

85671: BASE 85675 with CURING AGENT 97371

For product description refer to product data sheet 85671

Scope: These Application Instructions cover surface preparation, application equipment and application details for HEMPADUR 85671.

Steel work: All steel work must comply with ISO 8501-3:2001, preparation grade P3.

The steel must be of first class quality and should not have been allowed to rust more than corresponding to grade B of ISO 8501-1:2007. Local areas showing rust grade C must be subject to extended inspection of salt contamination.

All steel work (including welding, flame cutting, grinding) must be finished before the surface preparation starts.

Note:

Degree of steelwork finish and surface preparation are more detailed described in HEMPEL's Technical Standard for Tank Coating Work.

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. Water soluble salts shall be removed by high pressure fresh water hosing if the concentration is above 50 mg/m²

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.

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 are made. Special care should be taken in evaluating pitted areas.

For optimum performance, gritblast to very near white metal, Sa 2½-3, ISO 8501-1:2007. 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 10a, or ISO 8503/1 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.

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.

Shoppripped and previously painted surfaces:

For use as tank lining all shopprimer or existing coating materials is to be completely removed. Avoid the use of zinc shopprimer whenever possible.

However, if the steel is shoppripped 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.

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Other degrees of cleaning including wet methods like ultra-high-pressure-water-jetting (UHPWJ) and blasting with mixtures of grit and water may be relevant according to Hempel-specification.

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:	0,018"-0,021"
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. <i>(Spray data are indicative and subject to adjustment).</i>

Thinning:

If required:

Max. 10% of THINNER 08450, as thinning may be required at higher temperatures to counteract dry-spray. However, never use more thinner than required to avoid possible risk of solvent entrapment. Thinner only to be added 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:

- 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.
- Stir the mixed paint thoroughly by means of a clean mechanical mixer until a homogeneous mixture is obtained.
- Allow the mixed paint to prereact before application, see table next page.
- Use all mixed paint before the pot life is exceeded. 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	30°C/86°F ²⁾	40°C/104°F ²⁾
Induction time	25 minutes	15 minutes	5 minutes	3 minutes
Spray application within	4 hours	3 hours	1 hours	30 minutes

1) Below 15°C/59°F the viscosity can be too high for airless spray application.

2) For temperatures 30°C/86°F and above, thinning with HEMPEL'S THINNER 08450 (5-7.5 %) is recommended to avoid 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, i.e. 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.

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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.

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 after the spray application. First stripe coat is applied after the first full coat and 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, possible undercuts (welds) and the similar will require brush application.

Film thickness:

For the standard specification the following dry film thickness applies:

2 x 150 µm /6 mils
3 x 100 µm /4 mils

Maximum DFT per coat should not exceed 200 µm/8 mils.

Note: At steel temperatures below 15°C/59°F, it is important not to exceed a dry film thickness of 150 micron /6 mils per coat in any area.

For cryogenic service below -50°C/122°F and high service temperature above 160°C/320°F it is recommended to specify 2 x 100 µm /4 mils and pay extra attention to avoid areas with excessive film thickness.

The minimum dry film thickness is evaluated according to the "90-10" rule, i.e. no more than 10% 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 90% of minimum dry film thickness, i.e. 270 micron/10.8 mils.

Microclimate:

The actual climate conditions at the substrate during application:

To ensure an all-over steel temperature of minimum 10°C/50°F, special attention should be paid to possible "cold bridges".

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 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.

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 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 be maximum 80%. In confined spaces, supply an adequate amount of fresh air during application and drying to assist the evaporation of solvent.

Drying, ventilation:

Correct film formation depends on an adequate ventilation during drying.

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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 m³ 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 overcoating interval are kept, the following curing times are valid:

Steel temperature	10°C/ 50°F	20°C/ 68°F	30°C/ 86°F	40°C/ 104°F
Fully cured	13 days	7 days	5 days	3 days

Post curing:

The chemical resistance of the coating can be extended by post curing. Post curing can take place **after** fully cured is achieved.

Post curing is accomplished by carrying a hot cargo of mineral lube oil, vegetable oil or animal oil at minimum 50°C/122°F. The curing time is 8 days at 50°C/122°F and 4 days at 60°C/140°F.

Post curing may also be accomplished by using tank cleaning machines to spray hot, clean fresh water to achieve a minimum steel temperature of 60°C/140°F and maximum 80°C/176°F. The curing time is 16 hours at 60°C/140°F and 3 hours at 80°C/176°F.

Contact HEMPEL for detailed advice about post curing.

Overcoating intervals:

Steel temperature	10°C/50°F*		20°C/68°F		30°C/86°F		40°C/104°F	
	Min	Max	Min	Max	Min	Max	Min	Max
Non potable water service	25 h	47 d	16 h	21 d	8 h	10.5 d	5 h	6.5 d
Potable water service**	7.5 d	52.5 d	3 d	21 d	2 d	10.5 d	36 h	6.5 d

d=day(s); h= hour(s)

* Absolute minimum temperature recommended.

** The approval from Folkehelseinstituttet, Norway will apply provided a minimum overcoat interval of 6 days (20°C/68°F).

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 excessive paint mist), e.g. by using a smaller fan angle, and the lowest possible pressure-

Each layer must be applied homogeneously, must be free from pinholes and other defects and as near 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, crack formation and solvent retention.

Surface irregularities such as dry spray, sagging, exaggerated thickness or embedded dust or abrasives will have to be remedied.

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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.

Taking into use:

Do not use the tank or pipeline before the coating is fully cured.

Being a solvent-borne paint HEMPADUR 85671 does contain traces of solvents after it has been fully curing. These solvents will leach out into the surrounding media during service.

In order to keep the concentrations below acceptable levels the following conditioning procedure is recommended for HEMPADUR 85671 in contact with **potable water**:

When cured for 1 month (20°C/68°F), but before taking the tank into use for **potable water**, fill twice with water at 60°C/140°F each time for a period of no less than 24 hours and finally flush with fresh water.

For tanks larger than 100.000 litres/26.000 US gallons flush the surface with fresh water (min. 15°C/59°F) for two days. Then wash the tank thoroughly with soap water, followed by brushing with water or steam cleaning.

On vessels adjacent tanks must be empty during the conditioning.

Repair process:

General:

Before mechanical treatment is started, surfaces to be repaired have to be cleaned from any salts and other contamination.

Areas up to approximately A4 size (20x30 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 2 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 cleanliness to min Sa 2.5 according to ISO 8501-1:2007. 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 2 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 by:

HEMPEL A/S - 85671

These Application Instructions supersede those previously issued.

For explanations, definitions and scope see "Explanatory Notes" available on www.hempel.com. Data, specifications, directions and recommendations given in this data sheet represent only test results or experience obtained under controlled or specially defined circumstances. Their accuracy, completeness or appropriateness under the actual conditions of any intended use of the Products herein must be determined exclusively by the Buyer and/or User. The Products are supplied and all technical assistance is given subject to Hempel's general conditions of sales, delivery and service, unless otherwise expressly agreed in writing. The Manufacturer and Seller disclaim, and Buyer and/or User waive all claims involving, any liability, including but not limited to negligence, except as expressed in said general conditions for all results, injury or direct or consequential losses or damages arising from the use of the Products as recommended above, on the overleaf or otherwise. Product data are subject to change without notice and become void five years from the date of issue.