

Hempatherm IC system

Application Guide

Introduction

Hempatherm IC 175 and Hempatherm IC 170 are water-borne insulation coatings used together over a suitable epoxy primer in a coating system to provide process insulation and energy conservation.

The Hempatherm IC system forms a seamless, hydrophobic layer that is able to resist water retention. Hence, the benefit of an insulation coating system is twofold – (i) it is able to maintain reliable and consistent insulation performance throughout its service life, (ii) while eliminating the risk of CUI.

The performance and durability of the Hempatherm IC system is directly related to the surface cleanliness and quality of the paint application. The application of Hempel's insulation coatings and any associated primer shall only be performed by experienced and trained applicators in compliance with insulation specification and this application guide. Hempel's field service technical department can provide onsite support to ensure compliance with this requirement.

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Safety

Use adequate personal safety equipment and follow sound procedures. Apply only in well-ventilated areas. Observe safety labels on packaging and paint containers and consult Hempel's Safety Data Sheets for the products to be applied.

Scope

This Hempel Technical Guideline shall:

- provide supplementary information to the Product Data Sheets and Safety Data Sheets to enable the applicator to correctly apply the Hemplatherm IC system.
- Always be used together with the relevant Product Data Sheets and Safety Data Sheets
- make reference to other codes and standards, and by reference will invoke the latest publication issue or amendments of the standard.

System description

The Hemplatherm IC system consists of

- A suitable epoxy primer – typically Hemplathprime CUI 275
- Hemplatherm IC 175
- Hemplatherm IC 170

The recommended primer is 150 microns [5.9 mils] Hemplathprime CUI 275. For use of other epoxy primer please consult Hempel prior to use.

Hemplatherm IC 175 is a two-pack water-borne insulation coating. The product has excellent thermal properties comparable to fibrous insulation materials in-service. It can be applied at high film thickness per coat, improving productivity and reducing associated cost in both newbuild and maintenance projects. As insulation performance depends on thickness, multiple layers may be needed. Hemplatherm IC 175 can be applied up to 5 mm WFT in a single layer with multiple passes. Typically, thickness is build-up in 2 mm DFT coats for shorter overcoating and faster job completion. The product is supplied as a separate liquid base and a pack of insulation powder.

Hemplatherm IC 170 is a single-pack, water-borne insulation coating. The product is used as a topcoat or sealer over Hemplatherm IC 175. The product may be applied up to 3 mm WFT in a single coat with multiple passes. The product forms a hydrophobic layer able to prevent water ingress and thereby helps to maintain reliable and consistent thermal insulation performance throughout the service life of the coating system.

Hemplatherm IC 175 and Hemplatherm IC 170 are available in contrasting shades. vo

Table 1.	Shades availability	
Hemplatherm IC 175	White (10000)	Light Grey (17700)
Hemplatherm IC 170	White (10000)	Light Grey (17380)

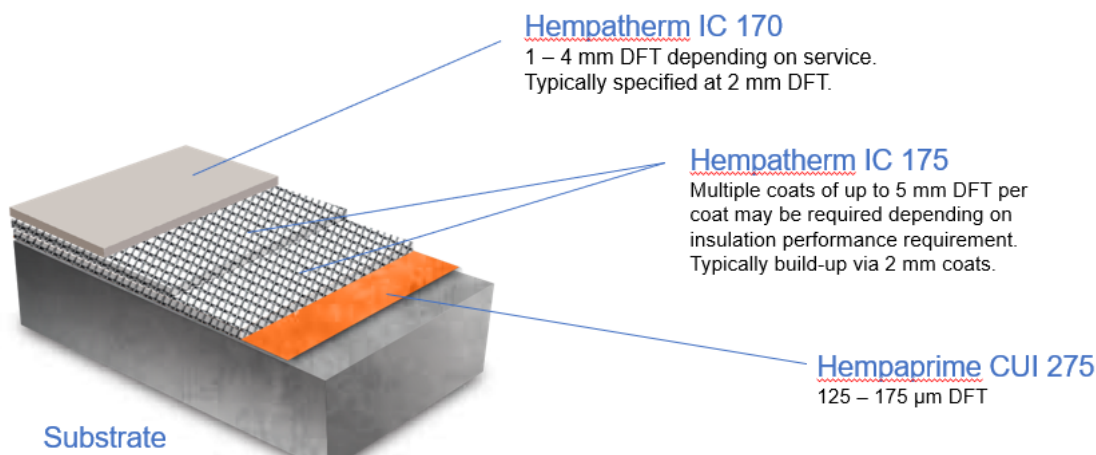


Figure 1: Layer diagram of a typical Hemplatherm IC system.

Surface preparation

To obtain the best performance and durability of the system it is crucial that it is applied on suitably cleaned and prepared steel according to the the Product Data Sheets. See also Hempel's Technical Guidelines for newbuild and repair.

Mixing

Hempatherm IC 175

The liquid base is supplied as a 15 kg unit filled in a 20 litre / 5 US gallon pail. The aerogel is supplied as a 2.1 kg unit in a plastic bag. One unit of base is to be mixed with one unit of aerogel. The mixed kit of 17.1 kg will provide approximately 42.6 litres of paint. Do not attempt to mix partial kits.

The mixed kit volume exceeds the volume of the pail in which the base is supplied, hence a separate mixing container will be required. Suitable plastic open-head drums of 60 litre / 15 gallon is recommended. See photo for example.

For better efficiency, the units can be doubled-up, i.e. mixing 2 units of base with 2 units of aerogel at one go in a suitable 120 litre / 30 gallon container.

Remove the lid from the 20 litre / 5 US gallon base. Agitate the base using a power mixer for at least 2 minutes at 700 rpm. Ensure that the agitator blade is of a suitable diameter for the pail. Pour half of the quantity of base into the mixing container. Lower the bag of aerogel into the mixing container and carefully empty the aerogel into the container. Take care to minimise the generation of dust cloud and material loss. Pour the remaining base into the mixing container and mix the base and aerogel using a power mixer for at least 4 minutes at 700 rpm. Start the agitation slow for smoother incorporation of aerogel powder into the liquid base before working up to a thorough mix.



Scrape down the sides of the mixing container periodically to ensure thorough mixing. Insufficient mixing or improper mixing is detrimental to the performance of the product.

Conduct a sampling check to ensure the correct specific gravity has been obtained. The specific gravity should be at or below 0.4. See **Appendix A**.

Hempatherm IC 170

Hempatherm IC 170 is a single-pack product that can be mixed directly in the supplied pail. Agitate using a power mixer for at least 2 minutes at 700 rpm. Ensure that the agitator blade is of a suitable diameter for the pail and ensure that the pail is secured before commencing agitation. Check that a homogenous mixture has been obtained.

Hempatherm IC 175 & Hempatherm IC 170

Do not thin the products with water or any other solvent. Doing so may damage the material and render it unusable.

Application

Primer

The epoxy primer should preferably be applied by airless spray according to the Product Data Sheet. Strict control of the final film thickness shall be maintained.

Stripe coating is recommended for edges, welds, fasteners, bolts, nuts, and other irregular and difficult to reach areas. Care should be taken when applying stripe coats to inner corners and cavities to avoid excessive film thickness.

Application of Hempatherm IC 175/170

Having the right application equipment is paramount to a successful application. Airless spray shall not be used

The most productive method of applying Hempatherm IC 175/170 for large areas is to use air-assisted spray. The recommended equipment setup is per **Table 2**. There are a number of commercially available machines, and Hempel does not recommend one machine over another. However, examples of setups which have demonstrated successful application of the Hempatherm coating system has been added in **Appendix C**. Other similar machines may be used – consult the manufacturer or Hempel for advise on other machines.

Table 2. Equipment setup recommendations

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Pump size	9:1 to 15:1 low pressure pump A smaller pump (e.g. 5:1 or 3:1) can be used for finer application control or for small area jobs. Other options may be possible; please consult Hempel.
Fluid line	½ inch paint hose (max. 40 m), preferably PTFE (Teflon®)-lined.
Spray gun	Air-assisted heavy material or texture spray gun
Fluid nozzle/ Cap size	4 – 6 mm cap for Hemptherm IC 175 3 mm cap for Hemptherm IC 170
Filters	None. Remove mesh filters.
Fluid pressure	2 – 4 bar
Air assist pressure	1 – 4 bar higher than fluid pressure (to adjust according to field condition)
Pump Lower End	Remove any suction tube / hopper and place lower end directly in the paint

The spray equipment manufacturer should supply operating instructions for their specific equipment and where necessary provide training.

To allow successful spray application, the following compressed air requirements shall be met.

Table 3. Compressed air recommendations	
Compressor size	Min. 50 cubic feet per minute
Pump air inlet pressure	29 – 43 bar (2 – 3 cubic feet per minute)
Air assist inlet pressure	29 – 43 bar (2 – 3 cubic feet per minute)
Compressed air quality	Compressed air shall be free of oil and verified clean in accordance with ASTM D4285.

The operating parameters in this application guide should be used to optimise the application rates and maintain the materials characteristics during application. However, environmental conditions, such as wind speed, may dictate the final values for optimising application of the material.

Increase air assist pressure to approx. 0.5 bar to minimise the risk of product back filling the heavy material gun and air line. The use of a non-return valve fitting at the interface of the gun and air line is encouraged to mitigate material backfilling the air line.

Place the mixing container of the freshly mixed Hemptherm IC 175/170 under the pump inlet. Hopper or siphon must be removed. Increase the pump air inlet pressure until the pump begins to stroke and material is visible at the spray gun. If the lines contain fluid, ensure that this is fully removed from the lines into a waste bucket prior to application on substrate. **Do not re-circulate product into the mixing pail.**

Once Hemptherm IC 175/170 is visible at the spray gun, fit the spray cap.

Adjust the air assist pressure until a suitable spray pattern is achieved.

Commence spray. Maintain about 30 cm (1 ft) between the gun and substrate.

Hemptherm IC 175 can be applied up to 5 mm per coat in a wet film thickness (WFT). The recommendation is to apply in 2 mm WFT coats for quicker overcoating and faster job completion. Thickness per coat shall be achieved by multiple passes.

Hemptherm IC 170 can be applied up to 3 mm per coat in a wet film thickness (WFT). This should be achieved by multiple passes.

Regular wet film thickness checks shall be carried out using standard wet film gauges or specially adapted 'dip' gauges. Ensure WFT gauge marks are brushed out to avoid potential defects in the applied coating.

The products shall be applied free of runs, drips and sags to a uniform appearance. Any defects shall be corrected whilst the product is still wet wherever possible. Visually inspect for any pinholes or discontinuities (holidays) in the Hemptherm IC 170 topcoat. Recoat as needed to repair any discontinuities (holidays).

The mixed batch of Hemptherm IC 175 shall be used in entirety. If the coating process is interrupted for a period longer than 45 minutes the material must be checked for changes in specific gravity before being put to application. If the specific gravity rises above 0.4, the batch should not be used anymore and should be discarded.

Once application has been completed, the spray equipment shall be thoroughly cleaned down using clean water. Increase air assist pressure to approx. 0.5 bar to minimise the risk of water back filling the spray gun and air line. Ensure that the equipment is fully flushed to

Hempel Technical Guideline

remove any material from the pump, spray lines and spray gun. Disassemble any items where material may have accumulated and clean thoroughly.

Overcoating

Please refer to the Product Datasheet for overcoating intervals. In addition, the use of thumb test described in appendix B to confirm readiness to overcoat.

Hot surface application

Hempatherm IC system can be spray applied on to hot surfaces up to 150°C [302°F].

Apply a mist coat of about 0.5 mm WFT Hempatherm IC 175 onto the primed surface. Allow to dry for 5 minutes.

Apply a light coat of about 1-2 mm WFT Hempatherm IC 175 next. Allow to dry for 20 minutes.

Subsequent coats of Hempatherm IC 175 be applied at 2-3 mm WFT per coat. Each coat shall be build-up through multiple thin passes and keeping the film as open as possible. Avoid over-application, which can result in blistering.

Depending on the temperature and environmental conditions, the film may be overcoated in as little as 30 mins, but suitability for overcoating shall be assessed in field using the thumb test.

Allow the completed Hempatherm IC 175 layers to dry for 24 hours before application of Hempatherm IC 170.

Sanding can be done to achieve better surface smoothness prior to Hempatherm IC 170 application, if desired.

Apply 1-1.5 mm WFT of Hempatherm IC 170.

Apply the next coat of 1-1.5 mm WFT. Suitability for overcoating shall be assessed in field using the thumb test.

A roller coat may be applied for better surface finish, if desired.



Figure 2 A) Mist coat of Hempatherm IC 175 (0.5 mm WFT)
B) Light coat of Hempatherm IC 175 (1-2 mm WFT)
C) Subsequent coat(s) of Hempatherm IC 175 (2-3 mm WFT)

Reference area

A reference area is a common method to establish the application process and to agree on the quality of application (in particular aesthetics) prior to commencing full coating application. The sample of finish should be within the project specification. However, it is strongly recommended that a reference area should be completed.

The reference area should be of a suitable size and representative to the project and should remain accessible throughout the application.

The reference area shall be witnessed and agreed by all contracting parties prior to commencing full coating production.

All contracting parties should be in agreement to the level of aesthetics required and that the standard is to be maintained throughout the project.

The reference area should remain as a permanent reference. Should any ambiguity arise later in the project then the reference area can be referred back to.

Repair and touch-up procedure

Damages or scored surfaces on fully dried films can be filled and levelled with a putty knife or trowel. Remove all loose materials back to a sound adhering edge and feather the edges. Fill the gap with fresh Hempatherm IC 175, taking care not to press down or compress the coating with excessive force. Allow the fresh coating to dry, using the thumb test to confirm readiness for overcoating, before topcoating with Hempatherm IC 170 by spray or roller.

If a section of the film is required to be removed, it can be done with a knife while the coating is still soft. Mechanical tool, e.g. grinder, may be needed when the coatings has fully dried.

Inspection

On completion of the application, a visual inspection may be conducted to check that a uniform finish has been achieved. The finishing does not typically affect the thermal insulation performance of the coating. An additional thin coat of Hempterm IC 170 can be roller-applied to achieve a smoother finish, if desired.

Dry film thickness (DFT) measurements should be conducted. This can be done using specialized probes for high DFTs, e.g. Elcometer A456 with T456CF6ARM probe or similar.

Surface temperature measurements can also be taken with a direct contact temperature probe.

The coating applicator shall be responsible for preparing a suitable inspection test plan (ITP) in consultation with the purchaser and coating material supplier. Good co-ordination is required when carrying out inspection work between the coating applicator, the purchaser's representative (often a third party inspector) and representatives of the coating material supplier. Hempel can provide a reference ITP, if needed.



Figure 3 Examples of good uniform finish and of poor rough finish from Hempterm IC 170 spray application.

Further Information

This application guide shall be read in conjunction with the Product Data Sheets and Safety Data Sheets as well as the relevant Hempel Technical Guidelines available at: [Technical Guidelines - Hempel](#)

- Surface preparation
- Spray application
- Stripe coating
- Application on hot surfaces

Appendix A. Density check

Ensure a homogenous mixture of Hempterm IC 175 has been obtained.

Prepare and weigh a small container of known volume. A container of around 0.5 L is recommended. The weight of the empty container should be tare on the weighing scale or recorded for calculation later. Fill the container with the mixed Hempterm IC 175.



Scrape off excess Hempterm IC 175 but do not shake or press down the product in the container; compressing the product will may lead to an inaccurate reading. Weigh the container containing Hempterm IC 175 on the weighing scale.

To calculate the density or specific gravity, divide the weight of the product by the volume of the container. If the weight of the empty container was not tare earlier, then weight of the empty container must be manually subtracted from the combined weight of the product and the container to obtain the weight of the product. Specific gravity should be at or below 0.4 for acceptance. Formula for the calculation as below:

$$\text{density} = \frac{\text{weight of filled container} - \text{weight of empty container}}{\text{volume of container}}$$

Record the measured density or specific gravity. You may wish to use the sample record sheet provided bellow.

This document is intended for professional use and provides generic advice in respect of the subject matter only. It is not intended to be used as a comprehensive guide. The buyer/applicator should always read the relevant Product Data Sheet (“PDS”) and Safety Data Sheet (“SDS”) relating to the Products ordered which are available for download on www.hempel.com. If in doubt, please contact your local Hempel representative for further advice. To the extent relevant, the disclaimer set out in the relevant PDS(s) applies to this document.

**Hempatherm
IC 175 Record
of Density
Check**

Project:	
Country/ Location of project:	
Applicator:	
Hempel rep (if present):	

Model of weighing scale	
Weight of empty container	
Volume of empty container	

No.	Date	Time	Part A (55488) Batch Number	Part B (99494) Batch Number	Ambient temperature	Specific Gravity

Appendix B: Use of thumb test for checking drying level of Insulation coatings

Hempatherm IC 175 and 170 are acrylic based insulation coatings that are applied at high thicknesses and the drying of the coatings is a physical process of evaporation. After application of each layer, drying checks must be carried out before recoating with itself or overcoating with Hempatherm IC 170 topcoat.

If the coating is not sufficiently dried and a next layer is applied, water can be trapped in the coating. Adding more coats will make the water evaporation from the underlying coats even worse, which will keep the coating soft and it will lead to more tendency for damages during handling and transportation as well as risk of blistering upon heating. When this happens, the surface might be dry to touch but still be very soft under pressure.

The thumb test is a simple method to evaluate the drying level on an insulation coating. By pressing the thumb in the surface with a pressure of 4 kg, the evaluation of the mark will indicate the drying level of the applied insulation.



Hempatherm IC 170

Hempatherm IC 175

Picture 1 : Thumb tested on insulation coating


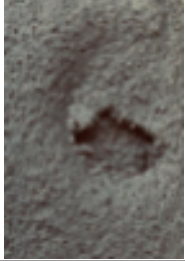
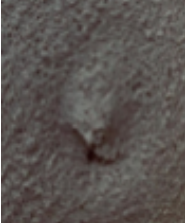

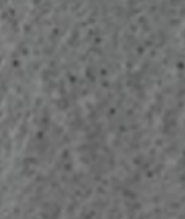


Picture 2: Thumb calibration to check the amount of pressure that corresponds to 4Kg




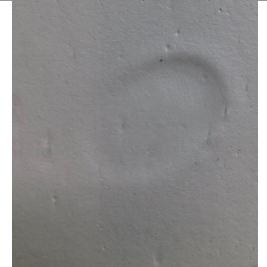
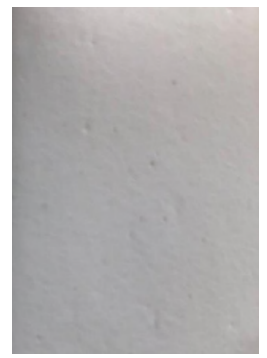
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The coatings are elastomeric so when the thumb marks recovers then the coating is dry enough to be overcoated or handled. If the thumb mark does not recover then the coatings needs to dry for longer before overcoating or handling.

The images in the tables are provided to aid the visual assessment of the drying of the insulation coatings: **Hempatherm IC 175**.

Appearance	Description	Action
	<p>Coating is very soft and a deep impression is left in the coating which feels wet under the surface. The surface of the coating is completely broken</p>	<p>Additional drying is required</p>
	<p>Coating is soft and an impression is left in the coating which still feels wet under the surface. The surface of the coating is partially broken</p>	<p>Additional drying is required</p>
	<p>Coating is still soft and an impression is left in the coating which still feels soft under the surface. The surface of the coating is maybe partially damaged</p>	<p>Additional drying is still required</p>
	<p>Coating is quite dry and a small impression is left in the coating. The surface of the coating is now intact and not damaged</p>	<p>Close to be ready for overcoating as fully surface dry but still additional drying required.</p>
	<p>Coating is dry and a slight impression can be made in the coating, which disappears after a couple of minutes</p>	<p>Ready for further insulation coating application or top coating with Hempatherm IC 170.</p>

The images in the table are provided to aid the visual assessment of the drying of the insulation coating: **Hempatherm IC 170**

Appearance	Description	Action
	<p>Coating is very soft and a deep impression is left in the coating which feels wet under the surface. The surface of the coating is completely broken</p>	<p>Additional drying is required</p>
	<p>Coating is soft and an impression is left in the coating which still feels wet under the surface.</p>	<p>Additional drying is required</p>
	<p>Coating is still soft and an impression is left in the coating which still feels soft under the surface. The thumb print does not recover</p>	<p>Additional drying is still required</p>
	<p>Coating is quite dry and a small impression is left in the coating. The surface of the coating is now intact and not damaged</p>	<p>Close to be ready for overcoating as fully surface dry but still additional drying required.</p>
	<p>Coating is dry and a slight impression can be made in the coating, which disappears after a couple of minutes</p>	<p>Ready for further insulation coating application or top coating with an approved top coat. Also dry to handle by suitable methods.</p>

Appendix C. Equipment

All part numbers (P/N) provided in this guide may differ in different regions and are subjected to changes by the equipment suppliers. Please contact equipment manufacturers for substitutions or Hempel for alternatives.

Examples of suitable pumps and their set-up



Photo C1. Graco President with EvenFlow® valve

Part	Models	Notes
Pump	Graco President 10:1 with EvenFlow® valve	P/N 954088
Spray gun	Graco RTX texture spray gun, or Graco heavy fluid Series-J spray gun	RTX texture sprayers P/N 24S134, 24S135, 24S155 or P/N 204000, Series J
Peripherals	<ul style="list-style-type: none"> • ½”(m)x1”(f) coupler (to connect paint hose to gun). • ½”x3/4” nipple (to connect paint hose to pump). • A low pressure check valve for ½” pump/ paint outlet (optional) • ½” paint hose • Air inlet and air-assist hoses 	P/N 278499 ½”x15m paint hose



Photo C2. Graco M680a (hopper and motor air pilot valve to be removed)

Part	Models	Notes
Pump	Graco ToughTek M680a	P/N 24T837. No hopper. Remove motor air pilot valve.
Spray gun	Graco RTX texture spray gun, or Graco heavy fluid Series-J spray gun	RTX texture sprayers P/N 24S134, 24S135, 24S155 or P/N 204000, Series J
Peripherals	<ul style="list-style-type: none"> • ½”(m)x1”(f) coupler (to connect paint hose to gun) • ½”x1” nipple (to connect paint hose to pump) • A low pressure check valve for ½” pump/ paint outlet (optional) • ½” paint hose • Air inlet and air-assist hoses 	P/N 278499 ½”x15m paint hose



Photo C3. Wiwa 410.09

Part	Models	Notes
Pump	WIWA 410.09	P/N 0653609 Note: stock regulator needs to be fitted with a second regulator; see Peripherals.
Spray gun	Graco RTX texture spray gun, or Graco heavy fluid Series-J spray gun	RTX texture sprayers P/N 24S134, 24S135, 24S155 or P/N 204000, Series J
Peripherals	<ul style="list-style-type: none"> • A second air regulator • 1/2" coupler (to connect paint hose to gun). • A low pressure non-return valve for 1/2" paint line. • Air inlet and air-assist hoses, 1/2" paint hose. 	A second regulator is required for independent control of pump vs. air-assist pressure; likes of Parker 06R118AC (1/4") or 06R218AC (3/8") can be added as the second regulator.

Mounting



Photo C4. Pneumatically operated height adjustable mount on a Graco President.

Various mounting options are possible for the pumps. Cart-mounted, customised retort stand, or a mounting plate to position the pump directly over mixing container are some possible options.

Spray gun



Photo C5. Graco RTX gun with WideTex accessory kit range

Optional: Graco fine finish kit (P/N 24S142) can be used with the Graco spray guns for better application control.

Mixer



Photo C6. Example of power mixer.

A power mixer with sufficient torque is required. A variable speed power mixer capable of mixing heavy fluid or mortar, and equipped with a large helical blade is ideal.

Suggested spares and tools for spray equipment

Suggestions for spray equipment spares

- Spray gun
- Fluid caps/ nozzles of various sizes
- Spray gun retaining cap.
- Reducing and increasing couplings of various sizes
- rings and C-clips
- Quick release fittings for air line

Auxiliary equipment

- Spare containers for pump flushing and waste
- A small container of known volume and weighing scale for density check (see **Appendix A**)
- Palette knives / scrapers
- Rags / disposable wipes
- Inspection equipment (see section **Inspection**)
- Wrenches/ spanners of various sizes
- Screwdrivers of various sizes
- Pliers
- Wire brush
- Rubber mallet
- Cable ties
- PTFE/ Teflon® tape
- Masking tape