For product description refer to 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, flame cutting, 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.

Abrasive blasting with sharp abrasive 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 10, Keane-Tator Surface Comparator, G/S min 3.0 or ISO 8503/1 rough Medium (G).

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.

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, eg. 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.

Additionally 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. Leftovers 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.

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:

Recommended minimum surface temperature is 0°C/32°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 night time.

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. 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 theoretical 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 min. 75% RH, curing requires min. 36 hours. At lower temperatures and relative humidity, curing time will increase considerably - see Product Data Sheet.

The relative humidity should be minimum 65% - and the minimum temperature 0°C/32°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 recoated.

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.

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.

A hydrocarbon wall wash test is recommended to asce rtain complete removal of hydrocarbon solvents present in H EMPEL'S GALVOSIL 15700 before loading hydrocarbon sensitive cargoes, e.g. methanol. If the test is positive, carry out additional fresh water washing.

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.

Topcoating procedure:

Non-weathered zinc silicate coatings are porous and popping may occur in the subsequent coat(s). 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).

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 - 1570019840C0026