensure an all-over steel temperature of minimum 10°C/50°F, special attention should be paid to possible "cold bridges" eg stiffeners on deck.

In case of steel temperatures lower than 10°C/50°F there is a severe risk of incomplete curing, resulting in a too open film with reduced chemical resistance.

When the outside temperature is lower than 10°C/50°F, it is therefore recommended to use insulation mats on deck and in addition to aim at a general steel temperature of 15°C/59°F to minimise the risk of (locally) too low steel temperatures.

Furthermore, the steel temperature should be kept reasonably constant - within the range of ± 3°C/5°F is recommended. Any changes of the outside temperature should therefore be carefully monitored and heating equipment calibrated accordingly.

A sudden drop of the steel temperature shortly after application will result in solvent entrapment and will cause a dry film containing vacuoles, ie resulting in reduced performance.

The maximum surface temperature should preferably be below approximately 30°C/86°F. In a warm climate it is recommended to carry out application during nighttime. Application at high temperatures, up to approximately 40°C/105°F, is possible, but extra care must be taken to avoid poor film formation and excessive spray dust.

The steel temperature must be above the dew point. As a rule of thumb, a steel temperature which is 3°C/5°F above the dew point can be considered safe. The relative humidity shall preferably be 40-60%, maximum 80%.

In confined spaces, supply an adequate amount of fresh air during application and drying to assist the evaporation of solvent.

Drying and curing, ventilation:

In a dry film thickness of 100 micron/4 mils, with a steel temperature of 20°C/68°F, a relative air humidity of maximum 80% and adequate ventilation, HEMPADUR 15500 will be dry to touch after 4-6 hours. Under these drying conditions, the paint film will accept light traffic after approximately 16 hours.

Correct film formation depends on an adequate ventilation during drying.

A good guideline for tank coating work is to ventilate to a calculated 10% of LEL during application and until the coating is dry.

One litre undiluted HEMPADUR 15500 gives off in total 82 litres solvent **vapour** until it is completely dry.

The lower explosive limit, LEL, is 1.0%.

To reach a common safety requirement of 10% LEL, the theoretical ventilation requirement is 82 m^3 per litre paint.

Because solvent vapours are heavier than atmospheric air, effective ventilation requires forced ventilation with exhaust from the lowest part of the tank.

During the following period until full curing a few air shifts per hour will suffice. Take actions to avoid "pockets" of stagnant air.

Please contact HEMPEL for further advice.
Actual safety precautions may require stronger ventilation.

HEMPADUR 15500

Curing time:

Provided that adequate ventilation, recommended relative humidity, specified film thickness, and recommended minimum recoating interval are kept, the following curing times are valid:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	(35°C/95°F)*
Curing time	18 days	14 days	10 days	8 days	7 days	(6 days)

*Avoid application at elevated temperatures to avoid dry-spray and poor film formation.

Post curing:

Postcuring must take place within 3 months after final acceptance of the coating/delivery of the vessel.

Postcuring is accomplished by carrying a hot cargo of mineral lube oil, vegetable oil or animal oil at 60°C/140°F for 5 days or at 50°C/122°F for 10 days.

Postcuring may also be accomplished by carrying clean seawater of minimum 45°C/113°F and maximum 50°C/122°F **provided all adjacent ballast tanks are empty and all adjacent cargo tanks are either empty or carrying a liquid cargo of minimum 40°C/104°F**. In case of seawater, postcuring time is 14 days.

Recoating intervals:

Provided observance of the above stated ventilation and relative humidity the following recoating intervals in relation to the (steel) temperature are valid:

Steel temperature		10°C/50°F*	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F
Minimum	after the first coat	90 hours	60 hours	36 hours	24 hours	18 hours
	after the second coat	60 hours	40 hours	24 hours	16 hours	12 hours
Maximum:		47 days	34 days	21 days	16 days	14 days

* Absolut minimum temperature recommended.

The maximum relative humidity before and between the coats should not exceed 80% and the steel temperature should always be above the dew point, in practice minimum 3°C/5°F above the dew point.

Conditions for paint application work:

Dry spray is not acceptable as this will reduce the protective characteristics of the paint and make later tank cleaning difficult. Dry spray can be avoided by using adequate stagings, spraying equipment and methods.

Hold spray gun at a right angle to and about 30-50 cm from surface making even parallel passes at a rate to produce the specified wet film thickness as per specification.

Avoid dry spray (overspray creating excessive paint mist), e.g. by using a smaller fan angle, and the lowest possible pressure. A small fan angle should also be used, if spray application is used, for "stripe coating" of for instance reverse sides of stiffeners.

Each layer must be applied homogeneously and as near above the specification of 100 micron/4 mils dry film thickness, as possible. The consumption of paint must be controlled, and heavy layers must be avoided because of the risk of sagging, cracks and solvent retention.

Surface irregularities such as dry spray, saggings, exaggerated thickness or embedded dust or abrasives will have to be remedied.

If a sandpapering between layers, for instance on the bottom, is needed, great care must be taken to avoid damage of otherwise intact surfaces. When using mechanical means only lightweight equipment should be used, orbital sander is recommended. Yet, avoid sandpapering on top of welds or irregularities or near to vertical surfaces.

The finished coating must appear as a homogeneous surface without pores, runners or contamination of any kind.

Issued: February 2002

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Control of dry film thicknesses:

For the standard specification the following applies to the dry film thickness:

The minimum dry film thickness is 300 micron/12 mils, the maximum thickness is approximately 600 micron/24 mils (below 15°C/59°F: 450 micron/18 mils). The minimum dry film thickness is evaluated according to the "80-20" rule, ie no more than 20% of the total number of individual measurements must be lower than the minimum dry film thickness, and the lowest individual measurement must be at least 80% of the minimum dry film thickness, ie 240 micron/9.6 mils. Dry film thickness control is not to be carried out within the first 24 hours after application of final coat (20°C/68°F, sufficient ventilation). The measurement must be carried out using an electromagnetic dry film thickness gauge calibrated with shims placed on a smooth steel substrate. The maximum dry film thickness can also be evaluated according to the "80-20" rule.

Taking into use:

Do not use the tank before the coating is properly cured. Reference is made to curing time on page 5.

Repairs:

It is of great importance that all damage to the coating is repaired.

Repair must be started up as soon as possible. Repair of mountings for stagings, etc. must take place in connection with the dismantling of the stagings, the tempo of which shall be adjusted to the touch-up procedure.

It is important that the repaired areas, as well as the rest of the coated areas, are fully cured before the tank is taken into use or washed by the tank cleaning system.

The extent of damage to the coating can be evaluated by a seawater test. Wash the tanks with clean seawater by means of the tank cleaning machines until profiles and/or heating coils on tanktop is covered. Allow the water to stay for minimum 3 days, after which period the tank is emptied and cleaned with clean fresh water to remove salts.

The repair process:

General: Before mechanical treatment is started, surfaces to be repaired have to be cleaned for any salts and other contamination.

Areas less than 5 x 5 cm.

The surface preparation can be executed by grinding to a clean rough metal surface, feathering edges of intact coating and slightly sanding the adjacent surface.

Clean and wash with HEMPEL'S THINNER 08450.

Touch-up by brush to full film thickness with minimum 4 coats of HEMPADUR 15500.

Areas up to 1 sq.m.

The surface preparation must be executed by vacuum blasting or open nozzle blasting so that the steel has a proper roughness and a cleanness to Sa 3 according to ISO 8501:1988. The overlapping zone must be sanded or sweep blasted to ensure a good adhesion of the new paint.

Clean and wash with HEMPEL'S THINNER 08450.

Touch-up by brush to full film thickness with minimum 4 coats or by spray 3 coats HEMPADUR 15500.

Areas more than 1 sq.m. or areas where several damaged spots are concentrated.

Treatment: Repeat the original specification.

HEMPADUR 15500

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued: February 2002 - 1550011630CR006
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPADUR® 15570

CURING AGENT 95570

Description:

HEMPADUR 15570 is a two component, polyamide-adduct cured epoxy paint, which cures to a strong and highly corrosion resistant coating, at temperatures down to -10°C/14°F. The Micaceous Iron Oxide pigmented light grey 12430 quality is also well suited for application under humid conditions, on damp steel surfaces, and may be applied on moist surfaces.

Recommended use:

1. As a maintenance and repair primer, intermediate, and/or finishing coat in HEMPADUR systems in severely corrosive environment. As a finishing coat where a cosmetic appearance is of less importance.
2. As a low temperature curing epoxy primer, intermediate, and/or finishing coat in paint systems according to specification. Well suited as a (blast) primer in coal tar epoxy systems.

Service temperatures:

Dry:	Maximum 140°C/284°F
Ballast water service:	Resists normal ambient temperatures at sea*
Other water service:	40°C/104°F (no temperature gradient)
Other liquids:	Contact HEMPEL

**Avoid long-term exposure to negative temperature gradients.*

Certificates/Approvals:

Tested for non-contamination of grain cargoes at the Newcastle Occupational Health, Great Britain.
Has a German and Danish EC-type Examination Certificate.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Light grey/12430* *(MIO)* - Red/50630*
Finish:	Flat
Volume solids, %:	54 ± 1
Theoretical spreading rate:	5.4 m^2/litre - 100 micron 217 sq.ft./US gallon - 4 mils
Flash point:	25°C/77°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon
Dry to touch:	3-4 *(approx)* hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	430 g/litre - 3.6 lbs/US gallon
Min. curing temperature:	-10°C/14°F

**Another shade: grey 12170 may be available according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification nos:*
Marine maintenance	BAC-7, BT-6, DC-5, DC-6, ER-3, ID-3, FT-2
Marine newbuilding	BT-2, DC-5, ER-4, FT-2, -3, ID-2, SST-3, TS-3

Note: **HEMPADUR 15570 is for professional use only.**

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

October 2001 - 1557012430C0007
HEMPEL'S MARINE PAINTS A/S

APPLICATION INSTRUCTIONS

For product description refer to the product data sheet

HEMPADUR® 15570

CURING AGENT 95570

Physical data versus temperature:

Drying time and recoating interval vary with film thickness, temperature and later exposure conditions, thus: **In-field application:**
(100 micron/4 mils dry film thickness of HEMPADUR 15570)

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F
Drying time, approx	36 hours	16 hours	8 hours	4 hours	3 hours
Curing time, approx	2 months	1 month	14 days	7 days	5 days
MINIMUM recoating interval related to later conditions of exposure:					
Interval for recoating with HEMPATEX HI-BUILDs and 58030 (10°C/50°F or higher in the case of 58030)					
Atmospheric, medium	18 hours	9 hours	4 hours	2 hours	1½ hours
Atmospheric, severe	36 hours	18 hours	8 hours	4 hours	3 hours
Interval for recoating with HEMPADUR and HEMPATHANE qualities					
Atmospheric, medium	36 hours	18 hours	8 hours	4 hours	3 hours
Atmospheric, severe	36 hours	18 hours	8 hours	4 hours	3 hours
Immersion**	3 days	36 hours	16 hours	8 hours	6 hours
MAXIMUM recoating interval related to later conditions of exposure:					
Interval for recoating with HEMPATEX HI-BUILDs					
Atmospheric, medium	3 days	36 hours	16 hours	8 hours	6 hours
Atmospheric, severe	2 days	23 hours	10 hours	5 hours	4 hours
Interval for recoating with 58030					
Atmospheric, medium	Not relevant	Not relevant	6 days	3 days	1½ days
Atmospheric, severe	Not relevant	Not relevant	3 days	1½ days	1 days
Interval for recoating with HEMPADUR qualities					
Atmospheric, medium	None	None	None	None	None
Atmospheric, severe	None	None	None	None	None
Immersion***	(90 days)	(90 days)	60 days	30 days	23 days
Interval for recoating with HEMPATHANE qualities					
Atmospheric					
Medium	90 days	45 days	20 days	10 days	5 days
Severe	27 days	14 days	6 days	3 days	1½ days

** NOT relevant for HEMPATHANE Qualities.
*** Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.

Furthermore, please see page 2.

Issued: August 2000

HEMPADUR 15570

Workshop application:
(75 micron/3 mils dry film thickness of HEMPADUR 15570)

Surface temperature	10°C/50°F	20°C/68°F	30°C/86°F
Drying time, approx Curing time, approx	4 hours 14 days	2 hours 7 days	1½ hours 5 days
MINIMUM recoating interval related to later conditions of exposure:			
Interval for recoating with HEMPATEX HI-BUILDs 58030			
Atmospheric, medium Atmospheric, severe	30 minutes 4 hours	15 minutes 2 hours	10 minutes 1½ hours
Interval for recoating with HEMPADUR and HEMPATHANE qualities			
Atmospheric, medium Atmospheric, severe Immersion*	4 hours 4 hours 16 hours	2 hours 2 hours 8 hours	1½ hours 1½ hours 6 hours

* NOT relevant for HEMPATHANE Qualities

Maximum recoating intervals according to preceding table, page 1.

Maximum recoating intervals:
If the maximum recoating interval is exceeded, whatever the subsequent coat, roughening of the surface is necessary to ensure optimum intercoat adhesion or in the case of recoating with coatings other than HEMPADUR, apply a (thin) additional coat of HEMPADUR 15570 within the above directions for recoating.

Long recoating intervals:
A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing.

Any degraded surface layer, as a result of a long exposure period, must be removed as well. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

The short minimum recoating intervals when overcoated with 46330, 46370, 46410 and 58030, HEMPADUR and HEMPATHANE in case of workshop application, are only possible if the finished paint system is through dry before exposure to the environment.

Before recoating after exposure in contaminated environment, irrespective of recoating interval, clean surface thoroughly e.g. by (high pressure) fresh water hosing and allow to dry.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

August 2000 - 1557012430C0007
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPEL'S GALVOSIL® 15700

HEMPEL'S ZINC DUST 97170

Description:
HEMPEL'S GALVOSIL 15700 is a two-component, solvent-borne, self-curing, inorganic zinc silicate with outstanding resistance against weathering and abrasion.
It has excellent chemical resistance within the pH range 6-9. For service temperature range, see below. Applicable by airless spray. Offers cathodic protection of local mechanical damage.

Recommended use:
1. As a general purpose, heavy-duty, rust-preventing primer.
2. As a single, complete coating for long-term protection of steel exposed to moderately to severely corrosive environment and to abrasion.
3. As a tank lining in accordance with the CARGO PROTECTION GUIDE.

Service temperatures:
- Resistant to permanent dry temperatures up to 500°C/932°F.
- Resistant to occasional short-term heating (peak temperatures) up to 500°C/932°F while permanent service temperatures are otherwise below 400°C/752°F.
- In the case of cyclic service conditions with regular periods of low and high temperatures, the temperature should be kept below 400°C/752°F.

In the case of service temperatures above 400°C/752°F, it is of advantage to apply a topcoat of HEMPEL'S SILICONE ALUMINIUM 56910.

Certificates/Approvals:
Certificated by Scientific & Technical Services to comply with the requirements of low moisture fats and oil according to FDA.
Approved by Lloyd's Register of Shipping as a recognized corrosion control coating.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Metal grey/19840
Finish:	Flat
Volume solids, %:	64 ± 1
Theoretical spreading rate:	12.8 m²/litre - 50 micron 513 sq.ft./US gallon - 2 mils
Flash point:	14°C/57°F
Specific gravity:	2.65 kg/litre - 22.1 lbs/US gallon
Dry to touch:	30 (approx.) min. at 20°C/68°F (65-75% RH)
Fully cured:	3 (approx.) days at 20°C/68°F (65-75% RH)
V.O.C.:	535 g/litre - 4.5 lbs/US gallon
Min. curing temperature:	-10°C/14°F
Shelf life:	1 year (25°C/77°F) from time of production. Shelf life is dependent on storage temperature. Shelf life is reduced at storage temperatures above 25°C/77°F. Do not store above 40°C/104°F. Shelf life is exceeded if the liquid is gelled or if the mixed product forms gels before application.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:
Segment: *Specification no.:*
Marine maintenance/newbuilding: CT-4/BT-7, CH-8, -9, CT-4, DC-7, -8, -9, SST-7, TS-9

Note:
HEMPEL'S GALVOSIL 15700 is for professional use only.

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:
March 2003 - 1570019840C0026
HEMPEL'S MARINE PAINTS A/S

APPLICATION INSTRUCTIONS

For product description refer to the product data sheet

HEMPEL'S GALVOSIL® 15700

Scope:

These application instructions cover surface preparation, application equipment, and application of HEMPEL'S GALVOSIL 15700.

The following are general rules, which may be supplemented with more detailed descriptions when needed, for instance for major newbuildings/new constructions or extensive repair jobs.

Steel work:

For optimum performance, eg relevant for cargo tank coating, the following is recommended:
All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in weldings seams, undercuts, cracks, etc. should be avoided. If found, they must be remedied by welding and/or grinding.

All weld spatters must be removed.

All sharp edges must be removed or rounded off in such a way that the specified film thickness can be build-up on all surfaces. The radius of the rounding should be approximately 1-2 mm. Any laminations must be removed.

The steel must be of first class quality and should not have been allowed to rust more than corresponding to grade B of ISO 8501-1:1988.

Note: Porous surfaces such as certain types of cast iron cannot be properly protected with zinc silicate. Deeply corroded steel may also be difficult to protect with a zinc silicate.

All steel work (including welding, flamecutting, grinding) must be finished before the surface preparation starts.

Surface preparation:

Prior to abrasive blast cleaning of the steel, remove oil, grease, salts and other contamination with a suitable detergent followed by high pressure fresh water hosing. Alkali deposits on new welding seams as well as soap traces from pressure testing of tanks to be removed by fresh water and scrubbing with stiff brushes. Control for absence of contamination according to separate guidelines.

On repair jobs, a rough blasting to remove all loosely adhering materials may be required before degreasing/washing is carried out.

Old steel: Even after a very thorough cleaning, pits may typically contain contamination in the form of remnants of chemicals/water soluble salts. For this reason, repeated detergent washing plus abrasive blasting may be necessary. After the first blasting, a very thorough vacuum cleaning is carried out in order to see if any "chemical bleeding" occurs as well as controls for water soluble salts (reference is made to separate instructions) are made. Special care should be taken in evaluating pitted areas - ask for special guidelines.

Grit blast to min Sa 2½, ISO 8501-1:1988.

To obtain full chemical resistance according to the CARGO PROTECTION GUIDE, the steel surface must be abrasive blast cleaned according to ISO 8501-1:1988, very near to white metal Sa 2½-Sa 3. In practice, this requirement is to be understood as white metal Sa 3 at the moment of abrasive blasting, but allows for a slight reduction at the moment of paint application.

The resulting surface profile must be equivalent to Rugotest No. 3, min. BN 10a, Keane-Tator Surface Comparator, G/S min 3.0 or ISO/DIS 8503/1 rough MEDIUM (G).

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In case of new steel to be exposed to no more than medium aggressive (industrial) environment and without any extraordinary demands to lifetime, a surface preparation degree of SSPC-SP6 may suffice.

Note: A lower surface profile than specified will cause reduced adhesion and increased tendency to mud cracking.

Use steel grit, aluminium silicate, or similar sharp edged abrasives of a good quality free of foreign matters, soft particles, and the like. Control for absence of contamination according to separate guidelines.

Steel grit with particle sizes of 0.2-1.2 mm or aluminium silicate of 0.4-1.8 mm will usually create the desired surface profile when the air pressure measured at the nozzle is 6-7 bar/85-100 psi.

The compressed air must be dry and clean. The compressor must be fitted with suitable oil and water traps.

When the abrasive blasting is completed, remove residual grit and dust by vacuum cleaning. Abrasive particles not removed by vacuum cleaning are to be removed by brushing with clean brushes followed by vacuum cleaning.

The importance of systematic working must be stressed when blasting. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

Old tank coatings: Must be completely removed. If the steel is pit corroded, the above guidelines for "Old steel" must be followed.

Shopprimed surfaces: When shoppriming is required only zinc silicate shopprimer such as HEMPEL'S SHOPPRIMER ZS 15890 may be used and preferably in a reddish shade.

Before recoating with GALVOSIL 15700, intact shopprimer must be abrasive grit swept in order to obtain specified roughness. A uniform sweep blasting is required, removing minimum 70% of the shopprimer followed by vacuum cleaning to remove accumulated dirt and zinc salts and to ensure adhesion.

Welds, rusty spots, burned areas, and all areas with other types of shopprimers than zinc silicates of a type like HEMPEL'S SHOPPRIMER ZS 15890 must be completely abrasive grit blasted as described above.

Application equipment:

GALVOSIL 15700 can be applied by conventional spray equipment (pressure pot type), airless spray equipment, or by brush.

Conventional Spray equipment: Standard industrial spray equipment with mechanical agitator and pressure regulators, air filters, and water traps.

Air hose:	10 mm (3/8") internal diameter.
Material hose:	13 mm (1/2") internal diameter.

Hoses should be as short as possible, preferably not longer than 10 metres/30 feet.

Pot pressure:	2.5-5 bar (35-70 psi)
Atomization pressure:	1.5-2.5 bar (20-35 psi)
Nozzle orifice:	1.8-2.2 mm (.070"-.085")

(Spray-data are indicative and subject to adjustment).

Thinning, if required: max. 50% of THINNER 08700.

The pressure pot must be placed at the same level as or at a higher level than the spray gun when spraying, owing to the weight of the material. Alternatively a piston-pump (e.g. 10:1) may be used instead of the pressure pot. This will facilitate the use of longer hoses or having the spray gun at a higher level than the pump.

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When painting undersides, the spray gun will need intermittent cleaning with THINNER 08700 to prevent clogging of the nozzle.

With conventional spray application regulation of the pot and the atomizing air pressures can be made as follows:

1. Shut off the atomizing air.

2. Regulate the pressure in the pot so that the material reaches approximately 60 cm/20" horizontally out from the gun before falling to the ground.

3. Turn on the atomizing air using lowest possible pressure.

Airless spray equipment: A large, slow-working pump is preferred, e.g 30:1, with a pump capacity of 8-12 litres/minute. The in-line filter should be 60 mesh.

Gaskets:	Teflon
Nozzle orifice:	.019" through .023".
Fan angle:	40° through 70°.
Nozzle pressure:	100-150 bar (1400-2100 psi).

(Spray data are indicative and subject to adjustment).

Thinning, if required: max. 30% of THINNER 08700.

Thinning:

The amount of thinning necessary will depend upon prevailing conditions: Temperature, humidity, wind/ventilation, method of spraying, spray equipment, etc.

In the case of a high level of thinning and/or long stops in application, the mixed paint must be recirculated to avoid settlement of zinc particles in the spray hoses.

The coating **must** be wet and smooth just after application. Besides correct spray technique, the amount of thinner added must be selected securing this optimum film formation.

Too little thinning will typically lead to dry-spray and too much thinning to sagging and settling of zinc particles in the can or in the spray hoses.

Cleaning of equipment:

The whole equipment must be cleaned thoroughly with THINNER 08700 after use.

Addltionally for conventional spray-guns:

In the case of short stops, prevent packing of zinc around the needle by placing the spray gun in THINNER 08700 and let some air pass the spray gun. In the case of longer stops, clean the spray gun with THINNER 08700.

Mixing:

a. Do not open packings until immediately before use. The entire content of the two packings must be used for each batch to ensure a correct mixture. Left-overs in the packings cannot be used later. Protect the ZINC DUST against moisture before mixing.

b. Before mixing, shake or stir the GALVOSIL 15709 LIQUID very thoroughly.

c. Pour the ZINC DUST slowly down into the LIQUID with constant mechanical stirring. **Do not mix in the reverse order**. Continue stirring until the mixture is free of lumps.

d. Strain the mixture through a screen, 60 - 80 mesh (250 - 160 DIN Norm. 4188).

Pot life:

8 hours at 20°C/68°F.

Temperature of paint:

In a hot climate it is important that the cans with LIQUID are kept out of the sun and that the temperature of the liquid is kept below 30°C/86°F in order to avoid excessive dry spray.

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Application procedure, general:

Maintain constant agitation of the mixture until the batch is depleted.

The spray gun should be kept at a distance of 30-50 cm from the surface. Hold the spray gun at a right angle to the surface, making even, parallel passes with about 50% overlap.

Besides correct spray technique the amount of thinner added must be carefully adjusted to secure optimum film formation. **The coating must be wet and smooth just after application. It is important to avoid dry-spraying.**

Select small nozzles (small orifice and small fan angle) for spray application of complicated structures, while bigger nozzles may be used for regular surfaces.

The wet film thickness must be checked immediately after application, but it can only be used as a rough guidance because of the fast drying.

Application procedure, tank coating:

When used as a tank coating, HEMPEL'S GALVOSIL 15700 is normally specified in 1 x 100 micron/1 x 4 mils - minimum 80 micron/3.2 mils, maximum 150 micron/6 mils.

To achieve a correct film formation within these limits, it is recommended to apply two coats "wet-in-almost-dry":

Apply one coat and apply the second coat within 15-30 minutes before the first coat has turned grey but is still dark.

When following this procedure, HEMPEL'S GALVOSIL 15700 must be thinned approximately 15% in order to avoid too high film thicknesses.

Too high film thicknesses on welds in corners must be smoothened by a flat brush, approximately 1" wide.

When coating tanks, it is of the utmost importance to avoid dry-spray, which is a typical indication of poor film formation.

Poor film formation of a one-coat tank coating system like HEMPEL'S GALVOSIL 15700 may result in immediate failure.

Any dry-sprayed areas must be smoothened by scraping with a spatula (rounded corners) or by light sandpapering or by using a cleaning sponge ("3M", "Scotch-brite" type).

After vacuum cleaning as necessary, the smoothened areas are applied a thin coat of HEMPEL'S GALVOSIL 15700 achieved by using 20-25% thinning.

Note: If working conditions ask for it some hours may elapse between the first and the second coat provided that the relative humidity is kept constantly low, but it is recommended to finalize the application as soon as possible and within the same working shift.

Stripe coating:

All places difficult to cover properly by spray application must be stripe coated with a brush immediately before or after the spray application

Microclimate:

The actual climatic conditions at the substrate during application and until acceptance:

The minimum surface temperature is -10°C/14°F.

The maximum recommended surface temperature is approx. 40°C/104°F. Higher steel temperatures are acceptable provided dry-spray is avoided by (extra thinning and) proper spray application. In extreme cases a reduction of the dry film thickness may also be necessary. In a warm climate it is recommended to carry out application during nighttime.

The steel temperature must be above the dewpoint. As a rule of thumb a steel temperature which is 3°C/5°F above the dewpoint can be considered safe.

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With temperatures at or below 0°C/32°F beware of ice on the surface, which will hinder the adhesion, and use a capacitive RH-meter for measuring the relative humidity.

In confined spaces, supply an adequate amount of fresh air during application and drying to assist the evaporation of solvent. All surfaces must be ventilated. However, avoid ventilators blowing directly onto the freshly applied paint.

Drying and curing, ventilation:

Correct film formation depends on an adequate ventilation during drying.

A good guideline for tank coating work is to ventilate to a calculated 10% of LEL during application and until the coating is dry.

One litre undiluted HEMPEL'S GALVOSIL 15700 gives off in total 160 litres solvent **vapour** until it is completely dry.

The lower explosive limit, LEL, is 0.5%.

To reach a common safety requirement of 10% LEL, the thoretical ventilation requirement is 320 m^3 per litre paint.

Because solvent vapours are heavier than atmospheric air, effective ventilation requires forced ventilation with exhaust from the lowest part of the tank.

During the following period until full curing a few air shifts per hour will suffice. Take actions to avoid "pockets" of stagnant air.

Please contact HEMPEL for further advice.

Actual safety precautions may require stronger ventilation.

It is recommended to keep the relative humidity low during application and drying. Thereafter, let the relative humidity raise by "natural means", i.e. the dehumidifiers are notched off and normal ventilation used. However, it is recommended to let dehumidifiers run until dry film thicknesses have been checked - and if needed - rectified by an extra paint application.

Curing time:

Curing is dependent on (steel) temperatures and relative humidities.

At 20°C/68°F and 65-75% RH, curing requires approximately 3 days. At lower temperatures and relative humidity, curing time will increase considerably. Please contact Hempel for further instructions.

The relative humidity should be minimum 65% - and the minimum temperature -10°C/14°F - during the period of curing. Hosing down of tanks can support curing, but should if possible await the state of "near to complete" curing - please see below.

The coating will resist light showers after 1-2 hours at 20°C/68°F and 75% relative humidity. Curing may be promoted at low humidity by hosing down the surface with water 4 hours after application and keeping the surface constantly wet until curing is complete. If salt water is used, rinse with fresh water if the surface is to be overcoated.

State of curing:

Can be checked by rubbing the coating with a rag soaked in THINNER 08700. If the coating remains unaffected, state of curing is sufficient for recoating with other paint materials (when used as a cargo tank coating this state of curing may be described as "near to complete").

Full curing for cargo loading:

Before tanks are taken into use, the coating must be completely through-cured. This is secured by low pressure hosing/washing the tanks with (fresh) water 2-3 times after the above described condition of "near to complete curing" has been obtained. By using the tank washing equipment, the normal ½ hour cycle is applied with half a day to one day between washings. Let the tanks remain wet between the washing.

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Full curing is confirmed by rubbing the coating with methyl ethyl ketone.

The coating will now be fully resistant according to the CARGO PROTECTION GUIDE, but as long as the porosities are not yet filled with zinc salts, absorption of cargoes will take place, maybe making cleaning more difficult.

Curing may also be checked by scraping with e.g. a knife or a coin which shall produce a bright mark leaving some loosened zinc dust but no irregular detachment.

Full hardness will be obtained after weathering for some time.

Recommended film thickness:

For long time protection, **when topcoated with heavy-duty systems:**
50 micron/2 mils dry; 75 micron/3 mils wet, (undiluted).

For long time protection, **without topcoat:**
75-100 micron/3-4 mils dry; 125-150 micron/5-6 mils wet, (undiluted).

In tanks: 100 micron/4 mils dry; 150 micron/6 mils wet, (undiluted), may be specified.

For a tank coating specification the film thickness should be controlled according to the 80-20 rule, ie 80% of the dry film thickness measurements must be equal to or greater than the specified film thickness (100 micron/4 mils) and of those below the specified film thickness, no measurements must be lower than 80% of the 100 micron/4 mils. For narrow frames, girders and similar areas not being very accessible the film thickness could be controlled according to the 70-30 rule,

Too high dry film thickness, ie above approximately 150 micron/6 mils dry, should be avoided due to the risk of mud cracking or peeling. Please observe that according to accepted rules of measuring "a measurement" is to be the mean of three single point measurements taken in a close vicinity.

Note: Special care is necessary to ensure proper film thickness on welding seams, edges, corners, ribs, etc.

Extra coat (by itself):

Too low film thickness can be made good by applying an extra coat of HEMPEL'S GALVOSIL 15700. Surface preparation procedure - if necessary - and dilution of paint according to page 4 "Application procedure, tank coating".

The maximum interval for applying an extra coat is 7 days **provided** that the relative humidity is kept below 60%, absolute maximum is 65%, all the time until recoating and that the painted surface is not exposed to open weather, contamination of the like.

Spreading rate:

Theoretical (on a smooth surface):

dft, micron	dft, mils	m^2/litre	sq.ft./US gallon
50	2	12.8	513
75	3	8.5	342
100	4	6.4	257

Practical (with a consumption factor of 1.8):

dft, micron	dft, mils	m^2/litre	sq.ft./US gallon
50	2	7.1	285
75	3	4.7	190
100	4	3.6	143

Recoating interval (other paints):

HEMPEL'S GALVOSIL 15700 must be fully cured before recoating with a full paint system. By recoating with sealer in 25 micron/1 mil only, the interval can be reduced to eg 24 hours at 20°C/68°F and 65-75% RH provided that the following coats are applied **after** HEMPEL'S GALVOSIL 15700 is **fully cured**.

Topcoating procedure:

Non-weathered zinc silicate coatings are porous and popping may occur in the subsequent coat(s).

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One way to reduce the risk of popping is to apply a mist coat as the first pass of the subsequent coat, let the air escape, and then apply the remainder of the topcoat.

Some of HEMPEL's products will substantially reduce the risk of popping when applied directly on top of the zinc silicate. See painting specification.

Advanced paint systems are recommended for topcoating, e.g. HEMPADUR qualities.

Surface cleaning:

The cleaning before topcoating depends on the condition of the surface:

1. Intact zinc silicate surface with sporadic formation of "white rust" (zinc corrosion products).

   a. Remove oil, grease, dirt, etc. by detergent wash.

   b. Remove "white rust" by high pressure fresh water cleaning 200-350 bar (2900-5000 psi) at a nozzle-to-surface distance of 15-20 cm (6-8").

      If the surface is only slightly contaminated, corresponding to 1-2 months of exposure in a mildly corrosive environment, hosing down of the surface with fresh water and scrubbing with stiff brushes (nylon) may be sufficient and more practical. Check that the coating is through dry before recoating.

2. Zinc silicate surface with extreme formation of "white rust" which cannot be removed as described above.

   a. Remove oil, grease, dirt, etc. by detergent wash.

   b. Abrasive blast sweep to remove "white rust", followed by vacuum cleaning to remove abrasives and dust.

   c. Restore the zinc layer with any solvent borne GALVOSIL quality or zinc epoxy (HEMPADUR ZINC).

3. Damaged areas, burns, weld spatters, etc.

   a. Remove oil, grease, dirt, etc. by detergent wash.

   b. Remove weld spatters.

   c. Abrasive blasting to min. Sa 2½, followed by thorough removal of abrasives and dust by vacuum cleaning.

   d. Restore the zinc layer with any solvent borne GALVOSIL quality or zinc epoxy (HEMPADUR ZINC).

HEMPEL'S GALVOSIL 15700

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued: February 2002 - 1570019840C0026
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPADUR® ZINC 17360

CURING AGENT 97040

Description:

HEMPADUR ZINC 17360 is a two-component, zinc rich epoxy primer. It cures to a hard wearing and highly weather-resistant coating. Offers cathodic protection of local mechanical damage.

Recommended use:

As a "V.O.C.-compliant", versatile, long-term primer on steel for epoxy, vinyl and acrylic coating systems in medium to severely corrosive environments.

Service temperatures:

Maximum, dry: 160°C/320°F, however, depending on the subsequent coat.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Red-grey/19830
Finish:	Flat
Volume solids, %:	65 ± 1
Theoretical spreading rate:	13.0 m²/litre - 50 micron 521 sq.ft./S gallon - 2 mils
Flash point:	24°C/75°F
Specific gravity:	2.7 kg/litre - 22.5 lbs/US gallon
Surface dry:	½ (approx.) hour at 20°C/68°F (ISO 1517)
Dry to touch:	1 (approx.) hour at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	335 g/litre - 2.8 lbs/US gallon
Min. curing temperature:	-10°C/14°F

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification nos:*
Marine maintenance	SST-7, TS-9
Marine newbuilding	DC-6, SST-6, TS-8

Note:

HEMPADUR ZINC 17360 is for professional use only.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

October 2001 - 1736019830C0005
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPADUR® 17630/ HEMPADUR® 17633

Medium to high temperatures: 17630 with CURING AGENT 97330
Low to medium temperatures: 17633 with CURING AGENT 98420

Description:
HEMPADUR 17630/17633 is a two-component, high-build, polyamide adduct-cured epoxy paint which cures to a hard and tough coating with good resistance to abrasion, seawater and crude oil.

Recommended use:
As a selfprimed coating for ballast water tanks and similar. As a primer for epoxy systems for atmospheric or in-water service. Suitable for application down to -10°C/14°F. HEMPADUR 17633 is intended for use in cold/temperate climates, HEMPADUR 17630 is intended for use in temperate to warm climates.

Service temperatures:

Dry:	Maximum 120°C/248°F
Ballast water service:	Resists normal ambient temperatures at sea*
Other water service:	40°C/104°F (no temperature gradient)
Other liquids:	Contact HEMPEL

**Avoid long-term exposure to negative temperature gradients.*

Certificates/Approvals:
Classification B1 by Marintek, a subsidiary of Sintef, Norway.
Approved by Lloyd's Register of Shipping as a provisionally recognized corrosion control coating.
Approved as a corrosion control coating by Maritime Register of Shipping, Russia.
Approved as a ballast tank coating by Germanischer Lloyd, Germany. HEMPADUR 17630 has been tested for non-contamination of grain cargo at the HEMPADUR 17630 complies with Section 175.300 of the Code of Federal Regulations in respect of carriage of dry foodstuffs (FDA) in spaces with an internal surface area larger that 1000 m^2/10.750 sq.ft.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Version; mixed product:	**17630**	**17633**
Colours/Shade nos:	Grey/12170 - cream/20320	Grey/12170 - cream/20320
Finish:	Semi-flat	Semi-flat
Volume solids, %:	69 ± 1	69 ± 1
Theoretical spreading rate:	4.6 m^2/litre - 150 micron 184 sq.ft./S gallon - 6 mils	4.6 m^2/litre - 150 micron 184 sq.ft./S gallon - 6 mils
Flash point:	32°C/90°F	32°C/90°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon	1.4 kg/litre - 11.7 lbs/US gallon
Dry to touch:	7-8 hours at 20°C/68°F	20 hours *(app.)* at 5°C/41°F
Fully cured:	7 days at 20°C/68°F	20 days at 5°C/41°F
V.O.C.:	310 g/litre - 2.6 lbs/US gallon	305 g/litre - 2.6 lbs/US gallon
Min. curing temperature:	0°C/32°F	-10°C/14°F

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification no.:*
Marine maintenance	BT-3, BT-4
Marine newbuilding	BT-3, BT-4, BAC-4

Note:
HEMPADUR 17630/17633 is for professional use only.

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:
September 2002 - 1763012170CO0005/1763312170CO0002
HEMPEL'S MARINE PAINTS A/S

APPLICATION INSTRUCTIONS

For product description refer to the product data sheet

HEMPADUR® 17630/ HEMPADUR® 17633

Medium to high temperatures: 17630 with CURING AGENT 97330
Low to medium temperatures: 17633 with CURING AGENT 98420

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR 17630/17633.

Ballast tanks, steel work:

For optimum performance the following is recommended:
All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in welding seams, undercuts, etc. should be avoided. If found, they may necessitate extra stripe coating or filling (however, the classification societies' recommendations are to be followed).

All sharp edges to be broken or rounded depending on the actual conditions and the design lifetime. Laminations to be removed. However, rolled profiles, etc. from the steel mills normally have acceptably rounded edges.

All loose weld spatters to be removed.

Well adhering, scattered weld spatters are acceptable, but will need additional touch-up. If dense, they must be removed by grinding.

Requirements to the "surface quality" of welds according to WELD REPLICA NACE RP 0178 minimum Grade E (NACE Standard RP0178-95).

Abrasive blasting/ abrasive sweep blasting:

Before blasting any deposits of grease or oil must be removed from the steel surface with a suitable detergent followed by fresh water hosing. Minor spots of oil/grease may be cleaned with thinner and clean rags - avoid smearing out the contamination. Possible alkali weld deposits, chemicals used for testing of welds, soap residues from the pressure testing must be removed by fresh water hosing.

Repair:
Before blasting, old steel surfaces must be checked for any contamination. Possible blisters must be broken. If thick rust scale has been removed or deep pittings have been encountered, control procedures for contamination must be carried out. If still contaminated, the abrasive blast cleaned steel surface will need a repeated cleaning for salts and/or oil/grease followed by final abrasive blast cleaning.

Newbuilding/new steelwork: To obtain full performance of the ballast tank coating, welds, burns, damaged and rusty shopprimer must be abrasive blast cleaned to Sa 2½. Minor areas mechanically cleaned to St 3.

If welds have previously been coated with a (shop)primer just after welding this (shop)primer must be removed by abrasive blasting (sweeping) in order to obtain optimum performance.

Intact shopprimer:
Zinc salted surfaces, deposits of black iron oxides of plasma cutting and similar foreign matters to be removed by light abrasive sweep blasting. Chalk markings and plate marking of a non-compatible nature to be removed as well.

The shopprimer must have been checked randomly for excessive film thicknesses and areas detected to have film thicknesses above approx 40 micron/1.6 mils (as measured directly on the shopprimed surface with equipment calibrated on smooth steel) are to be sweep blasted in order to remove most of the shopprimer.

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Spot-checking for possible salt contamination of the surface to be executed before and after abrasive sweep blasting.

When blasting, the importance of working systematically must be stressed. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

In the case of abrasive blast cleaning, the surface profile must be equivalent to Rugotest No. 3, BN9-BN10 or Keane-Tator Comparator, 3.0 G/S. According to ISO 8503-1 the grade will be MEDIUM (G).

Note: If any doubt exists about the quality of the primary surface preparation (before shoppriming), the substrate must be re-blasted in situ as defined above.

Block assembly zones: Overlap zones must be treated with great care. Damage caused by possible over-blasting must be avoided, paint edges must be feathered and consecutive layers of paint coatings given greater and greater overlaps - old layers being roughened corresponding to these overlaps (when sand papering, use free-cut paper, grain size 80).

Furthermore, these areas may be either masked off with tape - to keep them as narrow as possible - or left with a **thin** zinc epoxy primer coat applied on these areas after secondary surface preparation at blockstage.

Secondary surface preparation of block assembly zones are preferably to be abrasive spot-blasted. However, mechanical cleaning to St 3 may be acceptable if zones are narrow and an extra coat of HEMPADUR 17630/17633 is applied to these areas. The procedure of masking off with tape or using the zinc epoxy primer as described above may advantageously be used in case of mec hanical cleaning.

Repair:
Corroded pits deeper than approx 2 mm, but not repaired by welding, are recommended to be filled with HEMPADUR EPOXY FILLER 35250 after blast priming has been carried out.

Stainless Steel: (Ballast tanks of chemical carriers) to be abrasive blast cleaned to a uniform, sharp, **dense**, profile (Rugotest No. 3, BN9-10, ISO Comparator Medium (G), Keane-Tator Comparator 2.0 G/S corresponding to Rz minimum 50 micron). Any salts, grease, oil etc. to be removed before abrasive blasting is commenced.

Water jetting:

This procedure will primarily be relevant for repair jobs. However, the very good removal of water-soluble salts may also make it useful in other cases.

The resulting standard is to be equal to the WJ-2 (NACE No. 5/SSPC-SP 12 "Surface Preparation and Cleaning of Steel and other Hard Materials by High and Ultra-High Pressure Water Jetting prior to Recoating", 1995).

Sufficient dehumidification equipment must be used to dry out the tanks as quickly as possible between the water jetting and the coating application.

Local ventilators may be required to distribute the drying air evenly in tanks. All "slurry" is to be removed before it dries. New rust will be acceptable as discoloration only, **not** as powdery, loose rust. Acceptable degree of "flash rust" is maximum FR-2 (HEMPEL standard). Inhibitors are **not** to be used.

All surfaces must be free from contamination at the time of painting and the relative humidity is to be below 85%.

Refurbishment:

It is recommended to carry out rough abrasive blast cleaning - or water jetting - to facilitate visual inspection and any necessary repair of the existing steel work. In the case of pit-corroded tank bottoms this rough blasting will also provide a better basis for a decision between welding of corroded pits or repair by filling.

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A main concern is the contamination from sea water (water-soluble, corrosive salts). The preventive method will be to include very thorough cleaning with plenty of fresh water, please see below.

The maximum allowable concentration of chlorides on steel surfaces immediately before application is 7.0 microgrammes/cm² as detected by the "Bresle Method".

In the case of contamination, cleaning procedures must be repeated and/or improved. Especially pit-corroded steel will need special attention and the only possible way to remove contamination from the pits may often be to carry out very thorough cleaning with fresh water after abrasive blast cleaning. After repeated control and drying, the entire surface will need abrasive blast cleaning to obtain the specified degree of cleaning. Alternatively, the pit-corroded areas are cleaned by water jetting, any surplus of water is mopped up or removed by vacuum cleaning, allow to dry.

Note: Actual type of steel work and surface preparation is dependent on factors such a shipyard technology, contractual specification, required lifetime, etc. Reference is also made to HEMPEL's Technical Standard for Ballast Tank Coating Work.

Application equipment:

HEMPADUR 17630/17633, being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter
	max. 30 metres/100 feet, 3/8" internal diameter
	max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh
Nozzle size:	.021"-.025"
Fan angle:	60-80°.

To spray complicated surfaces smallest nozzles should be used.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are necessary it may be necessary to raise the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by overthinning.

Airless spray data are indicative and subject to adjustment.

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Application:

Film-build/continuity: With this ballast tank coating it is of special importance that a continuous, pinhole-free paint film is obtained at application of each spray applied coat. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripe coat will usually be necessary. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.

The paint layer must be applied homogeneously and as close to the specification as possible. The consumption of paint must be controlled to avoid exaggerated film thickness, eg by controlling paint consumption and/or measuring wet film thickness.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Stripe coating: may either be applied by airless spray, (relatively small, narrow-angled nozzles) or by hand-tools. Apply the stripe coat as a uniform, regular film without excessive brush or roller marks in order to avoid cratering by entrapped air.

Application on zinc silicate:

A proper mist-coat technique is necessary in order to avoid/reduce the risk of "popping" /"pinholes". Add up to 50% thinner depending on the actual conditions of application.

Pot life/mixing/ induction time: (both curing agents):

When measured under standard conditions the pot life is 3 hours at 15°C/59°F and 2 hours at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packings. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 86 parts by weight of base and 14 parts by weight of curing agent or by volume: 4.0 parts by volume base and 1.0 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life	3 hours	2 hours	1½ hours	1 hour

1) At 15°C/59°F and below, the viscosity can be too high for airless spray application.
2) Temperatures above 30°C/86°F should preferably be avoided.

Induction time:
At **steel** temperatures below 5°C/41°F the paint may advantageously be prereacted 10-20 minutes before spray application (longer pre-reaction time at lower temperatures).

When two-component spray equipment is used, heating may be relevant to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

Physical data versus temperature:

(HEMPADUR 17630 in a dry film thickness of 150 micron/6 mils):

Surface temperature	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F
Drying time Curing time	32 hours 28 days	14 hours 14 days	7 hours 7 days	5 hours 3½ days
Initial curing*	20 days	10 days	5 days	2½ days

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(HEMPADUR 17633 in a dry film thickness of 150 micron/6 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F
Drying time Curing time	63 hours 56 days	32 hours 28 days	14 hours 14 days
Initial curing*	40 days	20 days	10 days

* When the state "initial curing" has been reached, the coating may exceptionally be exposed to ballast water provided it has been applied within the specified limits of film thicknesses **and** that all painted areas have been subject to thorough ventilation.

Recoating:

Recoating intervals (provided proper ventilation)
(150 micron/6 mils dry film thickness)

	17630				**17633**			
	Minimum		Maximum		Minimum		Maximum	
Steel temperature	10°C/50°F	20°C/68°F	10°C/50°F	20°C/68°F	-10°C/14°F	0°C/32°F	-10°C/14°F	0°C/32°F
Recoated with: (quality no. only)								
Itself (ballast tanks) 45182	16 hours 16 hours	8 hours 8 hours	90 days* 90 days	30 days* 30 days	3 days 3 days	36 hours 36 hours	(90 days)* (90 days)	90 days* 90 days

*Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.

Maximum recoating intervals:
If the maximum recoating interval is exceeded, whatever the subsequent coat, roughening of the surface is necessary to ensure optimum intercoat adhesion or in the case of recoating with coatings other than HEMPADUR, apply a (thin) additional coat of HEMPADUR 17630/17633 within the following directions for recoating:

- **Long recoating intervals:**
  A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing.

- **Any degraded surface layer, as a result of a long exposure period, must be removed as well**. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

To check whether the quality of the surface cleaning is adequate, a test patch may be relevant

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

September 2002 - 1763012170C0004/1763312170C0001
HEMPEL'S MARINE PAINTS A/S.

Product Data

HEMPADUR® MULTI-STRENGTH® 35530

CURING AGENT 95530

Description:

HEMPADUR MULTI-STRENGTH 35530 is a solvent-free, two-component, high-build, polyamine cured epoxy paint, which cures to a coating with good resistance to fresh water, seawater, crude oil, and to abrasion.
Applicable in thick coats by standard heavy duty airless spray equipment.
Harmless to grain cargo.

Recommended use:

1. As a heavy duty coating on steel exposed to abrasion where solvent-free materials are required. Full colour retention will be of secondary importance.
   If solvent containing paints are accepted, HEMPADUR MULTI-STRENGTH 45751 substitutes.
2. As a lining in potable water tanks and pipelines. Please see Certificates/Approvals.

Service temperatures:

	Dry:	In fresh water (directly on steel):
Maximum:	140°C/284°F	35°C/95°F (no temperature gradient)

Certificates/Approvals:

Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.
Approved by Water Research Centre, Great Britain, for potable water up to 23°C/73°F.
Approved by Ministry of Electricity & Water, Bahrain, for potable water.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/10500 - Red/51320
Finish:	Semi-gloss
Solids content:	100%
Theoretical spreading rate:	3.3 m²/litre - 300 micron 134 sq.ft./US gallon - 12 mils
Flash point:	> 100°C/212°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Surface dry:	12 (approx.) hrs at 20°C/68°F *(ISO 1517)*
Dry to touch:	24 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	0 g/litre - 0 lbs/US gallon
Min. curing temperature:	10°C/50°F

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances. Further reference is made to "Explanatory Notes" in the HEMPEL book. The theoretical spreading rate has been calculated on the basis of a 100% solids volume.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification no.:*
Marine maintenance	FW-2
Marine newbuilding	FW-2

Note:
HEMPADUR MULTI-STRENGTH 35530 is for professional use only.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

November 2001 - 3553010500C0002
HEMPEL'S MARINE PAINTS A/S

This Product Data Sheet supersedes those previously issued. For definition and scope, see explanatory notes to applicable Product Data Sheets.

APPLICATION INSTRUCTIONS

For product description refer to the product data sheet

HEMPADUR® MULTI-STRENGTH® 35530

BASE 35539 with CURING AGENT 95530

Scope:

These Application Instructions cover surface preparation, application equipment, and application details for HEMPADUR 35530.

Surface preparation:

Steel:
Abrasive blasting to min. Sa 2½. Grit-blasted surfaces: recommended profile is Rz minimum 100 micron/4 mils - maximum 150 micron/6 mils corresponding to ISO Comparator Coarse (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasives and dust. HEMPADUR 15590 may be used as a blast primer/hold-coat.

On old steel surfaces having been exposed to salt water , excessive amounts of salt residues in pittings may call for dry abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again. Alternatively, water jetting may be used provided the steel surface has already the surface profile as described above.

In case of extensively pit-corroded surfaces (tank bottoms): Remove oil and grease with suitable detergent. Blasting to Sa 2, ISO 8501-1: 1988. Pittings on tank bottoms are often omega-shaped (typically in the case of chloride-induced corrosion) for which reason the following procedure is recommended:

After rough cleaning for dust and abrasives, the tank surfaces are to be thoroughly high pressure fresh water hosed. Let the water remain in the tank so that all pit corroded areas are covered by approx 5 cm/2" of water.

After 24 hours the water is removed by wet vacuum cleaning and the tank is dried. If needed, i.e. if there is still salt contamination to be found in the pits, the washing treatment has to be repeated. After cleaning, the surfaces are blasted to min. Sa 2½ with a surface roughness profile as described above. After blasting clean the surface carefully for abrasives and dust. Special care must be taken when cleaning the tank bottom.

Concrete: The concrete must be of good quality and fully cured, eg 28 days for normal Portland cement, and completely dry with a humidity content in the surface below 4%. The concrete must also be controlled for absence of capillary water action or for subsoil water.

Minimum pull-off value should normally be 20 kilopond/cm² measured after surface preparation. Any cracks, crevices and voids must be repaired.

All possible slip agent, oil, grease and other contaminants must be removed by eg abrasive blasting, volatilizing by flame cleaning or treatment with suitable detergent. The last mentioned in the following way: Saturation of the surface with fresh water. Washing with suitable detergent followed by fresh water hosing.

Depending on construction and purpose, abrasive blast, high pressure water jet or treat the concrete with power tools to obtain a rough and firm surface free of scum layer and other contamination. Remove dust and loose material.

If mechanical treatment is impossible, the surface may be treated with acid etching. For this purpose an approx. 5% w/w nitric or phosphoric acid solution is recommended.

Note: Strong acids, take necessary precautions, make sure that safety regulations are obeyed!

Issued: March 2003

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Prior to etching the concrete should be saturated with fresh water to prevent acid corrosion of the reinforcement bars. Leave the acid to act for 3-4 minutes and hose down the surface with fresh water - preferably first a 5% w/w sodium hydroxide solution - and scrub carefully. After that the surface must dry homogenously and appear as an even, rough surface free of a loose outer layer. The surface must have a pH reaction of between 6.5-8.0. If any of these conditions are not fulfilled, the process must be repeated. The surface must be dried with good ventilation for at least 2 days at 65% relative humidity and 20°C/68°F. The pretreatment is controlled by scraping with a strong knife. The surface must feel solid and hard, and the knife must only leave a clear scratch mark.

Seal the surface with HEMPADUR SEALER 05990 in such a way that the surface **is just saturated. Surplus must be removed** (do also see the Product Data sheet for HEMPADUR SEALER 05990).

Application equipment:

HEMPADUR MULTI-STRENGTH 35530, being a solventfree, high viscosity material, requires special measures to be taken at application.

Standard airless heavy duty spray equipment:

Pump ratio:	min 45:1 (See Note below)
Pump output:	12 litres/minute (theoretical)
Input pressure:	min 6 bar/90 psi
Spray hoses:	max 15 metres/50 feet, 3/8" internal diameter max 3 metres/10 feet, 1/4" internal diameter

Regular surfaces:

Nozzle size:	.023" through .031"
Fan angle:	40-60°.

Complicated surfaces:

Nozzle size:	.019" through .023"
Fan angle:	40°

Note: Avoid the use of a suction hose. Use an interchangeable pipe, which makes it possible to remove cured paint If longer spray hoses are necessary the pump ratio must be raised to 60:1 or more, yet the high output capacity of the pump must be maintained.

Thinning:

Alternatively 1-2% THINNER 08450 may be added, but thinning must be done with care as the antisagging properties are drastically reduced by overthinning. **Do NOT use thinning when coating surfaces to be in contact with potable water.**

Airless spray data are indicative and subject to adjustment.

Mixing:

Stir the CURING AGENT 95530 well before mixing with BASE. Continue the mixing until a complete uniform colour is achieved.

Hot airless spray equipment:

Use the same airless spray pump as described above.

On the output side of the pump an electrically heated, explosion proof, high pressure, material heater is fitted. For instance 2500 Watt, max. working pressure well above 300 bar (4-1 safety factor) equipment.

Spray hoses:	45 metres/150 feet, 3/8" internal diameter. 3 metres/10 feet, 1/4" internal diameter.

Regular surfaces:

Nozzle size:	.023" through .031"
Fan angle:	40-60°

Complicated surfaces:

Nozzle size:	.019" through .023".
Fan angle:	40°.

Issued: March 2003

HEMPADUR MULTI-STRENGTH 35530

Procedure for hot airless spray:

a) Follow the supplier's instructions for the use of the heater.

b) At surrounding temperatures below approximately 15°C/59°F start by heating up the hoses by recirculation of THINNER 08450 or HEMPEL'S TOOL CLEANER 99610.

c) Keep THINNER 08450 or HEMPEL'S TOOL CLEANER 99610 readily available for fast cleaning of the equipment.

d) Start spraying immediately after proper mixing and mechanical stirring of BASE 35539 and CURING AGENT 95530.

e) Adjust the heater to approximately 50°C/122°F and check this temperature at short intervals.

f) The spraying should as far as possible run continuously. At any break longer than 2-3 minutes, switch off the heat and flush the equipment immediately and thoroughly with one of the solvents mentioned above under c).

g) After finishing the application, switch off the heat and clean the equipment immediately with THINNER 08450 or HEMPEL'S TOOL CLEANER 99610. Continue the cleaning by re-circulation for at least 30 minutes.

Pit-corroded surfaces: In case of extensive pit corrosion (old tank bottoms) it is advisable to apply the first coat by brush. The coating must be worked well into all pits facilitating a good wetting of the steel and closing the porosities. The following coat(s) can be applied by brush as well as by airless spray (as per above) securing full covering of the uneven/rough surface.

Pot life:

When measured under standard conditions the pot life is one hour at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT is so intense that the corresponding practical pot life is **substantially shorter**.

Therefore:

- Irrespective of equipment, use the paint immediately after mixing. At a normal application speed the 20 litres/5 US gallons are used in approx. 10 minutes.
- Keep an eye on the paint temperature frequently for instance by touching the can with your hand. If it feels more than hand warm, discard the paint and flush the equipment immediately irrespective of type of spray equipment.

Paint temperature:

If the in-can temperature is below approximately 15°C/59°F viscosity will be too high for application. If the paint temperature at mixing is 25°C/77°F or higher a substantial risk of shortened pot life and curing in can/spray equipment exists. **When working in warm, sub-tropical/ tropical climates a refrigerated container can be used for storing/ cooling of the paint before application.**

Application:

Film-build/continuity: With this typical one-coat tank coating it is of great importance that a continuous, pinhole-free paint film is obtained. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. The usual way of obtaining this result is to spray-coat all these areas separately followed by a full coat all over. Furthermore, stripe coating by brush will typically be required. To obtain good and steady atomizing, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity.

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HEMPADUR MULTI-STRENGTH 35530

The paint layer must be applied homogenously and as close to the specification as possible. The consumption of paint must be controlled to avoid exaggerated film thickness, eg by controlling paint consumption and/or measuring wet film thickness.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Stripe coating:

Edges, corners, manual welds, and places difficult to cover properly by spray application should be stripe coated (touched up) either before or after the spray application.

One or two stripe coats will usually be necessary, but depending on actual conditions.

HEMPADUR MULTI-STRENTGH 35530 may be slightly thinned with THINNER 08450, except for stripe coating of surfaces to be in contact with potable water.

Extra film thickness:

Extra thickness - extra layer(s) - may be necessary in case of severely pitted and/or where very high degrees of antiabrasive properties are needed.

Two- coat application:

When applied in two coats it is an advantage to apply the first coat thicker than the second coat, for instance 300 micron for first, 200 micron for the second layer.

Recoating intervals:

Within a maximum of 85% Relative Humidity the following recoating intervals apply (d=days h=hours):

Steel temperature °C/°F		10/50	15/59	20/68	25/77	30/86	35/95	40/104
HEMPADUR qualities	Min Max	60 h 13 d	38 h 8 d	24 h 5 d	16 h 3½ d	12 h 2½ d	9 hours 44 hours	8 hours 36 hours
HEMPATHANE qualities	Min Max	30 h 60 h	19 h 38 h	12 h 24 h	8 h 16 h	6 h 12 h	4½ h 9 h	4 h 8 h

The layer of HEMPADUR MULTI-STRENGTH 35530 must NOT be exposed to (steel) temperatures below 10°C/50°F, to condensing humidity nor to relative humidities higher than 85% before recoating.

Curing table:

The following curing times apply:

Steel temperature °C/°F	10/50	15/59	20/68	25/77	30/86	35/95	40/104
Fully cured "Initial curing"	18 days 7½ days	11 days 5 days	7 days 3 days	5 days 2 days	3½ days 1½ days	2½ days 1 day	2 days 1 day

Time before taking into use:

Tanks or pipelines should generally not be taken into use before HEMPADUR MULTI-STRENGTH 35530 is fully cured (see above).

Full curing is mandatory in case of potable water service.

Exposure to ballast water and crude oil may exceptionally take place after an "initial curing" time as listed above.

Water resistance:

HEMPADUR MULTI-STRENGTH 35530 is resistant to light showers and condensation after an initial curing time as listed:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F
Minimum time	60 hours	32 hours	24 hours	20 hours	15 hours

Note: HEMPADUR 35530 **must not be exposed to water or high humidity between stripe coating and full coating respectively between full coating and any necessary second full coating** as there is a certain risk of curing agent exudation which will hinder adhesion. If exudation is present on the surface this must be removed by very thorough cleaning. Cleaning should be carried out by hand-warm fresh water washing at a pressure of approx 60 bar. Such cleaning must not take place before the minimum curing time for obtaining water resistance as listed above has elapsed. Contact the nearest Hempel office for further details.

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Ventilation during application:

Ventilation is not required for drying/curing of the coating, but some ventilation is recommended in order to remove eg spraydust from application.

Minimum out-docking interval of ships:

When the painted surface will be exposed to abrasion shortly after out-docking, the recommended minimum drying/curing time before out-docking is:

Steel temperature °C/°F	10/50	15/59	20/68	25/77	30/86	(35/95)	(40/104)
Minimum days	12½	8	5	3½	2½	(2)	(1½)

When out-docking takes place into water with a temperature at or above 10°C/50°F, and sufficient time afterwards is allowed for full cure before the coating is exposed to abrasion, the recommended minimum time before out-docking is:

Steel temperature °C/°F	10/50	15/59	20/68	25/77	30/86	(35/95)	(40/104)
Minimum days	7½	5	3	2	1½	(1)	(1)

Notes:

1. The temperatures in the tables above are mean values, but the temperature during curing should at no time come below 10°C/50°F.
2. Curing will proceed under water when the water temperature is above 10°C/50°F.

Remarks:

Stripe coating is recommended in tanks.

In case of deep pittings higher film thickness is recommended on areas with pittings.

Post treatment of coated surfaces to be in contact with potable water:

After complete curing, i.e. minimum 7 days at 20°C/68°F, and before being taken into use, the surfaces must be cleaned properly. This will be subject to local/individual specification or regulation but at least for tanks a careful hosing down with clean fresh water (max. 40°C/104°F if warm water is used) and/or - if possible - by filling with water allowed to stand for at least 24 hours. Drain and repeat the procedure, and finally flush with clean fresh water. Desinfication by for instance chlorination can be very aggressive towards the coating and separate instructions are available.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

March 2003 - 3553010500CO002
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPADUR® 45141/ HEMPADUR® 45143

High temperatures: 45141 with CURING AGENT 97820
Low to medium temperatures: 45143 with CURING AGENT 97430

Description:

HEMPADUR 45141/45143 is a two-component, polyamide adduct cured epoxy paint with good wetting properties and low water permeability. It is selfpriming and forms a hard and tough coating which has good resistance against abrasion and impact as well as to seawater, mineral oils, aliphatic hydrocarbons and splashes from petrol and related products. Harmless to grain cargoes.

Recommended use:

1. As a high build primer, intermediate and/or finishing coat in (heavy duty) paint systems according to specification.
2. For repair and maintenance work at application temperatures above -10°C/15°F on hatch covers, decks, in cargo holds, etc.
3. As a ballast tank coating.
4. As a finishing coat where a cosmetic appearance is of less importance.

HEMPADUR 45143 is intended for use in cold/temperate climates, HEMPADUR 45141 for warmer climates - see APPLICATION CONDITIONS overleaf.

Service temperatures:

Dry:	Maximum 150°C/302°F *(See REMARKS overleaf)*
Ballast water service:	Resists normal ambient temperatures at sea*
Other water service:	40°C/104°F (no temperature gradient)
Other liquids:	Contact HEMPEL

**Avoid long-term exposure to negative temperature gradients.*

Availability: Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Version; mixed product:	**45141**	**45143**
Colours/Shade nos:	Red/50630*	Red/50630*
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	60 ± 1	60 ± 1
Theoretical spreading rate:	4.0 m^2/litre - 150 micron 160 sq.ft./US gallon - 6 mils	4.0 m^2/litre - 150 micron 160 sq.ft./US gallon - 6 mils
Flash point:	25°C/77°F	25°C/77°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon	1.3 kg/litre - 10.8 lbs/US gallon
Surface dry:	4 (approx.) hrs at 20°C/68°F *(ISO 1517)*	5 (approx.) hrs at 5°C/41°F *(ISO 1517)*
Dry to touch:	7 (approx.) hours at 20°C/68°F	11 (approx.) hours at 5°C/41°F
Fully cured:	7 (approx.) days at 20°C/68°F	20 (approx.) days at 5°C/41°F
V.O.C.:	385 g/litre - 3.2 lbs/US gallon	385 g/litre - 3.2 lbs/US gallon
Min. curing temperature:	15°C/59°F	-10°C/14°F

**Other shades according to assortment list.*
Available in a MIO version, colour no. 12430, on request.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification nos:*
Marine maintenance	BAC-4, BT-5, CH-5
Marine newbuilding	BAC-5, CH-4

Note: **HEMPADUR 45141/45143 is for professional use only.**

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued: February 2001 - 4514350630C0002 / 4514150630C0003
HEMPEL'S MARINE PAINTS A/S

APPLICATION INSTRUCTIONS

For product description refer to the product data sheet

HEMPADUR® 45141/ HEMPADUR® 45143

45141: BASE 45148 with CURING AGENT 97820
45143: BASE 45148 with CURING AGENT 97430

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR 45141/45143.

Surface preparation:

General: In order to obtain best performance, abrasive blast cleaning is recommended. However, HEMPADUR 45141/45143 may be applied on rusty steel surfaces where higher performance is needed than obtainable with conventional coatings but where mechanical cleaning and dust removal can only be carried out (beside the removal of salts and of oily contaminants).

Remove oil and grease with suitable detergent, salt and other contaminants by (high pressure) fresh water cleaning.

REPAIR AND MAINTENANCE:

Spot-repairs:
Clean damaged areas thoroughly by power tool cleaning to St 3 or by abrasive blasting to minimum Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of HEMPADUR 45141/45143. As an alternative to dry cleaning, water jetting to sound, well adhering coat and/or to steel. Intact coat must appear with roughened surface after the water jetting. By water jetting to steel, cleanliness shall be WJ-3 to WJ-2 (atmospheric exposure) / minimum WJ-2 (immersion) (NACE No. 5/SSPC-SP 12). A flash-rust degree of maximum FR-2 (atmospheric exposure) / FR-2, preferably FR-1 (immersion) (Hempel standard) is acceptable before application. Feather edges to sound and intact areas. Brush off loose material. Touch up to full film thickness.

Compatibility: HEMPADUR 45141/45143 may be used in connection with other generic paint systems than epoxy and polyurethanes.

In any case it is a must that the old paint system is tightly adhering and is properly prepared before the touch-up is performed. It is recommended to make a test patch.

Full coating:

Compatibility with old system: HEMPADUR 45141/45143 may exceptionally be applied directly on top of an old alkyd paint system provided this is tightly adhering. It is furthermore preferable that the old system is less than approximately 500 micron in film thickness. A test patch should always be performed before fullcoating is decided. Even old chlorinated rubber and vinyl systems may be overcoated but with an inherent risk of later tendency to "liftings" along mechanical damage and similar weaknesses.
Removal of old system: Full coating after mechanical removal of an old paint system is possible too. Yet, it must be considered that mechanical cleaning may produce a very smooth surface giving reason to reduced adhesive forces.

Note: Another risk is left over of a hard black rustscale being cleaned to an apparent brightness without showing any adhesive defects. Yet, the exposure to open air during cleaning may have started a continuous oxidation of the hard black rust making it mechanically weak and of poor adhesion to the underlying steel surface. Later, during service, the scale plus overlaying paintmaterial may flake off**.**

When used for immersion service:

1. Abrasive blasting to Sa 2½. After abrasive blasting, clean the surface carefully from abrasives and dust. For temporary protection, if required, use suitable shopprimer. All damage to shopprimer and contamination from storage and fabrication should be thoroughly cleaned prior to final painting.

Issued: March 2002

HEMPADUR 45141/45143

Stainless steel: (Ballast tanks in chemical carriers) to be abrasive blasted to a uniform, sharp, dense profile, ISO Comparator Medium (G), corresponding to Rz minimum 50 micron. Any salts, grease, oil, etc. to be removed before abrasive blasting is commenced.

2. If the HEMPADUR 45141/45143 will form an integral part of heavy duty systems (impact and antiabrasion purposes) best performance will be obtained by applying it directly to the blast-cleaned steel, subsidiary using HEMPADUR 15590 as "blast primer".

Note: On old steel surfaces having been exposed to salt water, excessive amounts of salt residues in pittings may call for high pressure water jetting, wet abrasive blasting, alternatively dry abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Application equipment:

HEMPADUR 45141/45143 being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max 100 metres/300 feet, ½" internal diameter
	max. 30 metres/100 feet, 3/8" internal diameter
	max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh

Regular surfaces:

Nozzle size:	.021"-.023"
Fan angle:	60-80°.

Complicated surfaces (and touch up):

Nozzle size:	.019"
Fan angle:	40°.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may increase paint flow, thereby improving the spray fan. If longer hoses are necessary it may be necessary to raise the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by overthinning.

Airless spray data are indicative and subject to adjustment.

Application:

Film-build/continuity: With this paintmaterial applied in one/few coat(s) it is of special importance that a continuous, pinhole-free paint film is obtained at application of each coat. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripecoat will usually be necessary. To obtain good and steady atomizing, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.

The paint layer must be applied homogenously and as close to the specification as possible. Avoid exaggerated film thickness due to the risk of sagging, cracks and solvent retention. The paint consumption must be controlled.

HEMPADUR 45141/45143

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

On **poorly prepared surfaces** it is always recommended to apply first coat by brush. Extra thinning will facilitate the penetration of the paint material but will also require an extra layer to be applied.

Wet/dry film thickness:

The thixotropic nature of HEMPADUR 45141/45143 may give a rather "wavy"surface of the paint just after application. This smoothens at drying but can make it necessary to let the wet film readings be of a higher value than indicated. In many cases, the wet film thickness reading should be 25-50 micron/1-2 mils higher than calculated. As the wavy surface becomes more smooth at drying this extra wet film thickness readings will not cause a higher paint consumption than otherwise stipulated.

Pot life:

When measured under standard conditions the pot life is 2 hours at 15°C/59°F when using CURING AGENT 97430. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

At these temperatures therefore: Irrespective of equipment, use the paint immediately after mixing. (At a normal application speed the 20 litres/5 US gallons are used in approx. 10 minutes.) Anyhow, at paint temperatures, as an exception, being lower than 15°C/59°F allow the mixture to pre-react approximately 30 minutes before use. After this induction time, apply the paint immediately.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

March 2002 - 45143506300001/45141506300003
HEMPEL'S MARINE PAINTS A/S

Attached:

Tables of "physical data versus temperature"

In relation to recoating intervals the following is very important:

Maximum recoating intervals:
If the maximum recoating interval is exceeded, whatever the subsequent coat, roughening of the surface is necessary to ensure optimum intercoat adhesion or in the case of recoating with coatings other than HEMPADUR, apply a (thin) additional coat of HEMPADUR 45141/45143 within the following directions for recoating:

- **Long recoating intervals:**
  A completely clean surface is mandatory to ensure intercoat adhesion, especially in the case of long recoating intervals. Any dirt, oil and grease have to be removed with eg suitable detergent followed by high pressure fresh water cleaning. Salts to be removed by fresh water hosing.

- **Any degraded surface layer, as a result of a long exposure period, must be removed as well**. Water jetting may be relevant to remove any degraded surface layer and may also replace the above-mentioned cleaning methods when properly executed. Consult HEMPEL for specific advice if in doubt.

To check whether the quality of the surface cleaning is adequate, a test patch may be relevant.

HEMPADUR 45141/45143

Physical data versus temperature:

(HEMPADUR 45141 in a dry film thickness of 150 micron/6 mils):

Surface temperature	20°C/68°F	30°C/86°F
Drying time Curing time	7 hours 7 days	3½ hours 3½ days
MINIMUM recoating interval related to later conditions of exposure:		
Interval recoating with 46410, 56360		
Atmospheric, medium Atmospheric, severe	6 hours 8 hours	3 hours 4 hours
Interval for recoating with 58030		
Atmospheric, medium Atmospheric, severe	11 hours 11 hours	6 hours 6 hours
Interval for recoating with HEMPADUR and HEMPATHANE qualities		
Atmospheric, medium Atmospheric, severe Immersion*	8 hours 9 hours 12 hours	4 hours 5 hours 6 hours
MAXIMUM recoating interval related to later conditions of exposure:		
Interval for recoating with 46410		
Atmospheric, medium Atmospheric, severe	12 hours 12 hours	6 hours 6 hours
Interval for recoating with 56360		
Atmospheric, medium Atmospheric, severe	10 hours 10 hours	5 hours 5 hours
Interval for recoating with 58030		
Atmospheric Medium Severe	3 days 1½ days	36 hours 18 hours
Interval for recoating with HEMPADUR qualities		
Atmospheric, medium Atmospheric, severe Immersion**	None None 30 days	None None 15 days
Interval for recoating with HEMPATHANE qualities		
Atmospheric, medium Atmospheric, severe Immersion	10 days 3 days Not relevant	5 days 36 hours Not relevant

* Not relevant for HEMPATHANE qualities.
** Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.

Furthermore, please see page 3.

HEMPADUR 45141/45143

Physical data versus temperature:

(HEMPADUR 45143 in a dry film thickness of 150 micron/6 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F	20°C/68°F
Drying time	35 hours	14 hours	7 hours	4 hours
Curing time	2 months	28 days	14 days	7 days
MINIMUM recoating interval related to later conditions of exposure:				
Interval for recoating with 46410, 56360				
Atmospheric, medium	28 hours	14 hours	6 hours	3 hours
Atmospheric, severe	36 hours	18 hours	8 hours	4 hours
Interval for recoating with 58030				
Atmospheric, medium	Not relevant	Not relevant	12 hours	6 hours
Atmospheric, severe	Not relevant	Not relevant	12 hours	6 hours
Interval for recoating with HEMPADUR and HEMPATHANE qualities				
Atmospheric, medium	36 hours	18 hours	8 hours	4 hours
Atmospheric, severe	45 hours	23 hours	10 hours	5 hours
Immersion*	54 hours	27 hours	12 hours	6 hours
MAXIMUM recoating interval related to later conditions of exposure:				
Interval for recoating with 46410				
Atmospheric, medium	4 days	45 hours	20 hours	10 hours
Atmospheric, severe	4 days	45 hours	20 hours	10 hours
Interval for recoating with 56360				
Atmospheric, medium	2½ days	34 hours	15 hours	7½ hours
Atmospheric, severe	2½ days	34 hours	15 hours	7½ hours
Interval for recoating with 58030				
Atmospheric, medium	Not relevant	Not relevant	6 days	3 days
Atmospheric, severe	Not relevant	Not relevant	3 days	1½ days
Interval for recoating with HEMPADUR qualities				
Atmospheric, medium	None	None	None	None
Atmospheric, severe	None	None	None	None
Immersion**	(90 days)	90 days	60 days	30 days
Interval for recoating with HEMPATHANE qualities				
Atmospheric. medium	90 days	45 days	20 days	10 days
Atmospheric, severe	30 days	15 days	6 days	3 days

* Not relevant for HEMPATHANE qualities.
** Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.

Furthermore, please see page 3.

Product Data

HEMPADUR® 45182

CURING AGENT 98180

Description:
HEMPADUR 45182 is a two-component, low-temperature curing, modified polyamide adduct cured epoxy.

Recommended use:
For marine and protective use as a "tie coat" between epoxy and physically drying coatings. For marine use also as a “sealer” of old antifouling.

Service temperatures:
Maximum, dry: 80°C/176°F

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos.:	Yellowish grey/25150
Finish:	Flat
Volume solids, %:	46 ± 1
Theoretical spreading rate:	4.6 m²/litre - 100 micron 184 sq.ft./US gallon - 4 mils
Flash point:	23°C/73°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon
Dry to touch:	6 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F
V.O.C.:	490 g/litre - 4.1 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification no.:*
Marine maintenance	BAC-3, BAC-4, BAC-6, BAC-7, BAC-8, BAC-9
Marine newbuilding	BAC-3, BAC-4, BAC-5, BAC-6, BAC-7, BAC-8

Note: **HEMPADUR 45182 is for professional use only.**

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:
October 2001 - 4518225150CR001
HEMPEL’S MARINE PAINTS A/S

Product Data

HEMPADUR® MULTI-STRENGTH® 45751/45753

Medium to high temperatures: 45751: BASE 45755 with CURING AGENT 97652
Low to medium temperatures: 45753: BASE 45755 with CURING AGENT 98750

Description:
HEMPADUR MULTI-STRENGTH 45751/45753 is a self-priming, two-component, high-build, epoxy-polyamide/amine paint which cures to an abrasion and corrosion resistant coating. Applicable by standard heavy duty airless spray equipment.

Recommended use:
As a heavy duty coating for areas exposed to abrasion and aggressive corrosive climate such as ramps, ship hulls and holds of bulk carriers.
As a ballast tank coating for special purposes such as chemical carriers carrying hot cargoes and other purposes where "pure epoxy coating" is requested.
As a finishing coat where a cosmetic appearance is of less importance.

Service temperatures:
Dry: Maximum 140°C/284°F
Ballast water service: Resists normal ambient temperatures at sea*
Other water service: 50°C/140°F (no temperature gradient)
Other liquids: Contact HEMPEL
**Avoid long-term exposure to negative temperature gradients.*

Certificates/Approvals:
Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.
Approved by Lloyd's Register of Shipping as a recognized corrosion control coating.
Approved as a ballast tank coating by Germanischer Lloyd, Germany.
Classification B1 by Marintek, Norway.
Recognized by Lloyd's Register of Shipping as a low friction surface coating for ships navigating in first year ice conditions.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

	45751:	45753:
Version mixed product:		
Colours/Shade nos:	Grey/12340 - Red/50630	Grey/12340 - Red/50630
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	79 ± 1	79 ± 1
Theoretical spreading rate:	4.0 m²/litre - 200 micron 158 sq.ft./US gallon - 8 mils	4.0 m²/litre - 200 micron 158 sq.ft./US gallon - 8 mils
Flash point:	27°C/81°F	27°C/81°F
Specific gravity:	1.6 kg/litre - 13.4 lbs/US gallon	1.6 kg/litre - 13.4 lbs/US gallon
Dry to touch:	7-8 hours at 20°C/68°F	8-10 hours at 10°C/50°F
Fully cured:	7 days at 20°C/68°F	14 days at 10°C/50°F
V.O.C.:	255 g/litre - 2.1 lbs/US gallon	235 g/litre - 2.0 lbs/US gallon
Min. curing temperature:	10°C/50°F	-10°C/14°F

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification no.:*
Marine maintenance	BAC-8, BAC-9, CH-7, CH-8, TS-7, TS-8
Marine newbuilding	BT-5, BT-6, BAC-6, -7, -8, CH-6, -7, TS-6, -7

Note: **HEMPADUR 45751/45753 is for professional use only.**

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:
September 2002 - 4575112340C0002/4575312340C0001
HEMPEL'S MARINE PAINTS A/S

APPLICATION INSTRUCTIONS

For product description refer to the product data sheet

HEMPADUR® MULTI-STRENGTH® 45751/45753

Medium to high temperatures: 45751: BASE 45755 with CURING AGENT 97652
Low to medium temperatures: 45753: BASE 45755 with CURING AGENT 98750

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR MULTI-STRENGTH 45751/45753.

Surface preparation:

The specific type and degree of surface preparation depends on type and condition of the actual substrate and on desired performance. The better the surface preparation the better the performance, but it will not always be economic feasible to go for the highest degree within a given type of surface preparation.

For use as a heavy duty coating:
Bulk cargoholds, fender areas, hulls of ice-going vessels, ramps, splash zones etc.:
New steel:
Abrasive blasting to min. Sa 2½. Grit-blasted surfaces: Recommended profile is Rz minimum 100 micron/4 mils - maximum 150 micron/6 mils corresponding to ISO Comparator Coarse (G). Oil and grease must be removed with suitable detergent, salts and other contaminants by (high pressure) fresh water hosing prior to blasting. After blasting, clean the surface carefully from abrasive and dust. HEMPADUR 15590 may be used as a blast primer/hold-coat (min. temperature 10°C/50°F) or alternatively HEMPADUR MULTI-STRENGTH 45751 or HEMPADUR MULTI-STRENGTH 45753 (for temperatures below 10°C/50°F) diluted 15-25% with HEMPEL'S THINNER 08450.
Old steel:
For old steel with widespread surface corrosion, often in the state of large areas of fine, dense pit-corrosion - like Grade D, ISO 8501-1:1988 - an overall degree of cleaning corresponding to Sa2 can be the economical optimum treatment of surfaces exposed to combined mechanical abrasion/impact and atmospheric corrosion in marine environments. May advantageously be combined with a thorough fresh water hosing - or replaced by a water jetting - (degree WJ-2 according to NACE No.5/SSPC-SP 12) as long as the formation of flash rust is low, (maximum degree FR2 as per internal HEMPEL standard).

The fresh water cleaning will assist in removal of salt residues, yet total removal of salts embedded in the pittings will in practise, on large areas, be extremely difficult irrespective of method of cleaning.

In cases where elimination of risk of osmotic blistering is important, for instance frequently/permanently immersed surfaces or fresh water exposure a combined dry abrasive blasting, to remove "black scale" and water jetting (minimum WJ-2) may be relevant (possible formation of flash rust to be maximum, FR1).

After water jetting as surface preparation it is recommended to apply a diluted HEMPADUR MULTI-STRENGTH 45751/45753 (15-25% THINNER 08450) as an (extra) first coat. Surfaces to be dry at application.

Concrete: The concrete must be of good quality and fully cured, eg 28 days for normal Portland cement, and completely dry with a humidity content in the surface below 4%. The concrete must also be controlled for absence of capillary water action or for subsoil water.

Minimum pull-off value should normally be 20 kilopond/cm² measured after surface preparation. Any cracks, crevices and voids must be repaired (see below).

All possible slip agent, oil, grease and other contaminants must be removed by eg abrasive blasting, volatilising by flame cleaning or treatment with suitable detergent. The last mentioned in the following way: Saturation of the surface with fresh water. Washing with suitable detergent followed by fresh water hosing.

Issued: March 2003

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Depending on construction and purpose, abrasive blast, high pressure water jet or treat the concrete with power tools to obtain a rough and firm surface free of scum layer and other contamination and possible old paint/lining. Remove dust and loose material.

If mechanical treatment is impossible, the surface of new concrete may be treated with acid etching. For this purpose an approx. 5% w/w nitric or phosphoric acid solution is recommended.

Note: Strong acids, take necessary precautions, make sure that safety regulations are obeyed!

Prior to etching the concrete should be saturated with fresh water to prevent acid corrosion of the reinforcement bars. Leave the acid to act for 3-4 minutes and hose down the surface with fresh water - preferably first a 5% w/w sodium hydroxide solution - and scrub carefully. After that the surface must dry homogeneously and appear as an even, rough surface free of a loose outer layer. The surface must have a pH reaction of between 6.5-8.0. If any of these conditions are not fulfilled, the process must be repeated. The surface must be dried with good ventilation for at least 2 days at 65% relative humidity and 20°C/68°F. The pre-treatment is controlled by scraping with a strong knife. The surface must feel solid and hard, and the knife must only leave a clear scratch mark.

Cracks, voids and crevices must be opened and made good down to firm and hard material. After sealing - as described below - fill these openings with a suitable epoxy mortar.

Seal the surface with HEMPADUR SEALER 05990 in such a way that the surface is just saturated. Surplus must be removed (do also see the Product Data sheet for HEMPADUR SEALER 05990).

For use as a ballast tank coating:

Ballast tanks, steel work:

For optimum performance the following is recommended:
All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in welding seams, undercuts, etc. should be avoided. If found, they may necessitate extra stripe coating or filling (however, the classification societies' recommendations are to be followed).

All sharp edges to be broken or rounded depending on the actual conditions and the design lifetime. Laminations to be removed. However, rolled profiles, etc. from the steel mills normally have acceptably rounded edges.

All loose weld spatters to be removed.

Well adhering, scattered weld spatters are acceptable, but will need additional touch-up. If dense, they must be removed by grinding.

Requirements to the "surface quality" of welds according to WELD REPLICA NACE RP 0178 minimum Grade E (NACE Standard RP0178-95).

Ballast tanks, surface preparation:

Before blasting any deposits of grease or oil must be removed from the steel surface with a suitable detergent followed by fresh water hosing. Minor spots of oil/grease may be cleaned with thinner and clean rags - avoid smearing out the contamination. Possible alkali weld deposits, chemicals used for testing of welds, soap residues from the pressure testing must be removed by fresh water hosing.

Newbuilding/new steelwork: To obtain full performance of the ballast tank coating, welds, burns, damaged and rusty shopprimer must be abrasive blast cleaned to Sa 2½. Minor areas mechanically cleaned to St 3.

If welds have previously been coated with a (shop)primer just after welding this (shop)primer must be removed by abrasive blasting (sweeping) in order to obtain optimum performance.

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Intact shopprimer:
Zinc salted surfaces, deposits of black iron oxides of plasma cutting and similar foreign matters to be removed by light abrasive sweep blasting. Chalk markings and plate marking of a non-compatible nature to be removed as well.

The shopprimer must have been checked randomly for excessive film thicknesses and areas detected to have film thicknesses above approx 40 micron/1.6 mils (as measured directly on the shopprimed surface with equipment calibrated on smooth steel) are to be sweep blasted in order to remove most of the shopprimer.

Spot-checking for possible salt contamination of the surface to be executed before and after abrasive sweep blasting.

When blasting, the importance of working systematically must be stressed. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

The surface profile to be equivalent to Rugotest No. 3, BN9-BN10 or Keane-Tator Comparator, 3.0 G/S. According to ISO 8503-1 the grade will be MEDIUM (G).

Note: If any doubt exists about the quality of the primary surface preparation (before shoppriming), the substrate must be re-blasted in situ as defined above.

Block assembly zones: Overlap zones must be treated with great care. Damage caused by possible over-blasting must be avoided, paint edges must be feathered and consecutive layers of paint coatings given greater and greater overlaps - old layers being roughened corresponding to these overlaps (when sandpapering, use free-cut paper, grain size 80).

Furthermore, these areas may be either masked off with tape - to keep them as narrow as possible - or left with a **thin** zinc epoxy primer coat applied on these areas after secondary surface preparation at blockstage.

Secondary surface preparation of block assembly zones are preferably to be abrasive spot-blasted. However, mechanical cleaning to St 3 may be acceptable if zones are narrow and an extra coat of HEMPADUR MULTI-STRENGTH 45751/45753 diluted approx. 10-15% is applied to these areas as the first coat. The procedure of masking off with tape or using the zinc epoxy primer as described above may advantageously be used in case of mechanical cleaning.

Stainless Steel: (Ballast tanks of chemical carriers) to be abrasive blast cleaned to a uniform, sharp, **dense**, profile (Rugotest No. 3, BN9, ISO Comparator Medium (G), Keane-Tator Comparator 2.0 G/S corresponding to Rz minimum 50 micron). Any salts, grease, oil etc. to be removed before abrasive blasting is commenced.

Refurbishment:

It is recommended to carry out rough abrasive blast cleaning - or water jetting - to facilitate visual inspection and any necessary repair of the existing steel work. In the case of pit-corroded tank bottoms this rough blasting will also provide a better basis for a decision between welding of corroded pits or repair by filling.

Corroded pits deeper than approx. 2 mm, but not repaired by welding, are recommended to be filled with HEMPADUR EPOXY FILLER 35250 after blast priming has been carried out.

At refurbishment, a main concern is the contamination from sea water (water-soluble, corrosive salts). The preventive method will be to include very thorough cleaning with plenty of fresh water, please see below.

The maximum allowable concentration of chlorides on steel surfaces immediately before application is 7.0 microgrammes/cm² as detected by the "Bresle Method".

In the case of contamination, cleaning procedures must be repeated and/or improved. Especially pit-corroded steel will need special attention and the only possible way to

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remove contamination from the pits may often be to carry out very thorough cleaning with fresh water after abrasive blast cleaning. After repeated control and drying, the entire surface will need abrasive blast cleaning to obtain the specified degree of cleaning. Alternatively, the pit-corroded areas are cleaned by water jetting, any surplus of water is mopped up or removed by vacuum cleaning, allow to dry.

Note: Actual type of steel work and surface preparation is dependent on factors such a shipyard technology, contractual specification, required lifetime, etc. Reference is also made to HEMPEL's Technical Standard for Ballast Tank Coating Work.

Application equipment:

HEMPADUR MULTI-STRENGTH 45751/45753, being a high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter
	max. 30 metres/100 feet, 3/8" internal diameter
	max. 6 metres/20 feet, 1/4" internal diameter
Filter:	60 mesh

Regular surfaces:	Ballast tanks	Exterior hull and similar large regular areas
Nozzle size:	.021"-.023"	.023"-.027"
Fan angle:	60-80°	60°-80°

Complicated surfaces:

Nozzle size:	.019"
Fan angle:	40°.

After finishing the application, clean the equipment immediately with HEMPEL'S TOOL CLEANER 99610.

Note: Increasing spray hose diameter may ease paint flow thereby improving the spray fan. If longer hoses are necessary it may be necessary to raise the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approximately 5% THINNER 08450 may be added, but thinning must be done with care as the maximum obtainable film thickness is reduced significantly by overthinning. Airless spray data are indicative and subject to adjustment.

Application:

Film-build/continuity: It is especially important that a continuous, pinhole-free paint film is obtained at application of each spray applied coat. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripecoat will usually be necessary. To obtain good and steady atomising, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.
The paint layer must be applied homogeneously and as close to the specification as possible. Avoid exaggerated film thickness.
Saggings/"pools" of paint in corners are to be remedied to avoid later crackings and as a general rule highest acceptable dry film thickness will be 3 times the specified film thickness or 1000 micron.
The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Stripe coating: may either be applied by airless spray, (relatively small, narrow-angled nozzles) or by hand-tools. Apply the stripe coat as a uniform, regular film without excessive brush or roller marks in order to avoid cratering by entrapped air.

Pot life/mixing/

When measured under standard conditions the pot life is 2 hours at 15°C/59°F and 1

HEMPADUR MULTI-STRENGTH 45751/45753

induction time:
(both curing agents):

hours at 20°C/68°F. However, for a 20 litres/5 US gallons mix, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.

a. Mix the entire content of corresponding base and curing agent packings. If it is necessary to mix smaller portions, this must be done properly by either weighing base and curing agent in the prescribed weight ratio: 143 parts by weight of base and 20 parts by weight of curing agent or by volume: 4.0 parts by volume base and 1.0 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

c. Use all mixed paint before the pot life is exceeded. The pot life depends on the temperature of the paint as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	15°C/59°F[1)]	20°C/68°F	25°C/77°F	30°C/86°F[2)]
Pot life	2 hours	1 hour	½ hour	(1/4 hour)

1) At 15°C/59°F and below, the viscosity will be too high for airless spray application.
2) Temperatures above 30°C/86°F should be avoided.

Induction time:
At **Steel** temperatures below 5°C/41°F the paint may advantageously be prereacted 10 minutes before spray application (longer prereaction time at lower steel temperatures).

When two-component spray equipment is used, heating may be relevant to obtain a proper spray fan and a uniform and smooth paint film. This can either be done by preheating the two-component paint or by using a flow-heater on the pressure side. As an indication, a paint temperature of approx 40°C/104°F will be relevant, but has to be adjusted according to the actual conditions.

Physical data versus temperature:

(HEMPADUR MULTI-STRENGTH 45751 in a dry film thickness of 200 micron/8 mils):

Surface temperature	10°C/50°F	20°C/68°F	30°C/86°F
Drying time Curing time*	20 hours 18 days	8 hours 7 days	4 hours 3½ days
Initial curing*	13 days	5 days	2½ days

(HEMPADUR MULTI-STRENGTH 45753 in a dry film thickness of 200 micron/8 mils):

Surface temperature	-10°C/14°F	0°C/32°F	10°C/50°F
Drying time Curing time*	45 hours 63 days	23 hours 32 days	10 hours 14 days
Initial curing*	45 days	23 days	10 days

* Filling of ballasttanks/exposure to water: ask for special instructions.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

March 2003 - 4575112340C0002/4575312340C0001
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPADUR® MASTIC 45880/ HEMPADUR® MASTIC 45881

High temperatures: 45881: BASE 45889 with CURING AGENT 95881
Low to medium temperatures: 45880: BASE 45889 with CURING AGENT 95880

Description:
HEMPADUR MASTIC 45880/45881 is a two-component polyamide adduct cured, high solids, high build epoxy paint. It forms a hard and tough coating, has good wetting properties and low temperature curing.

Recommended use:
As a selfprimed, surface tolerant paint system or as an intermediate or finishing coat in heavy duty paint systems where low VOC and high film build are required.
Multipurpose coating as per specification for maintenance including ballast tanks and underwater hull and new steel in those cases, where a need for few products outweighs more specialised coatings.
Can be specified where extended recoating properties for polyurethane topcoats are requested (typically travel coating). May be used directly on cured zinc silicate (GALVOSIL products) or spray-metallized surfaces to minimize popping.
As a topcoat where the usual outdoor cosmetic appearance of epoxy paints is acceptable.

Service temperatures:
Maximum, dry: 120°C/248°F

Certificates/Approvals:
Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.
Has a German and Danish EC-type Examination Certificate.
Complies with Section 175.300 of the Code of Federal Regulations in respect of carriage of dry foodstuffs (FDA) in spaces with an internal surface area larger than 1000 m²/10,750 sq.ft.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

	45880	**45881**
Version, mixed product:		
Colours/Shade nos:	Grey/12170*	Grey/12170*
Finish:	Semi–gloss	Semi–gloss
Volume solids, %:	77 ± 1	77 ± 1
Theoretical spreading rate:	3.9 m²/litre - 200 micron 154 sq.ft./US gallon - 8 mils	3.9 m²/litre - 200 micron 154 sq.ft./US gallon - 8 mils
Flash point:	35°C/95°F	35°C/95°F
Specific gravity:	1.4 kg/litre - 11.7 lbs/US gallon	1.4 kg/litre - 11.7 lbs/US gallon
Dry to touch:	4 *(approx)* hours at 20°C/68°F	3 *(approx)* hours at 30°C/86°F
Fully cured:	7 days at 20°C/68°F	5 days at 30°C/86°F
V.O.C.:	220 g/litre - 1.8 lbs/US gallon	220 g/litre - 1.8 lbs/US gallon
Min. curing temperature:	-5°C/14°F	15°C/59°F

**Other shades including a MIO version, colour no. 12430, according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting Specification References:

Segment:	*Specification no.:*
Marine maintenance	CH-6, DC-4, ER-4, ID-2, SST-5, -6, -7, TS-5, -6, -9
Marine newbuilding	CH-5, CH-9, DC-4-DC-6, DC-8, DC-9, ER-5, ID-3, SST-4, -5, -6, -7, TS-4, -5, -8, -9

Note:
HEMPADUR MASTIC 45880/45881 is for professional use only.

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:
January 2003 - 4588012170C0010/4588112170C0007
HEMPEL'S MARINE PAINTS A/S

APPLICATION INSTRUCTIONS

For product description refer to the product data sheet

HEMPADUR® MASTIC 45880/ HEMPADUR® MASTIC 45881

High temperatures: 45881: BASE 45889 with CURING AGENT 95881
Low to medium temperatures: 45880: BASE 45889 with CURING AGENT 95880

Scope:

These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR MASTIC 45880/45881.

Surface preparation:

General: In order to obtain best performance, abrasive blast cleaning is recommended. However, HEMPADUR MASTIC 45880/45881 has "surface tolerant" properties and offers higher performance than many other coatings when applied to surfaces mechanically cleaned only (salts, oil, grease etc. shall always be removed).

Remove oil and grease with suitable detergent, salt and other contaminants by (high pressure) fresh water cleaning.

NEW STEEL:

When used as intermediate and/or finishing coat, surface preparation according to Product Data Sheet for the preceding primer coat (HEMPADUR primers). When used a s a selfpriming coat, surface preparation according to specification.

When applied to GALVOSILS:

HEMPADUR MASTIC 45880/45881 can be applied when the GALVOSIL is cured. Consult APPLICATION INSTRUCTIONS for the relevant GALVOSIL. Remove oil and grease etc. with suitable detergent. Remove salt and other contaminants by high pressure fresh water cleaning. After exposure to high humidity, zinc salts, "white rust", must be removed carefully by high pressure fresh water cleaning, if necessary combined with scrubbing with stiff nylon brushes.

REPAIR AND MAINTENANCE:

Spot-repairs:

Clean damaged areas thoroughly by power tool cleaning to minimum St 2 (spot-repairs) or by abrasive blasting to minimum Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of HEMPADUR MASTIC 45880/45881. As an alternative, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP12)(or according to spedification) may be used. A flash-rust degree of maximum FR-2 (Hempel standard) is acceptable before application. Feather edges to sound and intact areas. Brush off loose material. Touch up to full film thickness.

Compatibility: HEMPADUR MASTIC 45880/45881 **may** be used in connection with other generic paint systems than epoxy and polyurethanes.
It is recommended to make a test patch. In any case it is a must that the old paint system is tightly adhering and is properly prepared before the touch-up is performed.

Full coating:

Compatibility with old system: In general full compatibility can be expected with old epoxy systems. A test patch should always be performed before fullcoating is decided. If the old epoxy is not weathered/chalked or if it is topcoated with polyurethane, it is recommended to roughen the surface before recoating. Furthermore, very thorough cleaning is a must. Any dirt, chalked surface material, oil and grease should be removed with suitable detergent followed by high pressure fresh water hosing of the entire surface.

Removal of old system: Full coating after complete mechanical removal of an old paint system is possible too. Yet, it must be considered that mechanical cleaning by disc grinding or by rotating wire brushing may produce a very smooth surface which reduce the adhesive forces of the primer coat.

Issued: August 2002

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Note: Another risk is remains of a hard black rustscale being cleaned to an apparent brightness without showing any adhesive defects. Yet, the exposure to open air during cleaning may have started a further oxidation of the hard black rust making it mechanically weak and of poor adhesion to the underlying steel surface. Later, during service, the scale plus overlaying paintmaterial may flake off.

When used for immersion service, repair:
Remove oil and grease, etc. with suitable detergent. Remove salt and other contaminants by (high pressure) fresh water cleaning. Clean damaged areas thoroughly by power tool cleaning to St 3 (minor areas) or by abrasive blasting to min. Sa 2, preferably Sa 2½. Improved surface preparation will improve the performance of HEMPADUR MASTIC 45880/45881. As an alternative to dry cleaning, water jetting to minimum WJ-2 (NACE No. 5/SSPC-SP 12), may be used. A flash rust degree of FR-2 , preferably FR-1 (HEMPEL standard) is acceptable before application. Feather edges to sound intact areas. Dust off residues. Touch up to full film thickness

Note: On old steel surfaces having been exposed to s alty water, excessive amounts of salt residues in pittings may call for high pressure water jetting, wet abrasive blasting, alternatively dry abrasive blasting, high pressure fresh water hosing, drying, and finally, dry abrasive blasting again.

Application equipment:

HEMPADUR MASTIC 45880/45881 being a high solids and a relatively high viscosity material, may require special measures to be taken at application.

Recommended airless spray equipment:

Pump ratio:	min. 45:1
Pump output:	12 litres/minute (theoretical)
Input pressure:	min. 6 bar/90 psi
Spray hoses:	max. 100 metres/300 feet, ½" internal diameter max. 30 metres/100 feet, 3/8" internal diameter max. 6 metres/20 feet, 1/4" internal diameter

Regular surfaces:	Complicated surfaces (and touch up):
Nozzle size:.021" through .023"	Nozzle size: .017" through .021"
Fan angle: 60°.	Fan angle: 40°.

After finishing the application, clean the equipment immediately with THINNER 08450 or HEMPEL'S TOOL CLEANER 99610.

Note: Increasing hose diameter may increase paint flow, thereby improving the spray fan. If longer hoses are necessary it may be necessary to raise the pump ratio to 60:1, maintaining the high output capacity of the pump.

Alternatively up to approx. 5% THINNER 08450 may be added, but thinning must be done with care as the anti-sagging properties are drastically reduced by overthinning.

Airless spray data are indicative and subject to adjustment.

Induction time:

Should the paint temperature as an exception be 15°C/59°F or below, it is an advantage to allow the two components to prereact before application. This is especially relevant in the case of substrate temperatures also being below 15°C/59°F.

In case of a paint or substrate temperature at 15°C/59°F, an induction time of 15 minutes is recommended. In case of a paint or substrate temperature at 10°C/50°F, an induction time of 25 minutes is recommended. In order to obtain proper application properties, the paint temperature should preferably never be below 10°C/50°F. Yet for substrate temperatures below 10°C/50°F an induction time of 30 minutes is recommended.

Spray application:

Film-build/continuity: With this paintmaterial applied in one/few coat(s) it is of special importance that a continuous, pinhole-free paint film is obtained at application of each coat. An application technique which will ensure good film formation on **all** surfaces must be adopted. It is very important to use nozzles of the correct size, not too big, and to have a proper, uniform distance of the spray gun to the surface, 30-50 cm should be aimed at. Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas application of a stripecoat will therefore be good painting practice. To obtain good and steady atomizing, the viscosity of the paint must

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be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid dust-spray.

The paint layer must be applied homogeneously and as close to the specification as possible. Avoid exaggerated film thickness due to the risk of sagging, cracks and solvent retention. The paint consumption must be controlled.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, should be remedied.

Brush and roller application : At application with hand tools, brush, but especially by roller the natural tendency to a more uneven paint film obtained by these methods, is to be counteracted by more coats applied. If at all possible each coat is to be applied across the preceding one - in general follow good painting practise.

On **poorly prepared surfaces** it is always recommended to apply the first coat by brush. Extra thinning will facilitate the penetration of the paint material, but will also require an extra layer to be applied.

Wet/dry film thickness: Please note that the thixotropic nature of HEMPADUR MASTIC 45880/45881 may give a rather "wavy" surface of the paint just after application. This smoothens at drying, but can make it necessary to let the wet film readings be of a higher value than indicated. In many cases the wet film thickness, reading should be 25-50 micron/1-2 mils higher than calculated. As the wavy surface becomes more smooth during drying these extra wet film thickness readings will not cause a higher paint consumption than otherwise stipulated.

Film thickness/thinning: HEMPADUR MASTIC 45880/45881 is normally specified in 125-200 micron/5-8 mils. Depending on ambient conditions, usually maximum 5% thinning with THINNER 08450 is relevant, however, increasing at high temperatures to ensure proper film formation and avoid dust spray. May be specified down to 75 micron/3 mils. To obtain optimum film formation in film thicknesses lower than 125 micron/5 mils dry film thickness a dditional thinning with 5-10% THINNER 08450 is recommended.

Pot life: When measured under standard conditions the pot life is 1 hour at 20°C/68°F for HEMPADUR MASTIC 45880 respectively 1½ hours at 30°C/86°F for HEMPADUR MASTIC 45881. However, for a 20 litres/5 US gallons mix, and used under warm climate conditions, the heat developed by the chemical reaction between BASE and CURING AGENT may make the corresponding practical pot life shorter.
Therefore: At high temperatures, use the paint immediately after mixing irrespective of equipment.

Attached: Tables of "physical data versus temperature"

HEMPADUR MASTIC 45880/45881

Physical data versus temperature:

Drying time and recoating interval vary with film thickness, temperature and later exposure conditions:

HEMPADUR MASTIC 45880 in a dry film thickness of 100-150 micron/4-6 mils:

Surface temperature:	-5°C/23°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Drying time (approx)	3 days	24 hours	10 hours	4 hours	3 hours	2 hours
Curing time (approx)	2½months	1 month	14 days	7 days	5 days	3 days
MINIMUM recoating interval related to later conditions of exposure:						
Interval for recoating with HEMPADUR and HEMPATHANE qualities						
Atmospheric, medium	4 days	30 hours	12 hours	5 hours	4 hours	3 hours
Atmospheric, severe	6 days	42 hours	18 hours	7 hours	5 hours	4 hours
Immersion[1]	7 days	50 hours	22 hours	8 hours	6 hours	5 hours
Interval for recoating with HEMPATEX qualities						
Atmospheric, medium	4 days	30 hours	12 hours	5 hours	4 hours	3 hours
Atmospheric, severe	4 days	30 hours	12 hours	5 hours	4 hours	3 hours
Interval for recoating with HEMUCRYL topcoats						
Atmospheric, medium	N/R	N/R	12 hours	5 hours	4 hours	3 hours
Atmospheric, severe	N/R	N/R	18 hours	7 hours	5 hours	4 hours

1. Not relevant for HEMPATHANE qualities

Notes:
- Avoid sudden drops in (substrate) temperatures during drying/initial curing. It is especially important that the substrate temperature does not drop significantly before application of the acrylic or polyurethane finish and that proper ventilation is maintained.
- If faster handling or recoating at lower temperatures is required, HEMPADUR 45143 may be used.
- In case of low temperatures, it is recommended that HEMPADUR MASTIC 45880 has been given a proper induction time before application. Under such conditions, consider paint temperature equal to substrate temperature and follow the rules given on page 2.

HEMPADUR MASTIC 45880 in a dry film thickness of 200 micron/8 mils:

Surface temperature:	-5°C/23°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
Drying time (approx)	6 days	36 hours	15 hours	6 hours	5 hours	4 hours
Curing time (approx)	2½months	1 month	14 days	7 days	5 days	3 days
MINIMUM recoating interval related to later conditions of exposure:						
Interval for recoating with HEMPADUR and HEMPATHANE qualities						
Atmospheric, medium	5 days	42 hours	18 hours	7 hours	5 hours	4 hours
Atmospheric, severe	7 days	60 hours	25 hours	10 hours	8 hours	6 hours
Immersion[1]	8 days	3 days	30 hours	12 hours	10 hours	8 hours
Interval for recoating with HEMPATEX qualities						
Atmospheric, medium	5 days	42 hours	18 hours	7 hours	5 hours	4 hours
Atmospheric, severe	5 days	42 hours	18 hours	7 hours	5 hours	4 hours
Interval for recoating with HEMUCRYL topcoats						
Atmospheric, medium	N/R	N/R	18 hours	7 hours	5 hours	4 hours
Atmospheric, severe	N/R	N/R	25 hours	10 hours	8 hours	6 hours

1. Not relevant for HEMPATHANE qualities

Notes:
- Avoid sudden drops in (substrate) temperatures during drying/initial curing. It is especially important that the substrate temperature does not drop significantly before application of the acrylic or polyurethane finish and that proper ventilation is maintained.
- If faster handling or recoating at lower temperatures is required, HEMPADUR 45143 may be used.
- In case of low temperatures, it is recommended that HEMPADUR MASTIC 45880 has been given a proper induction time before application. Under such conditions, consider paint temperature equal to substrate temperature and follow the rules given on page 2.

HEMPADUR MASTIC 45880/45881

HEMPADUR MASTIC 45880 (independent on dry film thicknesses):

Surface temperature:	-5°C/23°F	0°C/32°F	10°C/50°F	20°C/68°F	30°C/86°F	40°C/104°F
MAXIMUM recoating interval related to later conditions of exposure:						
Interval for recoating with HEMPADUR qualities						
Atmospheric, medium Atmospheric, severe Immersion[1]	Extended* Extended* 3 months	Extended* Extended* 3 months	Extended* Extended* 2 months	Extended* Extended* 1 months	Extended* Extended* 23 days	Extended* Extended* 15 days
Interval for recoating with HEMPATHANE topcoats						
Atmospheric, medium Atmospheric, severe	Extended* Extended*	Extended* Extended*	Extended* Extended*	Extended* Extended*	Extended* Extended*	Extended* Extended*
Interval for recoating with HEMPATEX qualities						
Atmospheric,medium Atmospheric,severe	10 days 10 days	72 hours 72 hours	30 hours 30 hours	12 hours 12 hours	9 hours 9 hours	6 hours 6 hours
Interval for recoating with HEMUCRYL topcoats						
Atmospheric, medium Atmospheric, severe	N/R N/R	N/R N/R	6 days 3 day	3 days 1½ days	2 days 1 day	36 hours 18 hours

1. Depending on actual local conditions, extended maximum recoating intervals may apply. Please contact HEMPEL for further advice.

Notes:

- Avoid sudden drops in (substrate) temperatures during drying/initial curing.
- If faster handling is required at low temperatures, HEMPADUR 45143 may be used.

HEMPADUR MASTIC 45881 in a dry film thickness of 100-150 micron/4-6 mils:

Surface temperature:	20°C/68°F	30°C/86°F	40°C/104°F
Drying time (approx) Curing time (approx)	4 hours 7 days	3 hours 5 days	2 hours 3 days
MINIMUM recoating interval related to later conditions of exposure			
Interval for recoating with: HEMPADUR, HEMPATHANE, HEMPATEX and HEMUCRYL qualities			
Atmospheric, medium Atmospheric, severe Immersion[1](only HEMPADUR qualities)	5 hours 7 hours 8 hours	4 hours 5 hours 6 hours	3 hours 4 hours 5 hours

HEMPADUR MASTIC 45881 in a dry film thickness of 200 micron/8 mils:

Surface temperature:	20°C/68°F	30°C/86°F	40°C/104°F
Drying time (approx) Curing time (approx)	6 hours 7 days	5 hours 5 days	4 hours 3 days
MINIMUM recoating interval related to later conditions of exposure			
Interval for recoating with: HEMPADUR, HEMPATHANE, HEMPATEX and HEMUCRYL qualities			
Atmospheric, medium Atmospheric, severe Immersion (only HEMPADUR qualities)	7 hours 10 hours 12 hours	5 hours 8 hours 10 hours	4 hours 6 hours 8 hours

HEMPADUR MASTIC 45881 (independent on dry film thickness):

Surface temperature:	20°C/68°F	30°C/86°F	40°C/104°F
MAXIMUM recoating interval related to later conditions of exposure			
Interval for recoating with HEMPADUR qualities			
Atmospheric, medium Atmospheric, severe Immersion	Extended* Extended* 1 months	Extended* Extended* 23 days	Extended* Extended* 15 days
Interval for recoating with HEMPATHANE topcoats			
Atmospheric, medium Atmospheric, severe	Extended* Extended*	Extended* Extended*	Extended* Extended*
Interval for recoating with HEMPATEX qualities			
Atmospheric	12 hours	9 hours	6 hours
Interval for recoating with HEMUCRYL topcoats			
Atmospheric, medium Atmospheric, severe	3 days 1½ days	2 days 1 day	1 day 12 hours

HEMPADUR MASTIC 45880/45881

*** Notes on extended recoating Intervals with HEMPADUR and HEMPATHANE qualities**

Extended recoating intervals can be utilised when the following is strictly observed:

- The surface shall be thoroughly cleaned from all sorts of contaminants including invisible deposits of water soluble salts, oil, grease and similar harmful chemical substances.
- Surfaces having any degraded layer from exposure to UV radiation, heat etc. must have this layer removed by mechanical cleaning methods like, water jetting, abrading or sweep blasting.
- The existing coating system must in all respects be sound and applied according to Product Data Sheets, Application Instructions and Specification,

It should be recognised that the optimal intercoat adhesion is best ensured by observing the interval between the stated minimum and "Cured Time". Utilising extended recoating intervals it should further be understood that by chemical nature the intercoat adhesion between HEMPADUR qualities are better than between HEMPADUR and HEMPATHANE qualities. To determine whether the quality of the surface cleaning is adequate, a test patch may be relevant. However, such a test is not the final proof of long-term durability, but if the result is doubtful, repeated cleaning will be relevant. A more safe solution could be to refresh the surface with a new thin (diluted) coat of HEMPADUR MASTIC 45880/45881.

Safety: Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued: August 2002 - 4588012170C0010/4588112170C0007
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPATEX® HI-BUILD 46410

Description:

HEMPATEX HI-BUILD 46410 is a physically drying high build paint with good colour retention as a semi-flat finish. Based on acrylic resin, alkyd and non-chlorinated plasticizer. Contains zinc phosphate. Resistant to salt water, splashes of aliphatic hydrocarbons, animal and vegetable oils.

Recommended use:

1. As a primer, intermediate or finishing coat in HEMPATEX-systems in moderately corrosive environment.
2. As a selfprimed repair and touch-up coating where a fast and economic repair job is desired.

Service temperatures:

Maximum, dry: 80°C/176°F.

Certificates/Approvals:

Approved by CSIRO, Australia for carriage of foodstuffs.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/11480 - Red/50630*
Finish:	Semi-flat
Volume solids, %:	42 ± 1
Theoretical spreading rate:	4.2 m²/litre - 100 micron 168 sq.ft./US gallon - 4 mils
Flash point:	24°C/75°F
Specific gravity:	1.2 kg/litre - 10.0 lbs/US gallon
Surface dry:	1 (approx.) hours at 20°C/68°F *(ISO 1517)*
Dry to touch:	4 (approx.) hours at 20°C/68°F
V.O.C.:	515 g/litre - 4.3 lbs/US gallon

**Other shades according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specifications references:

Segment:	*Specification nos:*
Marine maintenance	DC-3, SST-2, SST-4, TS-2, TS-4
Marine newbuilding	DC-3, SST-2, TS-2

Note:

HEMPATEX HI-BUILD 46410 is for professional use only.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

October 2001 - 4641011480C0003
HEMPEL'S MARINE PAINTS A/S

This Product Data Sheet supersedes those previously issued. For definition and scope, see explanatory notes to applicable Product Data Sheets.

Product data are subject to change without notice and become void five years from the date of issue.

Product Data

HEMPEL'S SILVIUM® 51570

Description:
HEMPEL'S SILVIUM 51570 is an oleoresinous general purpose aluminium paint with good light reflection.

Recommended use:
As a finishing coat on steel and woodwork exterior and interior in mild to moderately corrosive environment where an aluminium surface or light reflection is desired, and/or for moderately hot surface.

Service temperatures:
Maximum, dry: 200°C/390°F.

Certificates/Approvals:
Complies with Section 175.300 of Food Additive Regulations (in respect of carriage of dry foodstuffs) of the Code of Federal Regulations as found by review of the U.S. Food and Drug Administration.
Approved by German authorities as a low flame spread material according to IMO resolution MSC 61 (67).
Has a German EC-type Examination Certificate.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade Nos:	Aluminium/19000
Finish:	Glossy
Volume solids, %:	38 ± 1
Theoretical spreading rate:	15.2 m²/litre - 25 micron 610 sq.ft./US gallon - 1 mil
Flash point:	38°C/100°F
Specific gravity:	1.0 kg/litre - 8.3 lbs/US gallon
Dry to touch:	5 (approx.) hours at 20°C/68°F
V.O.C.:	500 g/litre - 4.2 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification no.:*
Marine newbuilding	CH-1
Marine maintenance	CH-1

Note:
HEMPEL'S SILVIUM 51570 is for professional use only.

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:
October 2001 - 5157019000C0010
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPALIN® ENAMEL 52140

Description:

HEMPALIN ENAMEL 52140 is a glossy alkyd enamel which forms a weather resistant coating. It is flexible and resistant to salt water and spillage of mineral oil and other aliphatic hydrocarbons.

Recommended use:

As a general purpose finishing coat in alkyd systems on exterior and interior steel and woodwork in mildly to moderately corrosive environment.
As a finishing coat in engine rooms including tanktops, main engines and auxiliary machineriy.

Service temperatures:

Maximum, dry: 120°C/248°F (these temperatures may cause yellowing/discoloration).

Certificates/Approvals:

Approved as a low flame spread material by Danish, German, Belgian and Italian authorities according to IMO resolution MSC 61 (67).
Has a German and Danish EC-type Examination Certificate.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000*	Black/19990*
Finish:	Glossy	Glossy
Volume solids, %:	46 ± 1	43 ± 1
Theoretical spreading rate:	15.3 m²/litre - 30 micron 615 sq.ft./US gallon - 1.2 mils	14.3 m²/litre - 30 micron 575 sq.ft./US gallon - 1.2 mils
Flash point:	38°C/100°F	38°C/100°F
Specific gravity:	1.1 kg/litre - 9.2 lbs/US gallon	0.9 kg/litre - 7.5 lbs/US gallon
Dry to touch:	6-8 hours at 20°C/68°F	6-8 hours at 20°C/68°F
V.O.C.:	430 g/litre - 3.6 lbs/US gallon	455 g/litre - 3.8 lbs/US gallon

**Other shades according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification nos:*
Marine maintenance	ER-1, SST-1, TS-1
Marine newbuilding	ER-1, SST-1, TS-1

Note:

HEMPALIN ENAMEL 52140 is for professional use only.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

February 2001 - 52140100000C0016
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPALIN® DANREX® 52360

Description:

HEMPALIN DANREX 52360 is a versatile, alkyd-based, economy paint with fairly good penetration into rough and porous substrate.
Harmless to grain cargo.

Recommended use:

1. As a self-primed paint system on interior steel and woodwork, e.g. in dry cargo holds.
2. As a primer for alkyd-based paint systems in mild environment.

Service temperatures:

Maximum, dry: 120°C/248°F.

Certificates/Approvals:

Approved as a low flame spread material by German authorities according to IMO resolution MSC 61 (67).
Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.
Complies with Section 175.300 of Food Additive Regulations (in respect of carriage of dry foodstuffs) of the Code of U.S. Federal Regulations (FDA).
Has a German EC-type Examination Certificate.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Grey/10670	Red/50610
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	56 ± 1	57 ± 1
Theoretical spreading rate:	14.0 m^2/litre - 40 micron 561 sq.ft./US gallon - 1.6 mils	14.3 m^2/litre - 40 micron 571 sq.ft./US gallon - 1.6 mils
Flash point:	38°C/100°F	38°C/100°F
Specific gravity:	1.3 kg/litre - 10.8 lbs/US gallon	1.3 kg/litre - 10.8 lbs/US gallon
Dry to touch:	6-8 hours at 20°C/68°F	6-8 hours at 20°C/68°F
V.O.C.:	365 g/litre - 3.0 lbs/US gallon	360 g/litre - 3.0 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification nos:*
Marine maintenance	CH-2, CH-3
Marine newbuilding	CH-2

Note:

HEMPALIN DANREX 52360 is for professional use only.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

February 2001 - 52360106700011
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPALIN® DECKPAINT 53240

Description:

HEMPALIN DECKPAINT 53240 is a quick-drying, styrenated alkyd paint. Hardwearing and resistant to sunlight, salt water, and to oil splashes, but not to aromatic hydrocarbons, such as certain types of petrol (gasoline). For a skid-proof surface, see REMARKS overleaf.

Recommended use:

As a general purpose finishing coat, interior and exterior, on steel decks, stairways, catwalks, etc., in mildly to moderately corrosive environment.

Service temperatures:

Maximum, dry: 120°C/248°F.

Certificates/Approvals:

Approved as a low flame spread material by Danish and German authorities according to IMO resolution MSC 61 (67).
Has a German and Danish EC-type Examination Certificate.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Green/40640	Red/50630
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	42 ± 1	41 ± 1
Theoretical spreading rate:	14.0 m²/litre - 30 micron 561 sq.ft./US gallon - 1.2 mils	13.7 m²/litre - 30 micron 548 sq.ft./US gallon - 1.2 mils
Flash point:	28°C/82°F	28°C/82°F
Specific gravity:	1.1 kg/litre - 9.2 lbs/US gallon	1.1 kg/litre - 9.2 lbs/US gallon
Dry to touch:	1 (approx.) hour at 20°C/68°F	1 (approx.) hour at 20°C/68°F
V.O.C.:	490 g/litre - 4.1 lbs/US gallon	495 g/litre - 4.1 lbs/US gallon

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification no.:*
Marine maintenance	DC-1, DC-2, ID-1
Marine newbuilding	DC-1, DC-2, ID-1

Note:

HEMPALIN DECKPAINT 53240 is for professional use only.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

February 2001 - 5324040640C0016
HEMPEL'S MARINE PAINTS A/S

This Product Data Sheet supersedes those previously issued. For definition and scope, see explanatory notes to applicable Product Data Sheets.

Product data are subject to change without notice and become void five years from the date of issue.

Product Data

HEMPATHANE® TOPCOAT 55210

CURING AGENT 95370

Description:

HEMPATHANE TOPCOAT 55210 is a two-component, semi-gloss acrylic polyurethane coating with good gloss and colour retention.

Recommended use:

As a finishing coat for protection of structural steel in severely corrosive atmospheric environment, where light-fastness and gloss retention are required.
Minimum temperature for curing is -10°C/14°F.

Service temperatures:

Maximum, dry: 120°C/248°F (these temperatures may cause the paint to yellow/ discolour).

Certificates/Approvals:

Approved as a low flame spread material by German and Italian authorities according to IMO resolution MSC 61 (67).
Has a German EC-type Examination Certificate.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	White/10000*	Blue/30840*
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	52 ± 1	50 ± 1
Theoretical spreading rate:	10.4 m²/litre - 50 micron 417 sq.ft./US gallon - 2 mils	10.0 m²/litre - 50 micron 401 sq.ft./US gallon - 2 mils
Flash point:	33°C/91°F	33°C/91°F
Specific gravity:	1.2 kg/litre - 10.0 lbs/US gallon	1.1 kg/litre - 9.2 lbs/US gallon
Surface dry:	2½ (approx.) hrs at 20°C/68°F *(ISO 1517)*	2½ (approx.) hrs at 20°C/68°F *(ISO 1517)*
Dry to touch:	8 (approx.) hours at 20°C/68°F	8 (approx.) hours at 20°C/68°F
Fully cured:	7 days at 20°C/68°F	7 days at 20°C/68°F
V.O.C.:	440 g/litre - 3.7 lbs/US gallon	450 g/litre - 3.7 lbs/US gallon
Min. curing temperature:	-10°C/14°F	-10°C/14°F

**Other shades according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification nos:*
Marine maintenance	DC-6, SST-5, SST-7, TS-5, TS-7, TS-8, TS-9
Marine newbuilding	DC-5, DC-6, DC-9, SST-3, SST-4, SST-6, SST-7, TS-3, TS-4, TS-6, TS-7, TS-8, TS-9

Note: **HEMPATHANE TOPCOAT 55210 is for professional use only.**

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

October 2001 - 55210100000C0008
HEMPEL'S MARINE PAINTS A/S

Product Data

HEMPATEX® ENAMEL 56360

Description:

HEMPATEX ENAMEL 56360 is a finishing coat based on acrylic resin and non-chlorinated plasticizer for optimum gloss and colour retention. Physically drying. Resistant to salt water, splashes of aliphatic hydrocarbons and animal and vegetable oils.

Recommended use:

As a topcoat in HEMPATEX systems in moderately to severely corrosive environment.

Service temperatures:

Maximum, dry: 80°C/176°F.

Certificates/Approvals:

Tested for non-contamination of grain cargo at the Newcastle Occupational Health, Great Britain.

Availability:

Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Black/19990*	Red/50040*
Finish:	Semi-gloss	Semi-gloss
Volume solids, %:	31 ± 1	33 ± 1
Theoretical spreading rate:	8.9 m^2/litre - 35 micron 355 sq.ft./US gallon - 1.4 mils	9.4 m^2/litre - 35 micron 378 sq.ft./US gallon - 1.4 mils
Flash point:	25°C/77°F	25°C/77°F
Specific gravity:	1.0 kg/litre - 8.3 lbs/US gallon	1.0 kg/litre - 8.3 lbs/US gallon
Surface dry:	1 (approx.) hr at 20°C/68°F *(ISO 1517)*	1 (approx.) hr at 20°C/68°F *(ISO 1517)*
Dry to touch:	3-4 hours at 20°C/68°F	3-4 hours at 20°C/68°F
V.O.C.:	610 g/litre - 5.1 lbs/US gallon	595 g/litre - 4.9 lbs/US gallon

**Other shades according to assortment list.*

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.

Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification nos:*
Marine maintenance	DC-3, SST-2, SST-3, SST-4, TS-2, TS-3, TS-4
Marine newbuilding	DC-3, SST-2, TS-2

Note:

HEMPATEX ENAMEL 56360 is for professional use only.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

February 2001 - 5636019990C0009
HEMPEL'S MARINE PAINTS A/S

This Product Data Sheet supersedes those previously issued. For definition and scope, see explanatory notes to applicable Product Data Sheets.

Product data are subject to change without notice and become void five years from the date of issue.

Product Data

HEMPADUR® 85671

CURING AGENT 97371

Description:
HEMPADUR 85671 is a two-component, amine adduct cured phenolic epoxy (novolac) coating with very good adhesion and high temperature, water and chemical resistance.

Recommended use:
As an interior lining in tanks, pipelines etc. for hot water, brine, crude oil, etc.
For coating of potable water tanks.
As a primer coat in specific painting systems.

Service temperatures:

	Dry:	In water (maximum gradient 15°C/27°F):
Maximum:	160°C/320°F	90°C/194°F

For higher temperatures contact HEMPEL.

Certificates/Approvals:
HEMPADUR 85671 is in accordance with ARAMCO's specification APCS 2A, 2B and 2C.
Approved for use in potable water tanks by the Water Research Centre, England.
Approved for aviation fuel storage tanks by ExxonMobil Aviation International Ltd., England.
Certified by NSF, USA for use in potable water tanks with volumes of 1000 gallon or greater.

Availability:
Part of Group Assortment. Local availability subject to confirmation.

PHYSICAL CONSTANTS:

Colours/Shade nos:	Off-white/11630, Light red/50900
Finish:	Flat
Volume solids, %:	68 ± 1
Theoretical spreading rate:	6.8 m^2/litre - 100 micron 273 sq.ft./US gallon - 4 mils
Flash point:	24°C/75°F
Specific gravity:	1.7 kg/litre - 14.2 lbs/US gallon
Surface dry:	2-3 hours at 20°C/68°F
Dry to touch:	4-6 hours at 20°C/68°F
Fully cured:	10 days at 20°C/68°F
V.O.C.:	320 g/litre - 2.7 lbs/US gallon
Min. curing temperature:	10°C/50°F

Shelf life:
½ year (25°C/77°F) from time of production. Depending on storage conditions, mechanical stirring may be necessary before usage.
If the shelf life is exceeded please contact HEMPEL for further advice.

The physical constants stated are nominal data according to the HEMPEL Group's approved formulas. They are subject to normal manufacturing tolerances and where stated, being standard deviation according to ISO 3534-1. Further reference is made to "Explanatory Notes" in the HEMPEL Book.
Surface preparation, application conditions, preceding/subsequent coat and remarks: See relevant painting specification.

Painting specification references:

Segment:	*Specification nos:*
Marine maintenance	FW-3
Marine newbuilding	FW-3

Note:
HEMPADUR 85671 is for professional use only.

Safety:
Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:
March 2003 - 8567111630CR002
HEMPEL'S MARINE PAINTS A/S

This Product Data Sheet supersedes those previously issued. For definition and scope, see explanatory notes to applicable Product Data Sheets.

APPLICATION INSTRUCTIONS

For product description refer to the product data sheet

HEMPADUR® 85671

BASE 85675 with CURING AGENT 97371

Scope:

These appliation instructions cover surface preparation, application equipment, and application of HEMPADUR 85671.

The following are general rules, which may be supplemented with more detailed descriptions when needed, for instance for major newbuildings/new constructions or extensive repair jobs.

Steel work:

For optimum performance, the following is recommended:
All welding seams must have a surface finish which ensures that the quality of the paint system will be maintained in all respects. Holes in weldings seams, undercuts, cracks, etc. should be avoided. If found, they must be remedied by welding and/or grinding.

All weld spatters must be removed.

All sharp edges must be removed or rounded off in such a way that the specified film thickness can be built up on all surfaces. The radius of the rounding should be minimum 2 mm.

The steel must be of first class quality and should not have been allowed to rust more than corresponding to grade B of ISO 8501-1:1988. Any laminations must be removed.

All steel work (including welding, flamecutting, grinding) must be finished before the surface preparation starts.

Surface preparation:

Prior to abrasive blast cleaning of the steel, remove oil, grease, salts and other contamination with a suitable detergent followed b y high pressure fresh water hosing. Alkali deposits on new welding seams as well as soap traces from pressure testing of tanks to be removed by fresh water and scrubbing with stiff brushes.

Control for absence of contamination according to separate guidelines.

On repair jobs, a rough blasting to remove all loosely adhering materials may be required before degreasing/washing is carried out.

Old steel: Even after a very thorough cleaning, pits may typically contain contamination in the form of remnants of chemicals/water soluble salts. For this reason, repeated detergent washing plus abrasive blasting may be necessary. After the first blasting, a very thorough vacuum cleaning is carried out in order to see if any "chemical bleeding" occurs as well as controls for water soluble salts (reference is made to separate instructions) are made. Special care should be taken in evaluating pitted areas - ask for special guidelines.

For optimum performance, gritblast to very near white metal, Sa 2½-3, ISO 8501-1:1988. In practice this requirement is to be understood as white metal Sa 3 at the moment of abrasive blasting, but allows a slight reduction at the moment of paint application.

The resulting surface profile must be equivalent to Rugotest No. 3, min. BN 10, Keane-Tator Surface Comparator, G/S min. 3.0 or ISO/DIS 8503/1 rough MEDIUM (G).

Use steel grit, aluminium silicate, or similar sharp edged abrasives of a good quality free of foreign matters, soft particles, and the like. Control for absence of contamination according to separate guidelines.

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In case steel grit is used this must furthermore be controlled so that a proper grain size distribution is maintained.

Steel grit with particle sizes of 0.2-1.2 mm or aluminium silicate of 0.4-1.8 mm will usually create the desired surface profile when the air pressure measured at the nozzle is 6-7 bar/85 -100 psi.

The compressed air must be dry and clean. The compressor must be fitted with suitable oil and water traps.

When the abrasive blasting is completed, remove residual grit and dust by vacuum cleaning. Abrasive particles not removed by vacuum cleaning are to be removed by brushing with clean brushes followed by vacuum cleaning.

The importance of systematic working must be stressed when blasting. Poorly blasted areas covered with dust are very difficult to locate during the blast inspection made after the rough cleaning.

Shopprimed and previously painted surfaces: All shopprimer or existing coating materials to be completely removed. Avoid the use of zinc shopprimer whenever possible.

However, if the steel is shopprimed with zinc, it is very important that **all** zinc is removed by abrasive blast cleaning. Separate check procedures will be necessary to demonstrate the effectiveness of removal. More blast cleaning may be deemed necessary! Use of a red zinc shopprimer will facilitate the visual check of the blast cleaning and is considered necessary in order to obtain an acceptable surface preparation.

Note: Degree of steelwork finish and surface preparation are more detailed described in HEMPEL's Technical Standard for Tank Coating Work.

Application equipment:

HEMPADUR 85671 is to be applied by airless spray equipment. Stripe coating and minor repairs can be carried out by brushing.

Airless spray equipment: A large pump is preferred, with a pump capacity of 8-12 litres/minute.

Pump ratio:	Min. 45:1
Nozzle orifice:	.018"-.021"
Nozzle pressure:	200 bar (2900 psi)
Hoses:	To avoid excessive loss of pressure in long hoses, hoses with an internal diameter of up to 0.5" can be used

(Spray data are indicative and subject to adjustment).

Thinning

If required: max. 10% of THINNER 08450, possibly higher if tendency to d ry-spray will require more thinning eg at higher temperatures. Thinning should only be at the required level to avoid possible risk of solvent entrapment.
Only add thinner to the mixed paint.

Spraying properties are influenced by the induction time (premix time). Too much "thixotropy" will disappear after a certain reaction of the mixed components.

Cleaning of equipment:

The whole equipment to be cleaned thoroughly with HEMPEL'S TOOL CLEANER 99610 after use.

Mixing, pot life:

a. Mix the entire content of corresponding base and curing agent packings. If it is necessary to mix smaller portions, this must only be done by weighing base and curing agent in the prescribed weight ratio: 158 parts by weight of base and 11.4 parts by weight of curing agent or by volume 8.8 parts by volume base and 1.2 parts by volume curing agent.

b. Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.

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c. **Allow the mixed paint to prereact before application, see table below** .

d. Use all mixed paint before the pot life is exeeded. The pot life depends on the paint's temperature as shown in table below (valid for a 20 litres can):

Temperature of mixed paint	(15°C/59°F[1])	20°C/68°F	25°C/77°F	(30°C/86°F[2])
Induction time	(25 minutes)	15 minutes	10 minutes	(5 minutes)
Spray application within	(4 hours)	3 hours	2 hours	(1 hours)

[1] Below 15°C/59°F the viscosity can be too high for airless spray application.
[2] Temperatures at 30°C/86°F and above should be avoided due to a risk of dry-spray.

Application procedure:

The first full coat is usually applied immediately after vacuum cleaning. First stripe coat to follow afterwards.

Film-build/continuity: With this tank coating intended for aggressive service, it is of special importance that a continuous, pinhole-free paint film is obtained at application of each coat. An application technique which will ensure good film formation and no dry-spray on **all** surfaces must be adopted.

It is very important to use nozzles of the correct size, ie not too big. Select small nozzles for spray application of complicated structures, while bigger nozzles may be used for regular surfaces.

A proper, uniform distance of the spray gun to the surface, 30-50 cm, should be aimed at. To obtain good and steady atomizing, the viscosity of the paint must be suitable and the spray equipment must be sufficient in output pressure and capacity. At high working temperatures, use of extra thinner may be necessary to avoid d ry-spray.

The paint layer must be applied homogenously and as close to the specification as possible. The consumption of paint must be controlled and heavy layers must be avoided because of the risk of sags and cracks and solvent retention.

Furthermore, great care must be taken to cover edges, openings, rear sides of stiffeners etc. Thus, on these areas a stripecoat will usually be necessary.

The finished coating must appear as a homogeneous film with a smooth surface and irregularities such as dust, dry spray, abrasives, must be remedied.

Note: In case of old, pit corroded steel, application of a diluted, extra first coat is recommended to obtain better "penetration" in the fine pits. For this purpose, it is relevant to dilute 5-10%. Application by brush is recommended and film thickness so low that the surface is "saturated" only.

Stripe coating:

All places difficult to cover properly by spray application should be stripe coated twice by brushing immediately before the spray application. First stripe coat is applied after the first full coat and second stripe coat after second full coat.

The second stripe coat with brush can be replaced with spray application with a small narrow nozzle, but still air slots and similar and possible undercuts (welds) and the like will require brush application.

Film thicknesses:

The final dry film thickness of the three coat system must be between 300-600 micron (max. 450 micron below 15°C)/12-24 mils (max. 18 mils below 59°F).

Corresponding to 100 micron/4 mils dry film thickness, the wet film thickness must be 150-175 micron/6-7 mils and must be measured regularly.

Normally up to 200 micron/8 mils per coat may be accepted for 100 micron/4 mils specifications, **but at temperatures below 15°C/59°F, it is important not to exceed a dry film thickness of 150 micron/6 mils in any area** .

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Microclimate:

The actual climate conditions at the substrate during application:

The minimum surface temperature until full cure is 10°C/50°F.

To ensure an all-over steel temperature of minimum 10°C/50°F, special attention should be paid to possible "cold bridges" eg stiffeners on deck.

In case of steel temperatures lower than 10°C/50°F there is a severe risk of incomplete curing, resulting in a too open film with reduced chemical resistance.

When the outside temperature is lower than 10°C/50°F, it is therefore recommended to use insulation mats on deck and in addition to aim at a general steel temperature of 15°C/59°F to minimise the risk of too low steel temperatures.

Furthermore, the steel temperature should be kept reasonably constant - within the range of ± 3°C/5°F is recommended. Any changes of the outside temperature should therefore be carefully monitored and heating equipment calibrated accordingly.

A sudden drop of the steel temperature shortly after application will result in solvent entrapment and will cause a dry film containing vacuoles, ie resulting in reduced performance.

The maximum surface temperature should preferably be below approximately 30°C/86°F. In a warm climate it is recommended to carry out application during nighttime. Application at higher temperatures is possible, but extra care must be taken to avoid poor film formation and excessive spray-dust.

The steel temperature must be above the dew point. As a rule of thumb a steel temperature which is 3°C/5°F above the dew point can be considered safe.

The relative humidity should preferably be 40-60%, maximum 80%. In confined spaces, supply an adequate amount of fresh air during application and drying to assist the evaporation of solvent.

Drying and curing, ventilation:

In a dry film thickness of 100 micron/4 mils, with a steel temperature of 20°C/68°F, a relative air humidity of maximum 80% and adequate ventilation, HEMPADUR 85671 will be dry to touch after 4-6 hours. Under these drying conditions, the paint film will accept light traffic after approximately 16 hours.

Correct film formation depends on an adequate ventilation during drying.

A good guideline for tank coating work is to ventilate to a calculated 10% of LEL during application and until the coating is dry.

One litre undiluted HEMPADUR 85671 gives off in total 81 litres solvent **vapour** until it is completely dry.

The lower explosive limit, LEL, is 1.0%.

To reach a common safety requirement of 10% LEL, the theoretical ventilation requirement is 81 m^3 per litre paint.

Because solvent vapours are heavier than atmospheric air, effective ventilation requires forced ventilation with exhaust from the lowest part of the tank.

During the following period until full curing a few air shifts per hour will suffice. Take actions to avoid "pockets" of stagnant air.

Please contact HEMPEL for further advice.
Actual safety precautions may require stronger ventilation.

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Curing time:

Provided that adequate ventilation, recommended relative humidity, specified film thickness, and recommended minimum recoating interval are kept, the following curing times are valid:

Steel temperature	10°C/50°F	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	35°C/95°F	40°C/104°F
Curing time	18 days	14 days	10 days	8 days	7 days	6 days	4 days

Recoating intervals:

Provided observance of the above stated ventilation and relative humidity for the following recoating intervals in relation to the (steel) temperature are valid:

Steel temperature	10°C/50°F*	15°C/59°F	20°C/68°F	25°C/77°F	30°C/86°F	35°C/95°F
Minimum, non-potable water service						
- between the first and the second coat	90 hours	60 hours	36 hours	24 hours	18 hours	14 hours
- between the second and the third coat	60 hours	40 hours	24 hours	16 hours	12 hours	9 hours
Potable water service, all coats; minimum:	7½ days	5 days	3 days	2 days	36 hours	30 hours
Maximum	47 days	34 days	21 days	16 days	14 days	11 days

* Absolute minimum temperature recommended.

The maximum relative humidity before and between the coats should not exeed 80% and the steel temperature should always be above the dew point, in practice minimum 3°C/5°F above the dew point.

Conditions for paint application work:

Dry spray is not acceptable as this will reduce the protective characteristics of the paint and make later tank cleaning difficult. Dry spray can be avoided by using adequate stagings, spraying equipment and methods.

Hold spray gun at a right angle to and about 30 cm/1 foot from surface making even parallel passes at a rate to produce the specified wet film thickness as per specification.

Avoid dry spray (overspray creating exessive paint mist), e.g. by using a smaller fan angle, and the lowest possible pressure. A small fan angle should also be used, if spray application is used, for "stripe coating" of for instance reverse sides of stiffeners. Each layer must be applied homogeneously, must be free from pinholes and other defects and as near above the specification of 100 micron/4 mils dry film thickness, as possible. The consumption of paint must be controlled, and heavy layers must be avoided because of the risk of saggings, cracks and solvent retention.

Surface irregularities such as dry spray, saggings, exaggerated thickness or embedded dust or abrasives will have to be remedied.

If a sandpapering between layers, for instance on the bottom, is needed, great care must be taken to avoid damaging of otherwise intact surfaces. When using mechanical means only lightweight equipment should be used, orbital sander is recommended. Yet, avoid sandpapering on top of welds or irregularities or near to vertical surfaces.

The finished coating must appear as a homogeneous surface without pores, runners or pollution of any kind.

Control of dry film thicknesses:

For the standard specification following applies to the dry film thickness:

The minimum dry film thickness is 300 micron/12 mils, maximum recommended thickness is 600 micron/24 mils (below 15°C/59°F: 450 micron/18 mils). The minimum dry film thickness is evaluated according to the "80-20" rule, ie no more than 20% of the total number of individual measurements must be lower than the minimum dry film thickness, and the lowest individual measurement must be at least 80% of minimum dry film thickness, ie 240 micron/9.6 mils. The maximum dry film thickness can also be evaluated according to the "80-20" rule.

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Dry film thickness control must not be carried out within the first 24 hours after application of final coat (20°C, sufficient ventilation). The measurement must be carried out using an electromagnetic dry film thickness gauge calibrated with shims placed on a smooth steel substrate.

Taking into use:

Do not use the tank or pipeline before the coating is properly cured. Reference is made to curing time on page 5. When cured, but before taking the tank into use for **potable water**, fill twice with water each time for a period of no less than 24 hours and finally flush with fresh water.

Repairs:

It is of great importance that all damage to the coating is repaired.

Repair shall be started as soon as possible. Repair of mountings for stagings, etc. must take place in connection with the dismantling of the stagings, the tempo of which should be adjusted to the touch-up procedure.

It is important that the repaired areas, as well as the rest of the coated areas, are fully cured before the tank is taken into use or washed by the tank cleaning system.

The extent of damage to the coating can be evaluated by a seawater test: Wash the tanks with clean seawater by means of the tank cleaning machines until profiles and/or heating coils on tanktop is covered. Allow the water to stay for minimum 3 days, after which period the tank is emptied and cleaned with clean fresh water to remove salts.

The repair process:

General: Before mechanical treatment is started, surfaces to be repaired have to be cleaned for any salts and other contamination.

Areas less than 5 x 5 cm:

The surface preparation can be executed by grinding to a clean rough metal surface, feathering edges of intact coating and slightly sanding the adjacent surface.

Clean and wash with HEMPEL'S THINNER 08450.

Touch-up to full film thickness with minimum 3 coats of HEMPADUR 85671.

Areas up to 1 sq.m:

The surface preparation must be executed by vacuum blasting or open nozzle blasting so that the steel has a proper roughness and a cleanness to Sa 3 according to ISO 8501:1988. The overlapping zone must be sanded or sweep blasted to ensure a good adhesion of the new paint.

Clean and wash with HEMPEL'S THINNER 08450.

Touch-up to full film thickness with minimum 3 coats HEMPADUR 85671.

Areas above 1 sq.m. or areas where several damaged spots are concentrated:

Treatment: Repeat the original specification.

Safety:

Handle with care. Before and during use, observe all safety labels on packaging and paint containers, consult HEMPEL Material Safety Data Sheets and follow all local or national safety regulations. Avoid inhalation, avoid contact with skin and eyes, and do not swallow. Take precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

Issued:

September 2002 - 8567111630CR002
HEMPEL'S MARINE PAINTS A/S

This Product Data Sheet supersedes those previously issued. For definition and scope, see explanatory notes to applicable Product Data Sheets.