Application Instructions

Hempafire Pro 315 (43360)
Hempafire Pro 315 Fast Dry (43361)

For product description refer to product data sheet 43360 / 43361

Scope:

These Application Instructions include surface preparation, application equipment and application guidelines for Hempafire Pro 315 and Hempafire Pro 315 Fast Dry.
Hempafire Pro 315 and Hempafire Pro 315 Fast Dry are tested for a range of approvals for the fire protection of structural steel against cellulosic fires. Please consult the Product Data Sheet for more information. For latest information about country specific approvals, please contact your local Hempel office.

Hempafire Pro 315 and Hempafire Pro 315 Fast Dry are designed to be applied both off-site and on-site.

Note that Hempafire Pro 315 and Hempafire Pro 315 Fast Dry shall only be used together with Hempel approved primers and topcoats. For more information please consult the list of recommended primers and topcoats for Hempafire Pro 315 products or consult a Hempel representative.

Disclaimer

It is the applicator's responsibility to ensure that all coatings of a Hempafire coating system are applied in accordance with these application instructions. It is furthermore the responsibility of the applicator to ensure that the specified dry film thickness is achieved. Technical assistance can be provided by Hempel to assist the applicator and is given subject to HEMPEL's GENERAL TERMS & CONDITIONS FOR INTUMESCENT PAINTS.

Storage

Hempafire Pro 315 and Hempafire Pro 315 Fast Dry shall be stored in dry, shaded areas. The recommended storage conditions are between 5°C and 40°C. The shelf life of Hempafire Pro 315 and Hempafire Pro 315 Fast Dry may vary depending on the storage conditions. At 25°C the shelf life is 12 months from date of manufacture. The shelf life may be reduced if the products are stored outside Hempel's recommended storage conditions. The products must be re-inspected before use in case the shelf life is exceeded.

Substrates:

Hempafire Pro 315 and Hempafire Pro 315 Fast Dry can be used for fire protection of structural carbon steel and galvanised steel according to the below recommendations.

Carbon steel

Cleaning and degreasing. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. When the surface is dry, perform abrasive blasting to minimum Sa $2^1/_2$ according to ISO 8501-1. In case rusting has occurred between blasting and application of the primer, then the surface should be re-blasted and primed. Application of Hempafire Pro 315 and Hempafire Pro 315 Fast Dry on top of steel that contains millscale can never be accepted.

Under restrictions St3 steel can be accepted. Degrease and high pressure water-wash the substrate, prior to the St3 cleaning. Special care shall be taken to avoid polishing of the surface. Power tools such as chipping hammers, needle guns and power rotary wire brushes will provide acceptable roughness for proper adhesion of the primer. It is not acceptable that any mill scale is present on the cleaned surface. For steel prepared to St3, use primers Hempadur 45880, Hempadur 15570 or Hempel's 17020. Afterwards apply Hempafire Pro 315 and the specified topcoat as per the normal instructions. The St3 preparation is generally only recommended for repair of small areas.

Galvanised steel

Cleaning and degreasing. Entire area to be (high pressure) fresh water cleaned in order to remove salts and other contaminants. When surface is dry, perform either light abrasive sweep blasting to a uniform rough surface or roughen the surface by mechanical means. Afterwards, apply one coat of primer Hempadur 15553 at maximum DFT of 100 µm.

Surface preparation:

After priming and before application of Hempafire Pro 315 and Hempafire Pro 315 Fast Dry, remove potential present oil and grease etc. with suitable detergent. Salt and other contaminants shall be removed by (high pressure) fresh water cleaning. Leave the surface drying for sufficient time to ensure full evaporation of water, prior to application of Hempafire Pro 315 and Hempafire Pro 315 Fast Dry.

Hempel must be consulted in all cases of doubt about the suitability for overcoating of the primer. Cases where Hempel should be consulted include (but are not limited to): surface contamination, damages and defects, unknown primer pre-applied, non-approved primer and exceeded dry film thickness or overcoat time of primer.

Primers

Hempafire Pro 315 and Hempafire Pro 315 Fast Dry have been tested with several primers for compatibility and suitability in fire scenarios. **Only primers approved by Hempel can be used in combination with Hempafire Pro 315 and Hempafire Pro 315 Fast Dry.** Consult your Hempel technical representative for detailed working specification.

Hempafire Pro 315 and Hempafire Pro 315 Fast Dry should under no circumstances be applied directly to the steel surface.

In Hempel's document "Hempafire Pro 315 – recommended products" are the maximum thickness and minimum/maximum overcoating intervals of the primers for Hempafire Pro 315 and Hempafire Pro 315 Fast Dry specified. Deviating from that could influence the performance during a fire.

Application conditions:

Hempafire Pro 315 can be applied on ambient temperature between +5°C and + 50°C but for optimum results it is recommended in the range +15ºC to +45ºC.
Hempafire Pro 315 Fast Dry can be applied on ambient temperature from +5°C up to +30°C but for optimum results it is recommended in the range +5ºC to +25ºC.

The surface temperature of the substrate must always be 3°C above dew point and the maximum relative humidity should not exceed 85% during the application.

The area where Hempafire Pro 315 and Hempafire Pro 315 Fast Dry is applied must be well ventilated and proper air circulation shall be secured for optimal drying.

For application under warm conditions, special attention shall be given to avoid solvent entrapment for application at high dry film thicknesses per coat. For optimum drying in these conditions it is generally recommended to apply several thinner coats to obtain the specified dry film thickness (e.g. apply 2 coats of 800µm each instead of 1600µm in a single coat). This will result in faster drying of the entire Hempafire Pro 315 coating. For applications outdoors at warm conditions, direct sunlight exposure can be avoided to prevent skinning of the paint that will result in longer overall drying times due to solvent entrapment; if direct sunlight cannot be avoided a lower DFT per coat may be beneficial for the drying time of the complete coating system.

It is recommended that the products in all situations are protected from condensation and water during application and drying.

Hempafire Pro 315 and Hempafire Pro 315 Fast Dry are relatively high viscosity materials and it is normal that they are supplied showing a false body effect. Prior to application, the material has to be stirred shortly in order to homogenise the material and break the false body effect to ensure good flow during the application. Excessive stirring should be avoided as this may cause increased solvent evaporation.

Application equipment:

Recommended airless spray equipment:
(Airless spray data are indicative and subject to adjustment)

Pump ratio:	min. 45:1
Filter:	It is recommended to remove the gun filter and the pump filter
Nozzle size:	.017" - .023" Nozzle
pressure:	200 bar/ 2800 psi
Fan angle:	30-50°.

After finishing the application, clean the equipment immediately with Thinner 08080 or 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 or higher maintaining the high output capacity of the pump.

Thinning:

Thinning of Hempafire Pro 315 and Hempafire Pro 315 Fast Dry is normally not required. Only for areas of low DFTs (<260µm DFT, 350µm WFT) , maximum 5% (vol) thinner can be used. Use Thinner 08080.

When thinned down, the sag resistance of the coating is reduced and 1600µm DFT will not be possible to achieve.

Spray application:

During application it is recommended to put the steel sections on support trestles such that the area of contact is minimum. Best practice is "sharp" contact. This minimises the damaged area and therefore limits the to-be-repaired surfaces after the applications.

With Hempafire products it is of special importance that a continuous, pinhole-free paint film is obtained at application of each coat. An application technique that will ensure good film formation on all faces of the profiles must be adopted. It is very important to use nozzles of the correct, not too big, size 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 stripe coat will therefore be good painting practice.

The finished coating must appear as a homogeneous film with a smooth surface; irregularities such as dust, dry spray and/or abrasives should be avoided or removed.

Brush and roller application:

Application with hand tools, brush or roller is possible but due to the natural tendency of the product a less smooth film by these methods may be obtained. Multiple coats may be necessary to obtain the specified dry film thickness.
Application by hand tools, brush, or roller is generally only recommended for small areas, repairs and touch-up; Repairs can also often be made easily by putty knife or plastering trowel.

Wet/dry film thickness:

It is important that the specified dry film thickness is achieved as a minimum in order to make sure that the coating system performs as specified.

The required dry film thickness of Hempafire Pro 315 products vary depending on the massivity (Hp/A value) of the steel profile and the configuration that the steel profile is used at. It is the responsibility of the applicator to ensure that the specified dry film thickness is applied on all areas.

It is recommended that the **wet film thickness** is measured frequently during the application using a wet film gauge to ensure that the specified thickness is achieved. This will allow the applicator to adjust the thickness if necessary. Avoid the gauge from sinking into the underlying coat to prevent incorrect wet film thickness measurements.

Measurements of the **dry film thickness** should be conducted on the fully dry Hempafire coats. It is important that dry film measurements are done on fully dried paint as measurements on not fully dried paint may give incorrect results. Normally electronic dry film thickness-gauges are

used for this. The applicator must confirm that the specified dry film thickness has been achieved according to the specification. If insufficient dry film thickness is measured then an additional coat or touch-up should be applied.

When indicative measurements have to be made prior to complete drying of the coating, indicative dry film thickness measurements may be done with an electronic DFT-gauge in combination with a shim. The shim must be held in between the coating and the gauge in order to minimise the sinking in of the gauge into the soft coating.

Drying checks made on areas that are in direct sunlight exposure may not represent the state of drying for the rest of the project. An intumescent coating is a thermoplastic product and (once dry) exposure to heat will soften the product. Softening can happen above approximately 30°C. Select areas at cooler conditions for making drying checks or check the state during the coolest time of the day, e.g. during the morning.

It is important that no topcoat is applied before dry film thickness of Hempafire Pro 315 and Hempafire Pro 315 Fast Dry has been measured and confirmed to be correct. If a topcoat has been applied on an area with insufficient Hempafire Pro 315 dry film thickness then the topcoat must be removed before repair/touch-up can be conducted.

The paint layer must be applied homogeneously and as close to the specification as possible. Avoid excessive film thickness due to the risk of sagging, cracks and solvent retention and extended drying/overcoating times.

The maximum DFT that can be applied in a single coat is 1600 µm (63 mils), equivalent to 2133 µm (84 mils) wet film thickness. When optimal (fast) drying is preferred, it is recommend to apply coats at maximum 800µm (27 mils) DFT, equivalent to 1066 µm WFT. In order to obtain the specified thickness, multiple coats may be needed.

A differentiation shall be made between on-site applications and off-site (in shop) applications.

For on-site application where steel members do not need to be handled after the coating application, it is beneficial to spray at the maximum DFTs per coat (1600 µm).

For off-site (in shop) application and on-site pre-erection, it is generally important that the drying of the applied coating is fast for quick throughput of the steel.
It is good practice to determine the state of drying of the coating by pressing firm with a thumb. When it is not easy to make a mark in the coating, it is ready to accept a next coat. (It is technically possible to apply the next coat sooner, but it will affect the drying of the entire coating system). If this advice is ignored, it will take considerable more time to dry the complete coating system.

Film thickness acceptance:

For proper fire protection the DFT should never be less than those specified for a given profile, and DFTs are not allowed to exceed 10% of the maximum certified value. Details of the certified value can be found in Hempel's Technical Guidance Document KB0013701 (Max DFT for PFP products).

For guidelines and acceptance criteria of dry film thickness measurements it is recommended to follow industry best practice guidelines e.g.: European Industry Best Practice Guide on the application of intumescent coatings to constructional steel - CEPE/EAIPC/EAPFP 2015 and ASFP TGD 16 and TGD17, Code of Practice for intumescent coatings, for off-site and onsite applied respectively

Hempel specifications:

Hempafire dry film thickness specifications made by Hempel are always based on information about steel sections, configurations and other project information provided by the customer and generic information about steel section types from databases. The information provided in the specification is therefore a guideline, made to the best knowledge of Hempel, for the applicator/customer who should confirm the specification prior to application of the material

Weathering exposure:

During the construction phase of a building, Hempafire Pro 315 can be exposed to mild exterior conditions up to 12 months without a topcoat applied. In practical terms this means, that the surface shall be protected against longer periods of rainfall, snow and very high humidity (i.e. an environment like C3 or C4 according to ISO 12944) or there shall be applied an approved acrylic or polyurethane topcoat. It is utmost important to ensure that the intumescent film is sufficiently dry before it is exposed. Even when topcoated, the surface shall be protected from pooling or standing water, either by coverage or by drainage.

Topcoats:

Depending on the end use of the coating system, a topcoat may be required. A selection of approved topcoats are compatible with Hempafire Pro 315 and Hempafire Pro 315 Fast Dry

Only Hempel-approved topcoats can be used in combination with Hempafire Pro 315 and Hempafire Pro 315 Fast Dry. Consult your Hempel technical representative for detailed working specification.

It must be ensured by the applicator that the total specified dry film thickness of Hempafire Pro 315 and Hempafire Pro 315 Fast Dry is achieved prior to the start of the topcoat application. Dry film thickness measurements must be done on a fully dry Hempafire Pro 315 coating in order to measure an accurate result.

Before application of a topcoat (or additional coat Hempafire Pro 315 and Hempafire Pro 315 Fast Dry) the applicator must ensure that the coating surface of the Hempafire Pro 315 products is clean of salts, oil, grease or other contaminants.

Selection of the recommended topcoat and its dry film thickness depends on the exposure conditions.

Topcoats may inhibit/prolong the drying of Hempafire Pro 315 and Hempafire Pro 315 Fast Dry. It is important that the topcoat is not applied before the preceding Hempafire coats are dry in order to avoid solvent entrapment. At higher DFTs there is more risk of solvent entrapment if not sufficient drying time is provided, pay special attention for this phenomenon if the DFT approaches and/or exceeds 2 mm.

It is good practice to measure the state of drying of the intumescent coating prior to the application of the next coat. Press firm with a thumb on the coating. It should not be easy to make an indent in the coating. Once this state is achieved the coating is ready to accept its topcoat. Acrylic topcoats could be applied sooner compared to Polyurethane topcoats, but for fastest drying of the entire system it is still recommendable to use the before mentioned “thumb-test”. It is not necessary to achieve the so called “nail hard” stage.

Repair of damaged areas:

Hempafire Pro 315 and Hempafire Pro 315 Fast Dry can be used as repair and touch-up coating for damaged areas of freshly applied Hempafire Pro 315 or Hempafire Pro 315 Fast Dry. Prior to repair, make sure that the surface is clean and free of contamination. Loose parts are to be removed completely.

When film damages are deep and bare steel is visible, then clean the area to St3 (ISO 8501-1) or by abrasive blasting to minimum $Sa2^1/_2$ (ISO 8501-1) or high pressure water jetting to $Wa2^1/_2$ (ISO 8501-4) prior to application of the new coating system. Application of the damaged areas can be done by airless spray, brush cladding, roller or spatula/putty knife. Conditions during these applications shall fulfil the requirements as during normal application conditions.

It is likely that after transport and handling the coating is damaged, especially at areas where the coated steel section has been lifted or was leaning on. Proper lifting equipment shall be used in order to minimise the damage. Areas where the steel sections lean on supporting bars shall be reduced to a minimum. Positioning the lifting equipment smartly also reduces, and potentially prevents damages.

At those spots where it was not possible to prevent damage, distinction has to be made between damage of the

- complete coating system, including the primer
- damage of the intumescent coating

Where the complete coating system is damaged, including the primer, the coating system shall be removed by St3 (ISO 8501-1) cleaning with a mechanical brush, until the bare steel is visible. Care shall be taken not to polish the substrate. After St3 (ISO 8501-1) cleaning, the primer shall be applied, followed by the Hempafire Pro 315 or Hempafire Pro 315 Fast Dry coating, if needed in multiple layers (up to a max DFT per coat of 1600µm) until the required intumescent DFT is achieved. After full drying of the intumescent coat the topcoat can be applied again. For spot repairs it is common to apply the primer by brush, and the intumescent coating by brush and/or putty knife.

Where only the intumescent coating is damaged, and the primer is still intact, the intumescent coating can be smoothened by a cutter, scraper or mechanical sanding machine. Make sure the surface is free of contaminants and then by airless spray, brush and/or putty knife the damaged areas can be filled up with maximum 1600µm for Hempafire Pro 315 and Hempafire Pro 315 Fast Dry per coat until the required DFT is achieved. After drying of the intumescent coating the topcoat can be applied.

If the damages occur, when the intumescent paint is still soft, it may be beneficial to remove the coating by knife or spatula/scraper. If the coating has already dried too much for this, St3 (ISO 8501-1) cleaning can be done using a mechanical wire brush.

For repairs of older systems, the full coating system shall be removed and the damaged areas shall be cleaned thoroughly by power tool cleaning to St3 (spot-repairs) or by abrasive blasting to minimum Sa $2^1/_2$ prior to application of the new coating system. After removing the loose particles and dust, the coating system can be build up per the normal procedure.

Maintenance:

Maintenance of Hempafire Pro 315 coating systems must be done with Hempel approved topcoats or with the same Hempafire Pro 315 products if no topcoat has been used before. Hempafire Pro 315 products cannot be directly applied over a coating system with topcoat.

Areas of damaged topcoats must be repaired immediately, as the underlying intumescent in these areas may be exposed to unacceptable weathering.
Maintenance of a Hempafire coating system without consulting Hempel for approval may influence the performance of the Hempafire Pro 315 products. All maintenance of any Hempafire coating system must therefore be done in consultation with Hempel.

Maintenance of Hempafire coating systems outside Hempel's instructions is subject to the conditions given in HEMPEL's GENERAL TERMS AND CONDITIONS FOR INTUMESCENT PAINTS.

Handling:

In off-site applications, the steel sections will need to be handled after drying of the coating system. It is important to note that due to the thermoplastic nature of acrylic intumescent coatings, they are sensitive to damage, also after full drying. Generally it is more of a matter to minimise the damage than to prevent damage. Therefore special care should be taken to smartly handle the coated steel sections. Use suitable lifting equipment. If the steel sections have areas that are not sprayed with intumescent paint (e.g. areas left blank as welding/bolting area), the lifting equipment should be installed in those places when possible. This reduces the amount of damage, and therefore also the repair work required. The amount of supporting beams used during pre-construction phase, normally of wood, shall be limited to the minimum required in order to minimise the damaged areas. Areas where the sections leaned on the supporting beams are likely damaged.
Maintain sufficient ventilation, also when the product is considered dry. Therefore, do not cover up the sections as this will affect the final drying properties.

Those areas that are damaged during handling and/or transport should be repaired according to the repair instructions to secure the fire protection properties.

Physical data versus temperature:

The data on drying times provided here has been obtained based on laboratory tests carried under controlled conditions. Drying times of Hempafire Pro 315 products are dependent on temperature, ventilation, amount of air renewal, air movement, state of the drying of previously applied coats, etc. Therefore the data provided is indicative and shall just be used only as a guideline for field applications.

Drying times (provided there is good ventilation and RH < 85%):

Table 1: Surface-dry (ISO 9117-3:2010)				
Temperature	10°C	20°C	30°C	40°C
Hempafire Pro 315 (800 µm DFT)	30 min	15 min	10 min	<8 min
Hempafire Pro 315 Fast Dry (800 µm DFT)	15 min	5 min	3 min	<3 min

Table 2: Through-dry (ISO 9117-1:2009)				
Temperature	10°C	20°C	30°C	40°C
Hempafire Pro 315 (800 µm DFT)	48 hours	21 hours	15 hours	8 hours
Hempafire Pro 315 Fast Dry (800 µm DFT)	28 hours	14 hours	8 hours	5 hours

Table 3: Dry to handle (Hempel internal method RD-857)						
	DFT	Nr of coats	10°C	20°C	30°C	40°C
Hempafire Pro 315	800 µm	1	6 days	1 day	15 hours	8 hours
	1600 µm	2	18 days	2 days	$1^{3}/_{4}$ day	$1^{1}/_{2}$ days
Hempafire Pro 315 Fast Dry	800 µm	1	5 days	16 hours	13 hours	6 hours
	1600 µm	2	15 days	$1^{1}/_{2}$ day	32 hours	28 hours

Note: Dry to handle is the minimum time for a coating that is required to dry in order to obtain sufficient hardness to be handled with care without significantly being damaged. However, intumescent coatings like Hempafire Pro 315 are always sensitive to damage due to the nature of the product and its thermoplasticity. Special care shall be taken to handle elements coated with Hempafire Pro 315.
Note: The dry to handle times for multiple coats in the table are measured using overcoat intervals of 24 hours. When shorter overcoat times are used, considerable longer dry to handle times will be valid.

Table 4: Minimum overcoating times (overcoating with itself)					
	DFT	10°C	20°C	30°C	40°C
Hempafire Pro 315	800 µm	10 hours	6 hours	4 hours	<4 hours
	1600 µm	24 hours	14 hours	10 hours	<10 hours
Hempafire Pro 315 Fast Dry	800 µm	8 hours	4 hours	3 hours	<3 hours
	1600 µm	20 hours	12 hours	7 hours	<7 hours

Note: For maximum throughput when applied in shop it is good practice to determine the condition of the paint prior to recoating or overcoating. In order to obtain the fastest drying of especially high-thickness coating-system (total DFT above 1600 µm), the previous intumescent layer shall be dry hard, which means no mark can be easily made in the paint by pressing firm with a thumb.

The coating does not necessarily have to be so called “nail hard”. For maximum throughput longer overcoat times are recommended than mentioned in table 4, 24 hours is common practice.

Table 5: Minimum overcoating time with approved Acrylic topcoat						
	DFT	Nr of coats	10°C	20°C	30°C	40°C
Hempafire Pro 315	800 µm	1	2 hours	1 hour	¾ hour	<¾ hour
	1600 µm	1	4 hours	2½ hours	1½ hour	<1½ hour
Hempafire Pro 315 Fast Dry	800 µm	1	1½ hour	½ hour	<½ hour	<½ hour
	1600 µm	1	3½ hours	2 hours	1 hour	<1 hour

Note: Overcoating early with a topcoat may delay the drying of the total coating system. The note from table 4 applies.

Table 6: Minimum overcoating time with approved Polyurethane topcoat						
	DFT	Nr of coats	10°C	20°C	30°C	40°C
Hempafire Pro 315	800 µm	1	3 days	1 day	15 hours	8 hours
	1600 µm	1	10 days	2 days	1¾ day	1½ day
Hempafire Pro 315 Fast Dry	800 µm	1	2½ days	16 hours	13 hours	6 hours
	1600 µm	1	8 days	1½ day	1¼ day	1 day

Note: Overcoating early with a topcoat may delay the drying of the total coating system. The note from table 4 applies

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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 TERMS AND CONDITIONS FOR INTUMESCENT PAINTS, 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.

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.

Important information: **It is the applicator's responsibility to ensure that all coatings of a HEM PAFIRE coating system are applied in accordance with these application instructions. It is furthermore the responsibility of the applicator to ensure that the specified dry film thickness is achieved. Technical assistance can be provided by Hempel to assist the applicator and is given subject to HEMPEL's GENERAL TERMS & CONDITIONS FOR INTUMESCENT PAINTS.**