# Chartek 1709
# Application Manual

International Paint Ltd.
www.international-pc.com

**Fire protection performance and pre-fire durability are critically dependent on the correct application of the system. These guidance notes are intended to assist applicators and are for guidance only; AkzoNobel accepts no liability for the acts or omissions of any applicators of Chartek.**

**Applicators must make direct contact with International Protective Coatings to discuss training requirements for the application of Chartek 1709 PRIOR to any commencement of a project.**

***TECHNICAL AND APPLICATION DATA*** *herein is for the purpose of establishing a general guideline of the coating and proper coating application procedure. Test performance results were obtained in a controlled laboratory environment and International makes no representation that the exhibited published test results, or any other tests, accurately represent results actually found in all field environments. As application, environmental and design factors can vary significantly, due care should be exercised in the selection, verification of performance, and use of the coating(s).*



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# 1. INTRODUCTION

These Application Guidance Notes contain advice on application of Chartek 1709 intumescent systems. Technical Service Representatives (TSRs) can aid in compliance with this manual however are not accountable as project inspectors. The accountability for inspection and quality control is the responsibility of the applicator and fabricator quality control departments.

Passive fireproofing materials prevent potentially catastrophic structural failures from occurring by providing an insulating shield against the intense heat of a fire. The Chartek 1709 fireproofing system is the result of over 40 years of research and development and possesses extensive certification for a wide range of fire protection ratings.

This document is subject to the following:

1. Compliance with individual country standards concerning fire resistance
2. All equipment being suitable and fully serviced prior to use for Chartek applications
3. All applicators being trained, competent and certified in the application of fire protection epoxy intumescent coatings
4. All Health & Safety recommendations of the equipment manufacturer being followed

This Chartek Application Manual is verified by International Paint Ltd.'s Technical department for fire and insulation.

From the date of approval the contents of the manual are to be considered effective.

The registration of the verification and approval of every edition of this manual and the original document are held in the archives of the office at Felling, which has the responsibility of conserving the document in its approved state and of distributing copies that conform to the last deposited revision. The previous editions are also held in the archives, separately, and conserved for possible consultation.

The document is identified by an ID code, revision number and issue date. This information is printed in the heading of every page.

This manual is distributed internally and externally with the aim of providing consistent information to all parties involved in the application of Chartek fireproofing systems.



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This manual uses metric (SI) and Imperial units of measure (in brackets).

The information given in this manual is not intended to be exhaustive: any person applying the product by any method other than that specifically recommended in this manual without first obtaining our written confirmation as to the suitability of the proposed method does so at his own risk. We try very hard to ensure that all advice we give about application of our product (whether in this manual or otherwise) is correct but we have no control over either the quality or condition of the substrate or the many factors affecting application of the product. In the event of any doubts or misunderstandings, International Protective Coatings should be consulted for clarification.

The information contained in this manual is liable to modification from time to time in the light of experience and our policy of continuous product development. It is the user's responsibility to ensure they are working from the correct version of this application manual.



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## Chartek Application Manual Revisions

| Rev | Date | Revision Notes |
|---|---|---|
| 0 | 01/05/2007 | Previous version to existing application manual |
| 1 | 17/04/2014 | Manual update due to recent project experience, and format change |



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# 2. SYSTEM DESCRIPTION

The Chartek passive fireproofing system consists of an epoxy intumescent coating designed to protect substrates from fire and corrosion. Dependent on the fire type, rating and design, Chartek fireproofing systems may require mesh reinforcement.

Chartek provides effective fire protection to a wide range of structures, vessels and equipment in almost any fire scenario. In a fire, Chartek fireproofing will intumesce (expand) to form an insulating layer of char. It is this char and its formation that protects the substrate from the effects of fire.



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# 3. SURFACE PREPARATION

Good surface preparation is critical for the success of any coating system and Chartek is no exception. Table 1 illustrates the processes recommended for various substrates.

**Table 1: Chartek 1709 Surface Preparation Chart**

| Operation Required | Substrate | | | | |
|---|---|---|---|---|---|
| | **Steel** | **Galvanised Steel** | **Stainless Steel** | **Aluminium** | **Glass or Fibre Reinforced Plastics** |
| Degreasing | ✓ | ✓ | ✓ | ✓ | ✓ |
| Blast Cleaning | ✓ | | ✓ * | ✓ * | |
| Sweep (brush-off) Blast Cleaning | | ✓ * | | | ✓ ** |
| Debris removal, e.g. vacuum | ✓ | ✓ | ✓ | ✓ | ✓ |
| Primer | ✓ | Epoxy primer | Epoxy primer | Epoxy primer | |

* Ensure that a non-metallic blasting medium is chosen for aluminium, galvanised or stainless steel substrates

** Or power tool clean to remove glaze

**Degreasing**

The presence of surface oil or grease prevents a coating from properly adhering to the substrate and can lead to rapid failure of the whole system. For this reason, all visible oil, grease and other soluble contaminants must be removed before the application of both primer and Chartek 1709. Degreasing is also important before blast cleaning activities.



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Cleaning and degreasing should be carried out to SSPC-SP1 standard. Methods of degreasing include:

- Hot water washing
- Steam cleaning
- Detergents or emulsion/alkaline cleaners followed by steam or fresh water wash to remove detrimental residues

The applicator should select the method most appropriate to the situation, giving due consideration to relevant health and environmental regulations. Heavy oil or grease deposits should be removed first by scraper, followed by detergent washing and a thorough fresh water rinse.

**Abrasive Blast cleaning**

Abrasive blast cleaning is widely accepted as being the best way of preparing carbon steel substrates before application of a protective coating and it is a very important part of the whole application process. When a primer is used, blast cleaning should be carried out in accordance with the requirements on the primer technical data sheet.

The general requirement is blast cleaning to Sa2½ (ISO 8501-1:2007), SSPC-SP6 or NACE No. 3, with a sharp angular profile being obtained. The blast profile ($R_z$) should be 50 to 75 microns (2 to 3 mils) for carbon steel and the recommended method for measuring the blast profile is with replica tape or blast profile comparators. Surface roughness should be generated such that a medium to coarse profile is achieved (ISO 8503-2) assessed using a grit blast comparator. A sharp angular profile should be attained to be consistent with the profile used for testing and certification (G24 steel grit used for testing and certification and can be used as a reference). The surface profile should be assessed by all parties prior to the start-up of the project and a replica tape reference made signed off by all parties. Variance to these surface profile recommendation is likely to compromise any warranty for the system and should be verified by the authorising body or bodies prior to start up as this may impact integrity of the protection system and the safety of those reliant upon this protection. Galvanised substrates should be prepared by sweep abrasive blasting to provide a roughened surface, to a standard similar to Sa 1 (ISO 8501-1), SSPC-SP7 or NACE No. 4. The blast profile ($R_z$) should be 50 to 75 microns (2 to 3 mils). For the abrasive sweep blast or brush blast, blast material particle size should range between 200 and 600 microns (8 and 24 mils) and be propelled by a blast pressure of just 350 kPa (50 psi). Garnet with (30/60 mesh) is to be used to generate a suitable blast profile.



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The surface should be clean, dry and grease free (see under Steel - Degreasing). Degreasing of most galvanized surfaces requires some effort to obtain a clean surface. Any white zinc corrosion products should be removed by high pressure fresh water washing, or fresh water washing with scrubbing. When using the preferred method of surface preparation, i.e. sweep blasting, it is still advisable to fresh water wash to remove soluble zinc salts. Many coatings based on non-saponifiable polymers can be applied directly to galvanized surfaces prepared in this way.

Aluminium and Stainless steel substrates should be prepared by abrasive blasting using a non-metallic abrasive. The blast profile ($R_z$) should be a minimum of 75 microns (3 mils).

**Sweep (brush-off) blast for preparation of galvanised substrate**

For the abrasive sweep blast or brush blast, blast material particle size should range between 200 and 600 microns (8 and 24 mils) and be propelled by a blast pressure of just 350 kPa (50 psi). Garnet with (30/60 mesh) is to be used to generate a suitable blast profile.

The surface should be clean, dry and grease free (see under Steel - Degreasing). Degreasing of most galvanized surfaces requires some effort to obtain a clean surface. Any white zinc corrosion products should be removed by high pressure fresh water washing, or fresh water washing with scrubbing. When using the preferred method of surface preparation, i.e. sweep blasting, it is still advisable to fresh water wash to remove soluble zinc salts. Many coatings based on non-saponifiable polymers can be applied directly to galvanized surfaces prepared in this way.

*Blast profile*

For galvanised substrates a sweep (brush-off) blast to Sa 1 (ISO 8501-1), equivalent to SSPC-SP7 or NACE No. 4, is required, as a minimum, in order to produce a suitably roughened surface. The blast profile ($R_z$) should be 50 to 75 microns (2 to 3 mils).

*Preparation of Galvanised Bolts*

1. 100% remove grease from the Galvanized Nuts and Bolts
2. Wire brush the Galvanized Nuts and Bolts
3. Solvent clean the Galvanized Nuts and Bolts (Solvent GTA 822 or equivalent)
4. Apply Chartek 1709 materials (no epoxy primer required)



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**Power tool cleaning**

Power tool cleaning is not an acceptable primary surface preparation method for large areas of steel in new construction. In scenarios where blasting is not permitted power tool surface preparation is acceptable provided a suitable surface profile and cleanliness is generated. For maintenance scenarios refer to Technical Note TN/F/CT/234 for guidance on surface preparation methods.

For these areas power tool cleaning methods must achieve a clean, roughened surface in accordance with SSPC-SP11, power tool cleaning. A minimum profile of 50 microns (2 mils) must be maintained. For areas less than $1m^2$ ($1550\ in^2$) a surface preparation yielding ST3 surface cleanliness is acceptable.

For bolts surface roughening using a wire brush is acceptable.

**Note: Power tool cleaning is not acceptable for projects required to comply with NORSOK M-501 without a clear deviation acceptance from the project team.**

**Wet abrasive blasting**

Wet abrasive blasting is an acceptable method of surface preparation. Surface profile and cleanliness shall be as detailed above. A qualified wet blast primer must be used with this method of surface preparation.

**Hydro-blasting (high pressure water jetting)**

Hydro-blasting may be an acceptable method of surface preparation of previously coated substrates. However, this is conditional on an adequate surface profile being revealed as detailed above. Where a suitable surface profile is not revealed, then sweep blasting or abrasive blasting will be required. A qualified wet blast primer must be used with this method of surface preparation.



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# 4. PRIMERS

It is possible to apply Chartek 1709 directly to blast cleaned substrates, if the relevant approval allows this but environmental factors (temperature, time, humidity etc.), may make it necessary to prime the substrate to prevent deterioration of the blast.

To ensure optimal bonding between the Chartek 1709 and substrate, correct primer type and thickness are required.

**Epoxy Based Primers**

Generally two-component epoxy-based primers are used with Chartek 1709. Only primers approved by International Protective Coatings can be used. Approved primers are indicated on the approved primer list. However this list is not exhaustive and International Protective Coatings can be consulted for enquiries on specific primers. Care should be taken to ensure that primer systems have reached sufficient levels of cure prior to over-coating with Chartek 1709. A 16 hour cure period is good general practice for all epoxy primers which have been applied at temperatures greater than 10°C.

It is the applicator's responsibility to ensure that the primed surface and the primer itself are in an acceptable condition for over-coating with Chartek 1709. Such factors as ageing of the primer (degradation and surface chalking), contamination, zinc salt formation, rust, bloom, etc. shall be considered when determining a surface's suitability before over-coating with Chartek 1709 (refer to Technical Note TN/F/CT/104 for suitable assessment methodology).

In all situations the surface of the primer must be clean, dry and free of all contaminants immediately prior to over-coating with Chartek 1709. Consult the relevant primer product data sheet for minimum over-coating times.

Any primer surface that is showing indications of UV degradation such as surface chalking or has exceeded its maximum over-coating period will need to be treated by abrasion e.g. sweep-blasting prior to over-coating. Areas of rust breakthrough should be abrasive blasted back to Sa 2½ (ISO 8501-1:2007) or SSPC-SP6 standard and the primer re-applied.



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Amine bloom formation on the primer surface can be removed by high pressure water-washing at a minimum of 170 bar (2500 psi).

If epoxy zinc primers such as Interzinc 52 are exposed to humid or outdoor conditions prior to application of Chartek 1709, zinc salts may be formed on the surface which is detrimental to adhesion of the Chartek 1709. These will need to be removed prior to application of the Chartek 1709. Typically this is achieved by high pressure water-washing at a minimum of 170 bar (2500 psi). If stubborn salts persist then brushing or another abrasive method will need to be included with the water-washing. Alternatively, an epoxy tie coat may be applied over the epoxy zinc primer to prevent salts forming.

Prior to over-coating the applied primer, dry film thickness checks should be made to ensure that the tolerances set out in Table 2 are not exceeded.

Over galvanised, aluminium, stainless and organic cladding surfaces (based on acrylates), Intergard 269 is the preferred world-wide available primer.

**Galvanised surfaces**

To ensure that the Chartek has been applied to an appropriate primed galvanised surface, pull off tests (ISO 4624) and Shear tests (TN/F/CT/104) should be used appropriately to ensure sufficient strength at all interfaces as well as the cohesive strength of the products applied. The procedures for TN/F/CT/104 must be undertaken if the primed surfaces have been exposed externally.

Pull off dollies may be applied to the primed galvanised steel after 3 days cure. Chartek should be used as the glue for the dolly. The primer should then be left for a total of 7 days prior to conducting the pull off tests. A pull off value greater than 5 MPa should be achieved.

If the pull off test results in a failure at the primer/Chartek interfaces a further sweep blast should be undertaken to ensure a robust interface with the Chartek system. Further tests are then required to ensure adhesion of the Chartek to the primer as outlined above. If the primer fails at the galvanised steel interface with the primer, then the primer should be removed by blasting, a full solvent wash be undertaken to ensure there is no oil and grease contaminants followed by re-instatement of the primer. Again further tests should be undertaken to ensure the Chartek will be adherent to the primed galvanised surface. If the galvanising layer fails then steel should be rejected as blasting will not assure the integrity of the galvanised layer.



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**Zinc Silicate Primers**

Zinc silicate primers are generally discouraged due to their inherent cohesive weakness and inconsistency of film. Several zinc silicate primers are approved for use under Chartek 1709 but it is preferred that an epoxy tie coat is applied to these prior to application of the Chartek. It is recommended that a solvent rub test, ASTM D4752 is carried out to assess the state of cure of the zinc silicate primer prior to overcoating. A minimum value of 4 should be obtained. Inorganic zinc silicate primers are especially susceptible to the formation of white zinc salts on external exposure and these must be removed prior to overcoating, as per recommendations above. For further information, please refer to the Chartek Qualified Primer list.

**Thermal Sprayed Coatings**

Protective coatings based on metallisation techniques can be porous. Prior to application of Chartek, the surface should be sealed using a suitable epoxy tie coat. Suitable examples are Intercure 200 thinned 15-20%, or Intergard 269 thinned 25-30%. Use of Interprime 179 is not an appropriate sealer for thermally sprayed metal coatings when Chartek is to be applied. Particular attention is required in relation to Chartek termination details.

**Primer Thickness**

Optimal bonding is achieved when the primer's dry film thickness (DFT) is sufficient to just cover the peaks of the blast profile and maintain a rust free condition prior to application of Chartek 1709. Where the Chartek is in service in cold climates, optimal performance to maximise the lifetime of the asset is expected by adherence to this principle. Maximum primer thickness is dependent on individual primers and careful monitoring and measurement of primer thickness is required. Dry film thickness measurement should be carried out in accordance with a recognised standard such as ISO 2808, SSPC PA2 and ASTM D1186. The method, frequency of measurement and number of measurements per spot should be agreed between applicator and client.

The **maximum** allowable primer system DFTs are summarized in Table 2:



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**Table 2: Primer System Maximum DFTs**

| Primer System | Dry Film Thickness (DFT) | |
|---|---|---|
| | Normal Areas | Overlap Areas |
| Epoxy Primer (e.g. Intergard 251) | 50 to 75 microns (2 to 3 mils) | 150 microns (6 mils) |
| Epoxy Zinc Primer (e.g. Interzinc 52) | 50 to 75 microns (2 to 3 mils) | 150 microns (6 mils) |
| Epoxy Zinc Primer plus Tie Coat | 75 to 110 microns (3 to 4.4 mils) | 150 microns (6 mils) |

Refer to the Chartek Qualified Primer list for specific primer information. The primer thickness required for specific schemes is to be supplied via an Interspec which will give the range of primer thickness for the project.

Specific exemptions to the general guidance are:

1. For maintenance scenarios where application is appropriate over previously rusted steel, Interseal 670HS may be used This has been verified as a result of detailed testing to allow a specification of a single coat of 125 microns (5 mils) dry film thickness to be applied (maximum 200 microns (8 mils) in overlap). In service steel temperatures greater than -10°C and less than 60°C.
2. For some new construction projects it is beneficial to apply a higher thickness of primer where corrosion protection is required for a longer period prior to application of the Chartek. Intershield 300 may be applied at a 150 micron (6 mils) specification dry film thickness (up to 300 microns (12 mils) dry film thickness allowed in overlap areas). In service steel temperatures greater than -10°C and less than 60°C. Suitable for accidental conditions involving cryogenic liquids.

**Note:** In areas of difficult access, such as internal angles, etc., where multiple spray passes are unavoidable, thickness should be carefully monitored and controlled.

**Reduction of Excessive Primer Thickness**

Excessive primer thickness should be reduced to the DFTs indicated in Table 2. The preferred method to be used is abrasive sweep blasting followed by thorough clean air blowing to remove contaminants from the surface. Sanding with P80-P100 grade aluminium oxide abrasive paper may be suitable for small areas less than 1m$^2$ (1550 in$^2$); however, care should be taken to prevent polishing of the surface which would lead to inadequate adhesion of the Chartek 1709. Frequent changes of the abrasive paper should be made.



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After primer reduction, surfaces should be cleaned of dust and contaminants in accordance with SSPC-SP1, preferably washed with potable water and thoroughly dried, prior to the application of Chartek.
The primer manufacturer's application instructions should be followed.

**It is the responsibility of the applicator** installing Chartek to assess the condition of the primer coating before Chartek is applied. Recommendation is to use TN/F/CT/104 to assess the primer condition if in any doubt. Should the primer's suitability for the over-coating with Chartek be in doubt in any way, for example, primer type, thickness, condition etc., the primer manufacturer and International should be consulted before the application of Chartek 1709



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# 5. AMBIENT CONDITIONS

Suitable application conditions are of critical importance for the successful application of Chartek 1709.

Consequently, it should only be applied when the ambient conditions are within the following parameters:

- Air temperature: minimum 10°C (50°F), maximum 50°C (122°F)
- Relative humidity: maximum 85%
- Surface temperature: at least 3°C (5°F) above dew point temperature less than 50°C for heated plural application and less than 60°C for hand application

Chartek 1709 may be applied at an air temperature minimum 5°C (41°F) using plural spray equipment only, recognizing that the time to cure will in such applications be extended. This should only be undertaken where there is no alternative to modify the ambient conditions. Additionally, there may also be a higher propensity for amine bloom formation which would affect over-coating with further layers of Chartek 1709, where required, and may affect over-coating with topcoats. For such low air temperature applications, plural equipment is the only recommended dispensing method.

In climates where there is direct sunlight with temperatures up to 50-60°C or there is a likelihood of condensation, application should be conducted in an encapsulated area and dehumidification equipment provided where required.



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# 6. STORAGE CONDITIONS

Chartek 1709 should be stored indoors and out of direct sunlight.

The following storage temperature ranges must be maintained:

1. General storage: minimum 1°C (33°F), maximum 30°C (86°F)
2. Material temperature for plural component spray application: 30-34°C (86-93°F) for 24 hours (maximum 48 hours) prior to use

To achieve the correct temperatures it may be necessary to use heated storage units, especially in cold and temperate climates. It is recommended that where the material has been stored at low temperatures, i.e. less than 5°C (41°F), that the temperature should be raised gradually to application temperature over a period of 48 hours.

Such storage units are typically built from standard site storage containers. The container will generally be lined with thermal insulation (see photographs below) and should be suitably ventilated.





**Accelerated methods of heating the Chartek 1709 containers prior to use, such as electrical heaters in direct contact with the containers or hot water baths, are not permitted.** Such methods can cause overheating of the outer layers of material in the container, which may produce undesirable changes to its properties (including shorter pot life).



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**Batch Numbering**

International Paint manufactures in a number of locations across the world and there are currently two batch numbering schemes in operation.

**Example 1:** AB1234 XY

A This represents the year of manufacture, starting with A for 2000, B for 2001 and so on. The letter I is not used.

B This represents the month of manufacture, starting A for January, B for February and so on. The letter I is not used.

1234 This represents the batch number.

XY This is an internal factory reference.

**Example 2:** 023612345

023 This is an internal factory reference.

6 This represents the year of manufacture, 6 = 2006, 7 = 2007 and so on.

12 This represents the week of manufacture in that year.

345 This represents the batch number.

Consult the Product Data Sheet for shelf life information.



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# 7. CARBON FIBRE MESH REINFORCEMENT

Requirements for mesh reinforcement depend on certification. UL certification mesh may be omitted for fire durations 1 hour or less. For type approval certification mesh may be omitted for dry film thickness less than 7.2mm. For vessels/tanks, mesh must be included for all dry film thickness requirements.

The meshing requirements for fire protection are given below and vary, depending on the relevant certification, as shown in Table 3. For areas requiring cryogenic spill protection, 100% coverage of HK-1 mesh is required with 50mm overlaps irrespective of fire protection requirement.

**Table 3: Mesh requirements where required**

| Use | Hydrocarbon (Pool) Fires | |
|---|---|---|
| | **UL Specified Projects** | **Class Society Specified Projects** |
| Structural Steel I and Open Sections | HK-1 mesh installed at approximately mid film thickness. No mesh is required on the web, mesh to be installed on the flange and around the tips as per the UL design. Mesh overlaps should be 50mm (2”). | HK-1 mesh installed at approximately mid film thickness with 50mm (2”) overlaps, 100% coverage. Beams and columns with webs less than 250mm (10”) deep do not require mesh on webs. |
| Structural Steel Hollow Sections | HK-1 mesh installed at approximately mid film thickness with 50mm (2”) overlaps, 100% coverage. | HK-1 mesh installed at approximately mid film thickness with 50mm (2”) overlaps, 100% coverage. |
| Tanks, Vessels | HK-1 mesh installed at mid film thickness with 50mm (2”) overlaps and with 100% coverage for all thicknesses. | HK-1 mesh installed at mid film thickness with 50mm (2”) overlaps and with 100% coverage for all thicknesses. |

HK-1 and HK-1 (M) carbon fibre meshes are knitted cloth of carbon filaments and glass thread. Both meshes are equivalent to each other with respect to their construction and constituent materials, and their performance. The designation of HK-1 and HK-1 (M) relates only to their manufacturing source.

HK-1 and HK-1 (M) are available from International Protective Coatings in 165m² (1776ft²) and 167.3m² (1800ft²) rolls respectively.



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General rules for Meshing:

1. Cut mesh to required sizes before starting Chartek application
2. Apply mesh to wet Chartek at approximately mid thickness
3. Roll the mesh thoroughly into the wet Chartek with short nap rollers dampened with GTA123 solvent
4. Overlap adjacent pieces of mesh by at least 50mm (2”)
5. To minimise waste the straight carbon (black) fibres are parallel to flange edges and the axis of hollow sections
6. After installing HK-1, either continue to build up the required thickness or spray a light coat of Chartek over the mesh to leave a good key for subsequent coats
7. The mesh profile may still be visible in the final coat. This is acceptable from a fire performance and film integrity performance perspective provided that mesh is fully encapsulated
8. At permanent terminations mesh must be encapsulated within the Chartek to prevent moisture ingress



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# 8. METAL MESH REINFORCEMENT

In some circumstances metal mesh reinforcement may be specified by the client or approval authority in cases where the existing paint system cannot be removed (typical for existing lead paint systems). The general method of mesh attachment and retention is by shot fired pins to the substrate. For hollow sections and pipe-work, mesh may be wrapped and fixed tight using tie wire utilising the appropriate lace wire to give the required stand-off. No pins are required for closed sections.

The metal mesh reinforcement systems used are:

- 12.7 x 12.7mm (½" x ½") square opening, 1mm diameter (19 gauge) galvanised wire mesh ("hardware cloth")
- 12.7mm hexagonal opening, 0.75 to 0.9mm diameter (20-22 gauge) galvanised wire mesh ("poultry netting")

In both cases, the mesh must be galvanised after manufacture. All wire mesh, and lacing wire must be galvanised.

For stainless steel substrates where required by the project, stainless steel mesh must be used. Stainless steel mesh should be Type 316 (18-10), with 12.7 x 12.7mm (½" x ½") square openings of 1mm diameter (19 gauge) wire mesh. All pins, mesh stand-offs and lacing wire must also be stainless steel.



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Installation of Pins:

- Pins shall be 25mm (1”) to 38mm (1½”) long and 3mm (1/8”) in diameter. (Note: 2mm (5/64”) diameter pins may be used for Chartek 1709 thicknesses up to 25mm (984 mils))
- Spacing of pins should generally be no more than 300mm (12”) on centres in any direction, unless the specific fire design allows less frequent spacing
- The normal method of pin attachment is by shot-fired pins for steel with pre-applied coating schemes. Pin attachment by capacitance discharge welding is also appropriate, however the coating is required to be removed at pin locations. Pins must be tested for weld integrity by achieving a 95% success rate on bend tests of at least 20 pins each day if applied by this method
- For carbon steel substrates, copper coated mild steel pins should be used. For stainless steel substrates, pins must be made of compatible materials
- The use of adhesive bonded pins or studs may be permitted for steel coated with existing paint schemes

**Note:** The use of metal mesh does not eliminate the requirement for HK-1 or HK-1M mesh. Its function is to provide a mechanical anchor of the PFP system. However whether or not to include is at the discretion of the client.



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General rules for Metal Meshing:

1. Adjacent pieces must not have more than 50mm (2”) gap between them. Effectively the mesh shall provide 100% coverage including web depths of less than 250mm (10”)
2. Mesh shall be brought as close as possible to the point where the Chartek 1709 terminates
3. Chartek 1709 shall be applied as soon after mesh installation as possible to avoid surface contamination
4. Chartek 1709 shall always be trowelled to ensure that the mesh is fully encapsulated and no voids around the strands of mesh are formed

**Table 4: Meshing Designs for Structural Members and Tanks (where HK-1/HK-1(M) is not used in conjunction with metal mesh)**

| Chartek 1709 Thickness | Flange Edges | Webs over 250mm (10”) in Depth | Hollow Sections and Tanks |
|---|---|---|---|
| Up to 12mm | A | A | A or C |
| 13mm+ | B | B | B or D |

A = 12.7 x 12.7mm (½” x ½”) square opening 1mm diameter (19 gauge) galvanised wire mesh (“hardware cloth”) pinned or tied to the surface

B = 12.7 x 12.7mm (½” x ½”) square opening 1mm diameter (19 gauge) galvanised wire mesh (“hardware cloth”) stood off 3mm from the surface

C = 12.7mm (½”) hexagonal opening 0.75-0.90mm (20-22 gauge) galvanised wire mesh (“poultry netting”) pinned or tied to the surface

D = 12.7mm (½”) hexagonal opening 0.75-0.90mm (20-22 gauge) galvanised wire mesh (“poultry netting”) stood off 3mm (1/8”) from the surface

**Note:** For projects where NORSOK Standard M-501 is specified there may be a requirement for welded pins and metal mesh. The project specification should be closely consulted.



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# 9. CHARTEK 1709 GENERAL APPLICATION NOTES

Qualified Chartek Application Contractor Companies who have not applied Chartek products within a period of two years must undergo refresher training prior to starting any Chartek application work. If the Contractor Company can prove they have employed Chartek qualified and experienced Supervisory/QC personnel and hands-on application personnel, the refresher training may not be necessary.

In order to ensure trouble free operation of this type of pump the material must be maintained at the correct temperature. It is therefore necessary to provide controlled heating or cooling for the Chartek and spray pump. Hoses should be insulated/heated in cold conditions or wrapped with heat reflecting tape in hot environments. It may also be necessary to raise hoses above the ground in extremely hot environments. High substrate temperatures should be avoided by providing suitable shade cover and air-conditioning of the area immediately surrounding the workface may also be necessary.

There should be sufficient area available to spray and enough manpower to keep up with the gun. Frequently shutting down spray machines causes wasted time and material spent cleaning and causes pressure build up in the material lines and spray gun, which may represent a safety hazard.

When spraying Chartek 1709, the thickness of each individual coat should be no less than 3mm (1/8”) to ensure satisfactory coalescence of the film. Where a spray finish has been applied, the final film specification thickness may be built up by using a thickness less than 3mm.

Where a good spray fan is not immediately achievable, or where application is through metal mesh, the first coat of Chartek is sprayed and quickly trowelled into the surface to ensure good wetting and even thickness. Trowelling helps to thoroughly encapsulate any pre-installed mesh and reduces the formation of air pockets.

Trowel marks and high points should be reduced with a short nap roller dampened with GTA123 solvent. Rolling achieves a further uniformity in the thickness of the coat, which allows uniform build-up of subsequent coats and ultimately the correct final thickness. Rolling also serves to produce a smoother surface finish.

Two precautions to be taken with rolling are:

1. If the Chartek has not gelled (started to cure) sufficiently, it can sag or slump
2. Too much solvent on the roller can reduce the cure rate if it is forced into the wet Chartek and will keep the film softer for longer than expected, potentially impacting handling and damage resistance



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When adding solvent for single-leg and trowel application, care must also be taken to ensure sufficient hardness development and to prevent material sagging and slumping. Any addition of solvent to the material will result in extending the drying and overcoating times.

For application of subsequent coats, the applied Chartek should be firm enough (sufficient cure) to allow wet film thickness measurements to be taken accurately and to support the weight of the additional material. Refer to the product data sheet for minimum overcoating intervals for plural spray application.

Preferably, subsequent coats should be applied when the previous coat is still tacky. Where practicalities prevent “wet on wet” application, overcoating time should be reduced to a minimum. A sprayed holding coat should be applied to leave the Chartek with a good key to improve the adhesion of the next coat where the interval exceeds 24 hours. A holding coat should also be applied to HK-1™ mesh when this is applied at the end of a working day.

The holding coat is produced by a faster than normal spray pass, resulting in a coarse finish that promotes good bonding with subsequent coats.

Before spraying subsequent coats onto cured surfaces, they should be checked for cleanliness and, if required, suitably cleaned with one of the approved methods described in “Surface Preparation”. It is imperative that surfaces are clean and thoroughly dry before additional coats of Chartek are applied.



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# 10. WATER CONTAMINATION

***CAUTION*: During application and curing, the surface should be protected from moisture (e.g. rain, high humidity, etc.) as required. These conditions could affect inter-coat adhesion with subsequent coats.**

Take the following action if water contamination occurs:

**Table 5: Water contamination resolution actions**

| Contamination | Action |
|---|---|
| Cured Chartek (fresh water) | Dry and solvent wipe |
| Cured Chartek (salt water) | Warm water wash - maximum 60°C (140°F)<br>Dry and solvent wipe |
| Uncured Chartek | Remove and replace all uncured material |

Sufficient cure is dependent upon temperature and advice should be sought on a case-by-case basis



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# 11. APPLICATION WITH PLURAL SPRAY EQUIPMENT

**Plural Component Spray Equipment**

Chartek 1709 is most efficiently applied with purpose built hot spray plural component pumps, which have the advantage of not requiring any premixing of the two parts. Examples of hot spray plural component equipment which have been shown to give the required film properties in the field are listed in Appendix J.

Plural component equipment used to apply Chartek 1709 must be capable of delivering the required pressures, temperatures and flow rates as well as be capable of operating reliably for long periods under a wide range of conditions. Machines built to spray Chartek 1709 are supplied by a number of companies. Each supplier provides instructions on machine operation and maintenance and should be able to advise on the individual set up required to achieve best application qualities. This information is given for advice only and the contractor is responsible for determining the suitability of specific pieces of equipment and maintenance of the equipment in good working order according to the manufacturer's recommendations.

For Chartek 1709 the application parameters possible depend on a number of factors (e.g. environmental conditions, equipment type, etc.) and, where possible, material temperatures should be kept to the lower value of the range stated in Table 6.

**Table 6: Chartek 1709 application parameters**

| Parameter | Value |
|---|---|
| Storage tank temperatures | Part A: 35-60°C (95-140°F)<br>Part B: 35-50°C (95-122°F) |
| Hose heater temperature | 45-65°C (113-149°F) |
| Gun exit temperature | 40-55°C (104-131°F) |
| Storage tank pressures (see Note 2) | Part A: 4.1-6.9 bar (60-100 psi)<br>Part B: 2.0-4.1 bar (30-60 psi) |
| Tank stirrer speed | 10-30 RPM |
| Displacement pump pressure | 175-276 bar (2500-4000 psi) |



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Recommended fluid lines and spray tips:

- Part A: ~18mm (¾") internal diameter fluid lines
- Part B: ~12mm (½") internal diameter fluid lines
- Whip length: 4.5 – 6.0m (15 – 20ft) with ~12mm (½") internal diameter
- Suggested tip size: 0.035" to 0.041" internal orifice diameter (35 to 41 thou OR 0.89 to 1.041mm). For smaller structural steel a narrow spray fan pattern should be used, i.e. a No. 3 or 4 tip (corresponds to a 6" to 8" [150 to 200mm] spray pattern width at the work surface for a spray distance of 12" [300mm]). For larger structures a wider spray fan pattern may be used, i.e. a No. 5 or 6 tip (corresponds to a 10" to 12" [250 to 300mm] spray pattern width at the work surface for a spray distance of 12" [300mm]).

**Note:** Ability to vary tank pressures is critical to achieve the correct weight mix ratios. Tank stirrers should also have the capability of speed variation.

It is necessary to provide controlled heated storage for the Chartek 1709 and advisable to place the machine in a modified insulated container for work at low air temperatures. The importance of keeping all spray equipment clean and efficient cannot be overstated, as down time is very costly. For this reason a skilled and experienced machine operator is a vital component of the team, together with a regular maintenance or service programme for the equipment.

When spraying in cold conditions, the spray pump should be located in a heated area, ideally the same area that is used to store the Chartek at a sprayable temperature. Hoses should be insulated and heated and ambient temperature parameters must be frequently checked and maintained.

In hot conditions, the spray pump and Chartek must be located in an air-conditioned environment. Hoses should be insulated and wrapped with heat reflecting tape. It may also be necessary to raise hoses above the ground in extremely hot environments. High substrate temperatures should be avoided by providing suitable shade cover and air-conditioning of the area immediately surrounding the workface may also be necessary. In-line heating should be kept to a minimum with this product.

The static mixer (sometimes referred to as the "worm") must be cleaned or exchanged for a clean worm every 1-2 hours to minimise build-up of fibre.

International recommend that to achieve an optimum uniform thickness / appearance, a maximum of 5mm per build up coat is to be spray applied in one application.



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**Ratio Checks**

No weight ratio checks are required for equipment which monitors volume ratio in “real time” as application is carried out, and where shut off mechanisms are in place if the equipment deviates outside of the volume ratio tolerances (±5% variance on the ratio required for Chartek). Care must be taken to ensure the equipment is in spray mode prior to commencement of spray application to the substrate. Maintenance in accordance with the equipment manufacture’s guidelines must be in place to ensure cut out controls operate correctly when the machine strays out of ratio.

For other equipment, it is important that the delivery ratio of plural spray pumps is regularly checked. As a minimum, a ratio check by weight should be performed at the start-up of each day’s production and again if the machine is shut down and restarted for any reason.

Use the following procedure for ratio checks by weight:

1. Weigh clean empty Parts A and B containers and note the respective weights.
2. Fix nozzles (35 thousandths of an inch orifice size) to the Part A and Part B dump valves on the mixing block. This is particularly important to maintain the pressure in the system and gain accurate ratio checks.
3. Place the containers under the ratio check valves located on the mixing block and open the valves at exactly the same time with the outlet pressure of the pump set at 3000psi.
4. Close the valves when the containers are at least half full at exactly the same time.
5. Find the net weight of each part by subtracting the weight of the containers.
6. Calculate the ratio of Part A to Part B.

***Example:***

Part A empty container weight – 2.3kg (5.0lb)
Part B empty container weight – 1.2kg (2.6lb)

Part A full container weight – 9.4kg (20.7lb)
Part B full container weight – 4.1kg (9.0lb)

Part A net weight – 7.1kg (15.7lb)
Part B net weight – 2.9kg (6.4lb)



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As a minimum a ratio check should be carried out at the start of each shift and after each machine shutdown and restart. In addition to the ratio checks, constant checking of the displacement pump pressure gauges and the colour of the mixed Chartek should be carried out by the machine operator and sprayer respectively.

The **weight ratio** for Chartek 1709 is 2.49:1.

The acceptable ratio range of Part A:Part B is: 2.37:1 Minimum
2.61:1 Maximum

**Film Density**

Chartek 1709 film density can vary significantly depending on equipment setup and application technique. Therefore, equipment settings and technique appropriate to achieve the target film density should be determined prior to the commencement of work and monitored throughout the project. Incorrect equipment setup and/or application technique can result in film densities above the target range and excessive material consumption.

**Table 7: Application film densities**

| Application Method | Target Film Density ($g/cm^3$) determined using ASTM D792-00 method A |
|---|---|
| Trowel Application | 1.2 ± 0.1 |
| Single Component Airless | 1.1 ± 0.1 |
| Heated Plural Component Airless | 1.0 ± 0.1 |

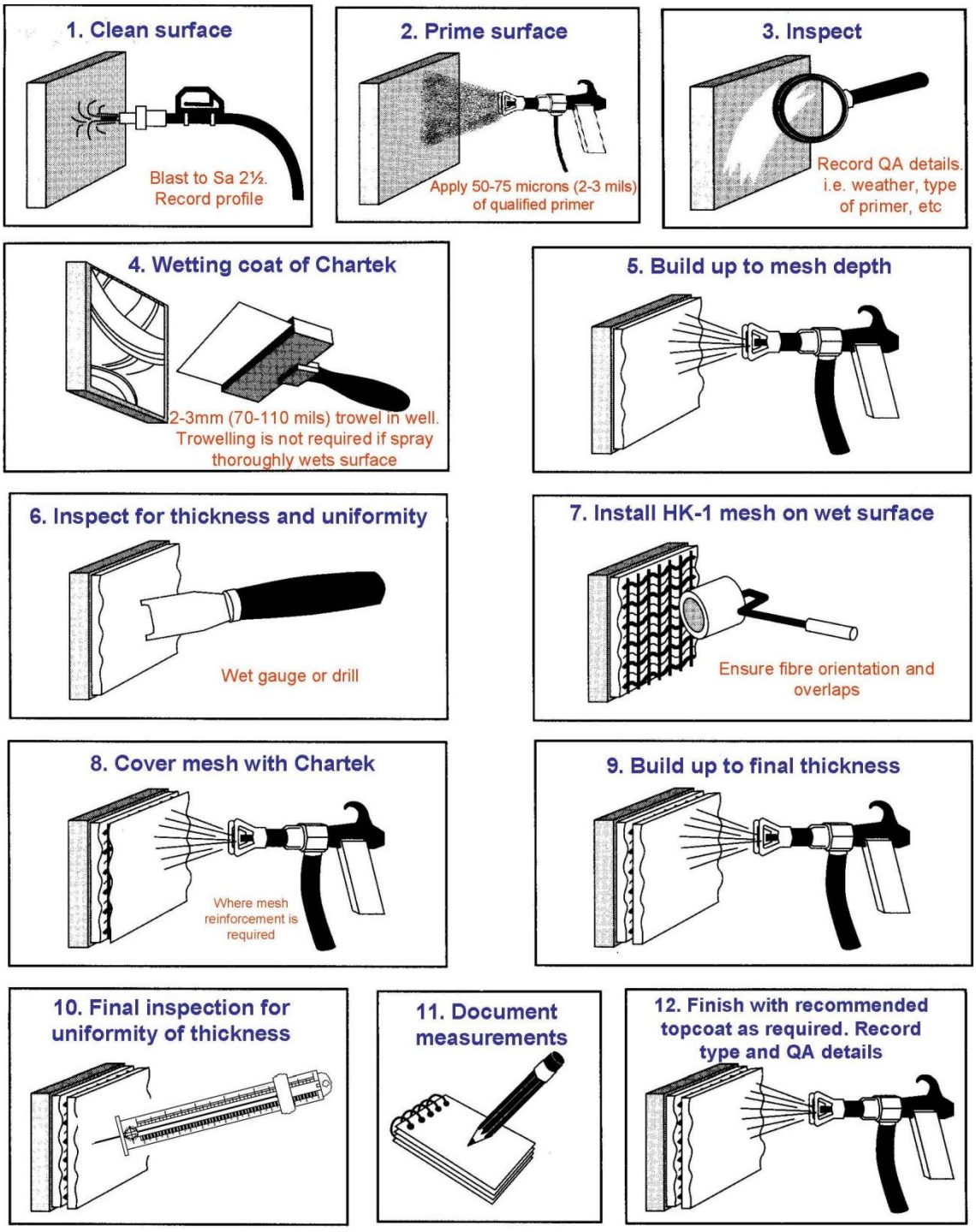


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# 12. CHARTEK 1709 APPLICATION SCHEMATIC






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# 13. APPLICATION WITH MODIFIED SINGLE LEG AIRLESS SPRAY EQUIPMENT

Application with single leg equipment is not as efficient as with plural component. More product wastage will occur and guidance notes labour requirements are likely to be higher. Usage rates up to 10% higher than those stated on the data sheet are likely to occur.

International Protective Coatings recommends the use of the plural component equipment whenever possible.

To facilitate application with single leg equipment the Chartek 1709 Part A and Part B material should be maintained at a temperature of 21-27°C (70-80°F) for a minimum of 24 hours prior to use.

**Mixing**

A small amount of International Protective Coatings thinner GTA123 (or GTA822) may be added to reduce viscosity for mixing and spraying. The amount required varies with initial material temperature but up to maximum 1.0 litre (0.25 US gallons) may be used per full 20 Kg kit of Chartek 1709 and is added into Part A. 50 Kg kits are not preferred for this application method.

When Part A has reached a smooth consistency, Part B is then poured into the Part A container, scraping the sides of the Part B container to empty it completely. The two parts are thoroughly mixed together with a high torque, variable speed, paddle mixer of minimum 5 HP air motors (or 1000W/110V electric motor minimum) equipped with 250mm (10”) diameter paddle.

The mixer can be mounted on a power ram base to ease the effort required and to allow vertical movement of the paddle blade. The mixing should begin slowly and speed built up gradually.

Mix carefully until a smooth texture and uniform colour are achieved, which should take approximately 4 minutes. Consideration should always be given to the relevant pot life and kits should not be mixed until they are ready to be used.



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The shearing action of mixing the material will cause the material to heat up so temperature should be checked after mixing. In addition, once the material is in a mixed state and left in the drum, the exothermic nature of the reaction will cause the material to continue to increase in temperature, greatly reducing the available pot life. If spray operations are held up for any reason then extended pot life can be achieved by emptying out mixed Chartek on to flat surfaces, spreading it out to reduce exothermic reaction and using it for trowel application.

**Modified Single Leg Airless Spray Equipment**

Pump compression ratio: from 68:1 to 74:1 fitted with check valve to eliminate spray fan fluctuation.

Air Motor: Graco Premier (or equivalent) mounted on a power ram with a follower or induction material feed plate.

- ~18mm (¾") internal diameter fluid line 15 to 20 metres (50 to 65 feet) long, rated to meet the required high pressures of the pump
- ~12mm (½") internal diameter whip line 4.5 metres (15 feet) long, rated to meet the required high pressures of the pump
- High pressure airless spray gun fitted with swivel
- 0.035" to 0.041" "reverse-a-clean" airless spray tips



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# 14. HAND/TROWEL APPLICATION

Chartek 1709 may also be applied manually using plasterer's trowels. This has the advantage of very little waste and virtually eliminates the need for masking. Special care must be taken during hand trowel applications when coating connection joints that a uniform thickness and required surface finish is achieved (See Section 15 Guidance on Surface Finish)

To facilitate application by trowel the Chartek 1709 Part A and Part B material should be maintained at a temperature of 21-27°C (70-80°F) for a minimum of 24 hours prior to use.

Mixing should be carried out as described for single leg airless spray application. A maximum of 0.5L (0.13 US Gallon) per 20kg kit may be added to facilitate application. It is preferred that the solvent is added to the mixed product rather than individual components. Where the temperature is low, to facilitate mixing the solvent may be added to Part A and mixed in prior to mixing with Part B.

After a kit has been mixed, it may be spread out on flat clean boards or surfaces for each applicator to work with. This prevents the material from curing too quickly and allows sufficient working time. Alternatively the material may be applied directly from the pail.

Often trowel application will require less than a full kit of Chartek 1709. In these cases, the required amounts of Parts A and B should be accurately weighed out into a clean container and thoroughly mixed as above. The correct ratio by weight for Chartek 1709 is detailed previously in this document.



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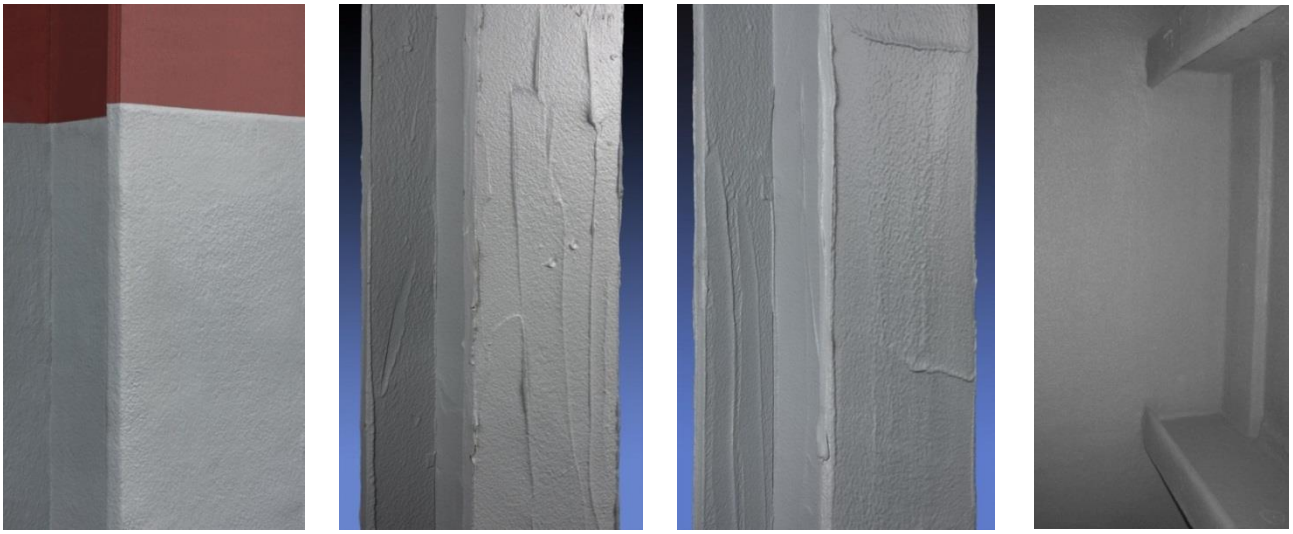
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# 15. SURFACE FINISH

Samples of the surface finish acceptable to the client, a reference area, should be prepared by the applicator prior to job start-up.

**Standards of Application Finish**



1 2 3 4

1. Typical standard of finish, additionally showing clean, straight, free edge terminations. Uniform rolled finish. Achieved with spray, trowel and rolled finish.
2. Material left in trowelled but unrolled finish
3. Poor standard of surface finish showing unacceptable heavy spray and sags
4. Sprayed uniform stipple finish. It is recommended that you apply the stipple coat wet on wet so it blends in and makes it all one system. Advantages of this finish are:
    a. A stipple holding coat will help production by at least one day per block maybe more.
    b. Less rolling for workers so more production.
    c. If DFTs are low in areas and a stipple coat has been applied, you can mark up the low areas and apply a build-up coat WITHOUT the need to abrade the surface with power tools.
    d. Gives a good key coat for the next coat of material, either PFP or paint top coat. No need to abrade the area during Chartek repairs as you will have a good key (profile) with the stipple.
    e. Surface looks in a better condition, easier for final inspections.
    f. The stipple coat is part of the system, at no extra cost.



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Samples of the surface finish acceptable to the client (a reference area) must be prepared by the applicator prior to project start-up. The Chartek 1709 system sample reference area with the project specified thickness must be carried out by the contractor / applicator prior to the project start-up. All project coatings QC departments and IP Field Service are to agree the standard of surface finish.



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# 16. THICKNESS MEASUREMENT

As the fire protection rating is determined by the Chartek 1709 thickness, it is imperative that applicators constantly measure and record thicknesses during application.

Chartek 1709 is a 100% volume solids product, so wet and dry film thicknesses are the same.

The following procedure for thickness measurement must be followed:

*A. Method for measuring wet thickness:*

The recommended method of measuring wet thickness is to use a pre-cut bridge gauge. Typically made from a putty knife, widths of between 40 and 100mm (1.5 – 4.0 inches) have been found to be most appropriate. Notch or pin gauges are not acceptable because they limit the measurement to one point. The gauge should just touch the rollered surface in the middle and the firm base layer at the edges. International Protective Coatings strongly recommends the continuous use of the bridge gauge by all members of the application team (sprayer, trowellers and rollers). This is the only way of ensuring the design thickness will be applied to the whole surface.

*B. Method of measuring dry thickness:*

Dry film thickness can be measured by either of the following methods:

- Drilling a small hole approximately 2mm ($^{1}/_{12}$”) in diameter and checking the Chartek 1709 thickness with a depth gauge (care must be taken not to damage the substrate and to refill the holes with Chartek 1709 as soon as possible);
- Using an eddy current thickness gauge (care must be taken to correctly calibrate the gauge on a smooth calibration plate immediately before taking any readings).

Where Chartek is supplied as part of a cryogenic spill protection system, thickness must only be determined by means of an eddy current thickness gauge.

It is recognized that the applied Chartek 1709 layer will never be perfectly even and that areas of lower than specified design thickness (“valleys”) are compensated by areas of higher than design thickness (“peaks”).



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Unless specifically stated otherwise in the project documentation, the minimum acceptable thickness at any point shall not be less than 85% of the design thickness up to a maximum of 1.5mm ($^1/_{16}$") less than the design thickness. In other words, for thicknesses up to and including 10mm ($^3/_8$") the minimum allowable thickness is 85% of the design thickness. For thicknesses above 10mm ($^3/_8$") the minimum allowable thickness is the design thickness less 1.5mm ($^1/_{16}$").

In all cases, the average thickness must be at least the specified passive fireproofing design thickness.

For protection against cryogenic releases combined with fire exposure, the minimum thickness requirement will be the specification thickness at all points.

The number of thickness readings to be taken should be decided by all parties before commencing application, and ideally be made with reference to local standards for the measurement of fire protection thicknesses.

Thickness readings should be accurately recorded.



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# 17. TOPCOATS

Chartek 1709 has been extensively tested to industry recognised standards to demonstrate its ability to withstand weather and environmental exposure, both with and without topcoats.

Generally Chartek 1709 will be topcoated to meet owners' colour schemes and finish requirements. However, there are specific situations where the use of a topcoat is recommended, these include:

- For aesthetic purposes on coastal locations or areas of high UV exposure: like all epoxy products, Chartek may chalk when exposed to high levels of UV and moisture for prolonged periods
- Areas exposed to periodic immersion such as the upper surfaces of flanges and areas in the splash zone (see Technical Note TN/F/183). Typically Interzone 954 at a thickness >250 microns is recommended
- Surfaces subject to continuous condensation (vessels operating at low temperatures in hot climates for example). Typically Interzone 954 at a thickness >250 microns is recommended
- Coarse sprayed Chartek surfaces: a stippled finish may collect airborne contamination and result in shading of the Chartek surfaces

It is recommended that Chartek 1709 is topcoated when it is sufficiently cured and the surfaces are clean and dry, and before being subjected to any possible surface contamination.

For recommended minimum overcoating intervals, please refer to the Chartek 1709 Technical Data sheet.

Maximum overcoating times are dependent upon environmental exposure, type of topcoat system used and other factors. The topcoat datasheet, the specification and application guidelines must also be consulted especially when utilising Interfine polysiloxanes as the maximum overcoat intervals are likely to be shorter than the general ones quoted on the datasheet.

Use of a tie coat and overcoating interval is a dependent on the type of finish. Site practicalities have to be considered as part of the assessment of top-coat type and application practice.

For acrylic urethane topcoats, the optimum time for overcoating Chartek is within 7 days of application. Extended periods before top-coating will reduce the optimum adhesion to Chartek. At lower temperatures (<15°C), a tie coat is recommended which enhances adhesion. Amine bloom is more likely at temperatures less



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than 15°C and / or where the relative humidity is high. If present, action should be taken to rectify prior to the application of the top-coat to the Chartek.

Where the over-coating interval has been exceeded or there is evidence of amine bloom the following procedure is required:

1. Manually abrade or sweep blast the surface of the Chartek 1709 with P36 disk (P100, P120 sandpaper also acceptable)
2. High pressure (150-200 bar) fresh water wash to remove all contaminants. Ensure surface is fully dry prior to application of the urethane top-coat

In extreme cases, excessive rollering with solvent can cause amine bloom on the surface of the Chartek 1709. This is not acceptable for application of topcoats.

International Paint have a range of top-coats which have been approved for use over Chartek. Approved topcoats are indicated on the technical data sheet. However this list is not exhaustive and International Protective Coatings can be consulted for enquiries on specific topcoats

For heavy duty protection, International Protective Coatings recommends one of the following topcoat systems:

1. Two coats of Interthane 990 at 50 microns (2 mils) DFT per coat
2. One coat of epoxy polyamide primer at 75 microns (3 mils) DFT plus one coat of Interthane 990 at 50 microns (2 mils) DFT or Interfine 878 at 50 microns (2 mils) DFT

**Non-slip finishes**

For upper horizontal surfaces where foot traffic will be experienced, a non-slip coating should be provided as a topcoat. The non-slip coating should incorporate an inert aggregate such as quartz and be of sufficient thickness to properly fix the aggregate to the surface. Where this system is applied on top of gratings, Chartek should be applied level with the grating top surface and the non-slip system applied.

Recommended International non-slip deck systems:
Interzone 954, 500-1000 microns (20-40 mils)

All the above products should incorporate an appropriate aggregate such as GMA132. Non slip deck systems can be top-coated with a cosmetic finish.



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# 18. ADHESION TESTING, COATBACKS, WELD CUTBACK AND REPAIR OF DAMAGED AREAS

**Adhesion Testing**

Refer to Primers section for information on primer suitability.

Verification of system integrity should be undertaken in accordance with Technical Note TN/F/CT/001. Once suitable reference areas have established good adhesion to the steel and between the primer and Chartek using this method, pull-off adhesion testing may then be used as an indicator for acceptable system integrity (cohesive strength, not adhesive strength from substrate). Pull-off tests should be conducted in accordance with ISO 4624, using 2cm dollies and a minimum value of 5MPa should be attained.

If suitability of aged primers to accept Chartek fireproofing has been determined using Technical Note TN/F/CT/104, then there is no requirement to also use Technical Note TN/F/CT/001 and pull-off testing may subsequently be used.

**Coatbacks**

Whilst there is no specific standard relating to coatbacks, a coatback distance for all secondary attachments to primary members should be considered. Typical industry 'norm' for offshore projects is 450mm (18") measured from the extremity of the primary member along the secondary attachment. This is often taken as the industry norm to deal with a heat transfer situation. The thickness to be applied on the secondary member shall be the same as that applied to the primary member unless otherwise specified. Typical Coatback designs can be found in Technical Note TN/F/CT/009.

Secondary members and minor attachments should be considered during the design process and detailed by owners or design engineers and endorsed by class societies where appropriate.

The requirements of owners, classification societies, designers and engineers may require that projects have coatback limits (cross sectional area, distance from primary members and thickness of PFP to be applied) specific to project requirements. Where doubt exists, consultation with the project specification, design engineer, classification society or owner should be made.



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If the decision is made not to protect the top-flange, for example in the case of a pipe rack, or beams supporting gratings, coatbacks are generally required for attached secondary structural steel.
For 3 sided solutions in jet fire environments, class societies and design engineers may have specific requirements for free edge and underside of top-flange termination detail, requiring the installation of welded pins. International recommend that no pinning of free edges in a fire zone is required for any termination detailing.

Refer to Technical Note TN/F/CT/009 for further information.



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**Termination detailing**

Caulking and sealing of free edges and terminations is not required for Chartek fire proofing applied to blasted mild steel substrates. Guidance should be sought for other substrate types.

No pinning at free edges is required in the fire zone. The installed carbon/glass fibre mesh should be encapsulated at the termination point within the Chartek depth. Fire performance and resistance to the environment is expected in the absence of pinning.

**Removal**

Chartek 1709 can be removed after application for additional work, e.g. welding of attachment, by the use of handheld air driven pistol chisel using a sharp chisel bit of the appropriate width, usually 25 or 50mm. The tool should be used to split the bond between Chartek 1709 and the steel, taking care not to gouge or damage the steel substrate.

Chartek 1709 may also be removed by the use of water jetting; guidance on this may be found in Technical Note TN/F/CT/204.

**Note:** Operators should wear suitable personal protection including but not limited to dust masks and eye protection.



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**Weld Cutback**

*Attachments:*

For small weld operations, such as addition of clips and hangers, a cutback of 50mm from weld area should be made. For large welds of heavy angle or other non-structural members, a cutback of 75mm should be made. Chartek 1709 can be removed with a fair degree of accuracy on an identified cut line without damage to surrounding material. After welding has taken place, the surrounding Chartek 1709 should show no sign of discolouration or damage. If discolouration, change of applied colour or *'browning'* is seen, then discoloured material should be removed back to sound material.

When welding on steel surfaces on the opposing side to the Chartek-coated surface, consideration needs to be given to whether the Chartek has degraded (discoloured) at the steel/Chartek interface. Chartek will need to be removed at specified locations to determine the degree of breakdown. Visual examination of the top surface of the Chartek is insufficient to be assured of the functionality of the fire protection.

*Structural Members:*

In the case of allowance of cutback for welding of structural members and structural members themselves which are to be pre-coated with Chartek 1709 prior to assembly, the following recommendation is made:

No weld preheat: 75mm either side of weld
Weld preheat: See Table 8

**Table 8: Cutbacks for weld preheat**

| Preheat (°C) | Duration (hours) | Free Distance (m) |
|---|---|---|
| 100 | 4-8 | 0.75 |
| 100 | 9-12 | 1.00 |
| 150 | 4-8 | 0.75-1.00 |
| 150 | 9-12 | 1.00-1.25 |



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The above figures are expected to be conservative, actual distance is a combination of factors, including mass of steel at weld junction and method of preheat.

As previously noted, discolouration of surrounding material will indicate insufficient cutback or overheating of an area. Chartek 1709 will have to be removed and reapplied back to sound material.



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**Repair of Damaged or Failed Areas**

Repair of damaged or failed areas, in the fabrication yard or during service life, and cutback areas should follow the procedure below. Application conditions must conform to specified conditions for primer topcoat and Chartek 1709 application. For abutment to epoxy PFP or cementitious PFP refer to Technical Notes TN/F/CT/085, TN/F/CT/148 and TN/F/CT/151 for specific detailing.

1. Check the **'border'** area of surrounding Chartek 1709 for soundness and adhesion in the joint area.
2. For guidelines on how to replace and/or abut against cementitious and epoxy fire proofing, refer to Appendices C, D and E
3. Mark out the area to be repaired. Masking should be done around the area to be repaired in a square or rectangular shape. This will give the patch a clean appearance once completed.
4. Using a disc grinder, cut through the Chartek 1709 (take care not to damage substrate).
5. Using chosen tools (hammer and chisel or pneumatic chisel), cut into patch to remove damaged Chartek 1709. Make sure all uncured material is removed.
6. Small areas, for example, welds and local repair areas, may be prepared by power discing with a carborundum disc or by needle gun to achieve a clean, roughened surface in accordance with SSPC-SP11 and maintaining a minimum profile of 50 microns (2 mils). Power tool cleaning should not be used as a **primary** surface preparation method for large areas.
7. Abrade adjacent surfaces for a distance of 150mm (6") from edge of repair area. After roughening, a suitable International Protective Coatings thinner GTA123 (or GTA822) solvent should be used to ensure that the area is clean.
8. Reinstate primer to specification, if required. For repairs, Chartek 1709 may also be applied directly to blast cleaned steel.
9. Reinstate mesh to specification. If the repair area is less than 150mmx150mm (6" x 6"), meshing is not necessary.
10. Reinstate Chartek 1709 to specification, taking care to smooth over the repair area edges. Trowel application of Chartek 1709 is acceptable for repair areas.
11. Topcoat replacement and repair should follow International Protective Coatings' guidelines and topcoat manufacturer's instructions.

Separate application manuals are available for cryogenic spill systems



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## 19. QUALITY CONTROL

A Quality Control Guidance document is available from International Protective Coatings upon request; this document outlines those things which should be recorded, as best practice. However, the template is ultimately at the discretion of the asset owner and applicator and should be agreed prior to contract start-up.

## 20. SAFETY AND ENVIRONMENT

Appropriate Material Safety Data Sheets and local Health & Safety personnel protection requirements must be observed for all materials used.

Refer to local legislation and the manufacturer's specific instructions with regard to equipment safety.

For the disposal of Chartek 1709 refer to local regulations and/or seek the advice of specialist waste disposal providers.



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# APPENDIX A – Meshing arrangements for Chartek

| REV | CHANGE DESCRIPTION | DRAWN | CHECKED | DATE |
|---|---|---|---|---|
| 2 | AMMENDMENT TO NOTES | PH | RW | 24/03/14 |

## INSTALLATION GUIDLINES
## HK-1™ CARBON FIBRE MESH REINFORCEMENT
## CHARTEK 1709

**General notes on fitting HK-1 mesh**
**Refer to Sheets 2 and 3 for details**

1. HK-1 mesh only required for fire ratings greater than 60 minutes.
2. Mesh should be installed at approximately half the final coating thickness of the Chartek.
3. Overlap adjacent pieces of mesh by a minimum of 50mm (2").
4. No mesh to be used on I sections and hollow sections up to a dry film thickness of 7.2mm. If the design requires full mesh for I sections, webs shall be meshed if their depth exceeds 250mm (10"). For projects requiring a UL design, no mesh to be placed in the webs of beams and columns. Mesh to be installed on flanges only. There is no limit in regard to the web depth.
5. Where edges of mesh meet at internal angles the maximum allowable gap is 25mm (1").
6. To minimise waste the straight carbon (black) fibres should be installed parallel to flange edges and the axis of hollow sections.

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| | |
|---|---|
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| Engineering Co. | N/A |
| Applicator | N/A |
| Project Name | CHARTEK 1709 APPLICATION MANUAL |

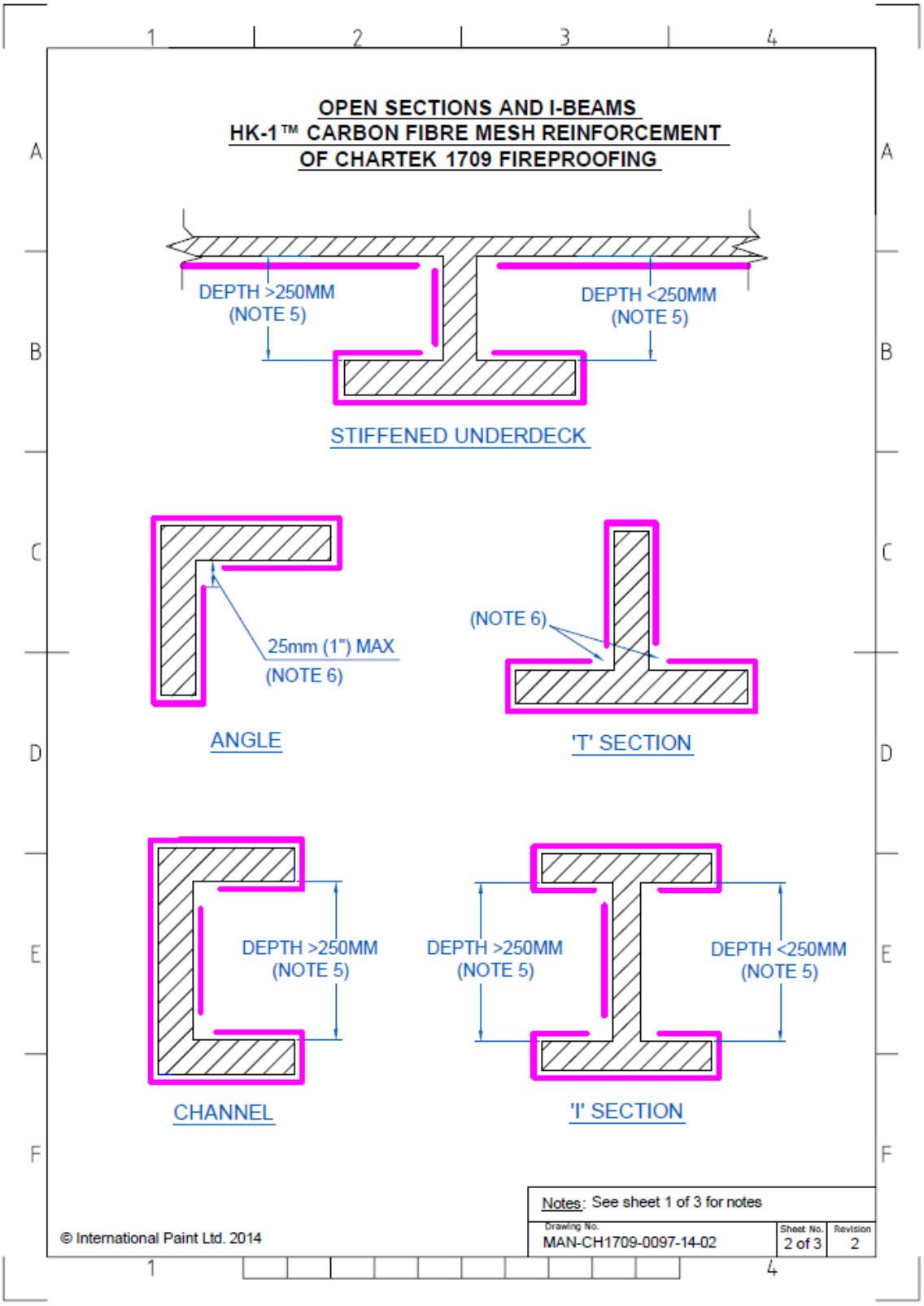
| Drawn By | Checked By | Scale | Date |
|---|---|---|---|
| PH | RW | NTS | 24/03/2014 |

| | | |
|---|---|---|
| Drawing Title | MESH INSTALLATION GUIDELINES FOR HK-1 AND HK-1(M) CARBON FIBRE MESH | |
| Drawing No. | Revision | Sheet Size |
| MAN-CH1709-0097-14-01 | 2 | A4 |



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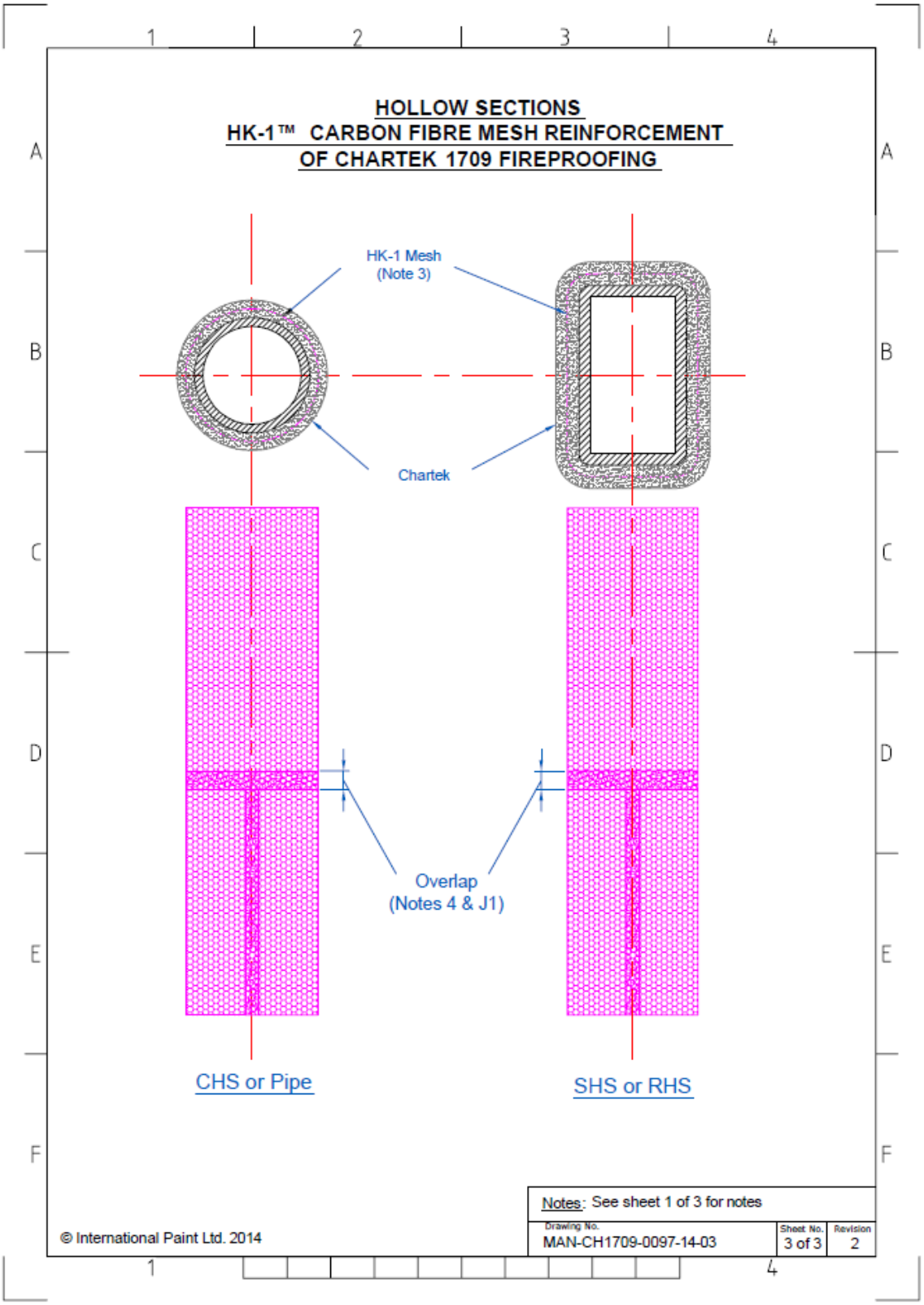





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APPENDIX B – Technical Note TN/F/CT/104

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Technical Note TN/F/CT/104_Rev.2
19/04/13

# Guidance Notes for Maximum Overcoating Intervals of all Qualified Primers

## Introduction

Chartek passive fire protection can be applied over a range of freshly applied pre-qualified primers, which have the correct properties for adequate adhesion.

Pre-qualified primers, which have undergone a degree of weathering, (e.g. atmospheric exposure/UV exposure) can result in these properties becoming compromised and adequate adhesion not being achieved. In this sense, Chartek fire protection behaves similarly to a solvent free epoxy type system and, as such, care must be taken to ensure adequate adhesion.

For zinc rich primers, International Paint advise that best performance will be achieved if the Chartek is applied within 5 days of application of the actual primer.

For zinc rich primers with epoxy tie coat, and epoxy primers direct to steel, it is advised that best performance will be achieved if the Chartek is applied within 3 weeks of application of the primer.

If these intervals are exceeded, it is strongly recommended that field trials are undertaken to fully evaluate the condition of the primer surface prior to full Chartek application. Ideally, this should be done via an adhesion test patch in addition to an overall visual inspection.

## Adhesion Test Patch

An adhesion test patch can be realistically evaluated using a sharp edged tool such as a scraper or chisel in combination with a hammer. The Chartek material should first be hand applied to the surface to give approximately 1-2mm thickness and allowed to cure to a hard film. It is recommended that Chartek is allowed to cure for 7 days at a minimum temperature of 10°C (50°F). See Photos 1 and 2 (soft films can give erroneous results).

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The adhesion should then be evaluated by attempting to remove the Chartek using the sharp edged tool almost parallel to the primer/Chartek interface at the edge of the test patch area. A degree of force may be required via the use of a hammer.

The mode of failure is the important issue here. This type of testing can be subjective at times. However, it is important to interpret the results via mode of failure and the 'ease' (if any) at which the Chartek can be removed from a leading edge. See Photos 3, 4 and 5. Where primer/Chartek adhesion is shown to be poor, in-house lab tests have indicated that a **very thorough sanding down** followed by a **very thorough fresh water wash down** can improve primer/Chartek adhesion. Alternatively the primer may be sweep blasted and re-primed, if necessary. Where 'sweep blast' (brush-off) is defined as removal of all loose coating and the surface is cleaned with abrasive blast.

Suitable abrasive paper grades for this type of work are P100 and P120. Water pressures should be adequate enough to remove any loose debris and dust following the sanding operation.



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Photo 1



Photo 2



Photo 3


Photo 4


Photo 5

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APPENDIX C – Technical Note TN/F/CT/101

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Technical Note TN/F/CT/101_Rev.0
12/11/04

# Disposal of Chartek Mixed (Cured) Material

This Technical Note addresses the procedure for the disposal of Chartek Parts A and B when mixed, that is cured material.

In the first instance, the local authorities under whose jurisdiction the disposal of waste materials fall should be consulted as local regulations may differ in various parts of the world and within different regions of a country. Additionally, disposal regulations are constantly being changed or amended and the following can only be considered a guide.

Mixed, that is when cured, Chartek material may be incinerated and disposed of in a land-fill site.

Chartek's constituent components Parts A and B when mixed and cured are classified as non-flammable and non-hazardous, and contain no toxins that would prevent land-fill disposal.

Should there be components of Parts A and B they should be mixed together and allowed to cure. All excess of each component should be removed from containers and the work site. The solid material is classified as non-flammable and non-hazardous.

After a fire charred material may also be treated in the same way, as above.

There are no specific requirements for protective clothing. However, it is recommended that as a precaution, during disposal, personnel wear overalls, gloves and a mask.

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APPENDIX D – Technical Note TN/F/CT/151

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Worldwide Protective Coatings
Technical Note TN/F/CT/151_Rev.0
21/03/07

# Replacement of Damaged or Failed FP Systems with Chartek®

It is sometimes requested that Chartek, an epoxy intumescent fire protection (FP) material, is used to replace damaged or failed FP systems. Additionally, the FP may be required to extend, using Chartek, where the adjacent material is not Chartek but is also an epoxy intumescent material produced by another manufacturer. In such cases, this procedure is equally applicable.

In all cases, the adjacent material to which Chartek is to be applied shall be in good condition and fit for its intended fire resistance rating. All damaged or failed material shall be removed. Removal should be in strict compliance with the instructions of the manufacturer of the damaged or failed material.

Regardless of whether the identified fire type is hydrocarbon pool or jet fire, the abutment detail, as shown in drawing number TCN-CHX-0070-07-01 Rev1, shall remain the same. The minimum Chartek thickness and reinforcement arrangements with the relevant classification societies' certification.

Drawing number TCN-CHX-0070-07-01 Rev1 (forming part of this Technical Note) shows the Chartek abutment detail that shall be used.

Surface preparation, primer details, Chartek application, reinforcement, topcoat, etc shall be strictly in accordance with the current Chartek Application Manual.

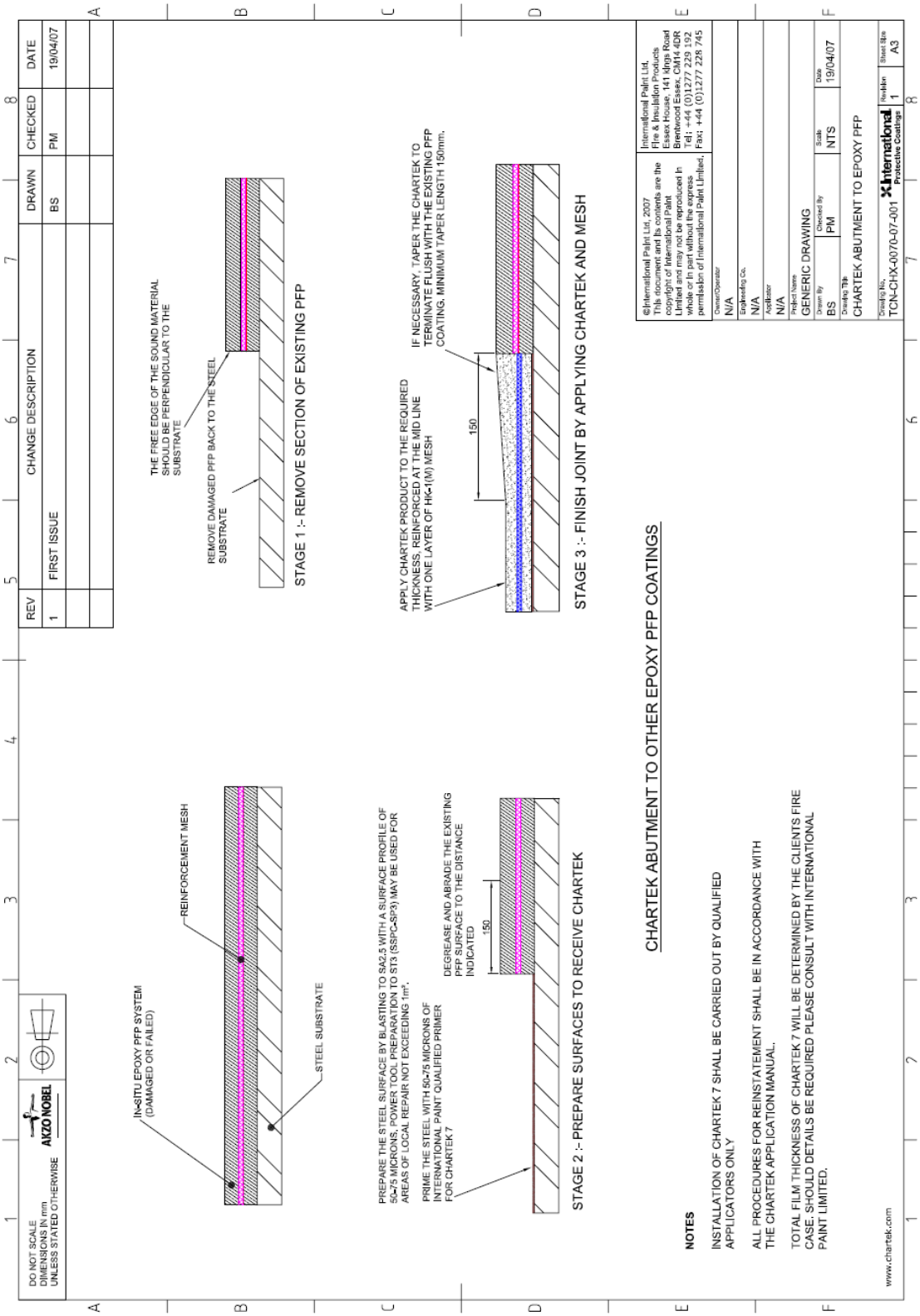
It is the responsibility of the applicator to ensure that the correct detail is being adopted and is suitable for the Chartek and adjacent material.

International Paint should be consulted in all cases.

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APPENDIX E – Technical Note TN/F/CT/085

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Technical Note TN/F/CT/085_Rev.5
14/03/14

# Abutment to cured Chartek, reinforced by HK-1 carbon fibre/glass fibre mesh, with fresh Chartek

## Introduction

In repair applications and procedures where Chartek passive fire protection material is to be installed, either to a steel substrate or existing cured Chartek, and abutted to existing cured and/or aged Chartek material, the process should be carried out in the following stages:

## Chartek Applied Over and Adjacent to existing (cured) Chartek

### Stage 1

All defective material shall be removed and the substrate prepared and primed in accordance with Stage 2 below. Only fully cured Chartek and Chartek that is tightly adhering to the substrate shall remain in place. All topcoat and any other material, that Chartek will not adhere to and to which the freshly applied Chartek will be located, must be removed.

Surface damage

There are cases where it is not necessary to remove all existing Chartek to expose the steel substrate.

- Chartek that is damaged only at the surface (e.g. small chips not reaching the mesh or where the Chartek that has charred above the mesh leaving unreacted Chartek surrounding the mesh).
- If the mesh is damaged by a single defect, but the area is less than 3000mm$^2$ (circle diameter of 60mm) and the single defect is not on an edge (i.e. flange tip). In such cases it is acceptable to reinstate the existing Chartek specification with new material for both pool fire and jet fire scenarios.

Loose Chartek must be removed to expose undamaged or non-reacted and sound material. The surface of the Chartek, to receive additional Chartek material, must be clean, dry and free from contaminants. The Chartek should be sanded to roughen the surface and loose material removed. The material thickness of the new material shall be in accordance with the design or certified thickness. Where

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damage is more extensive – multiple damage within 3000mm² (circle diameter of 60mm) or damage on edges – the following procedures should be undertaken:

Damage proximal and below the mesh

*Chartek Non-Jet Fire Applications – See attached Drawing No. GEN-CHX-0128-14-01_REV2*

Existing tightly adhering Chartek material should be chamfered at its edge to at least a 45° angle. The surface of the Chartek to receive additional Chartek material must be clean, dry and free from contaminants. The Chartek should be removed by mechanical means such as a disc grinder. For such application no pins are required. No mesh overlap is required for small damaged areas. Where the area of damage is greater than 150mm diameter then repair as per Jet Fire Applications is to be employed with a step back at the mesh layer greater than 50mm.

*Chartek Jet Fire Applications – See attached Drawing No. GEN-CHX-0129-14-01_REV5*

Removal and chamfering of Chartek is as for Non jet fire applications.

To achieve the jet fire specification for the Chartek thickness and reinforcement mesh (HK-1), the sound Chartek must be removed to a depth that enables both layers of HK-1 mesh to be within the mid-third of the overall thickness, to minimum distance of 150mm from the defect, taking care not to damage the existing reinforcement of the Chartek. Where required the thickness of Chartek should be increased to facilitate the mesh placement in the middle third of the overall film thickness.

## Stage 2

The substrate steelwork to which the Chartek material is to be applied shall be prepared, cleaned and primed in accordance with all specifications and documents relating to the project and in particular with reference to the current Chartek Application Manual.

## Stage 3

The replacement Chartek shall be applied by standard application procedures to approximately mid-depth of the specified thickness. For jet fire design where the existing Chartek has been recessed, the replacement Chartek shall be applied to a depth of approximately the same as the existing reinforcement mesh. Reinforcement mesh may now be installed. (Note: For 1 hour fire duration and thickness less than 7mm no mesh is required for Chartek 1709, 8)



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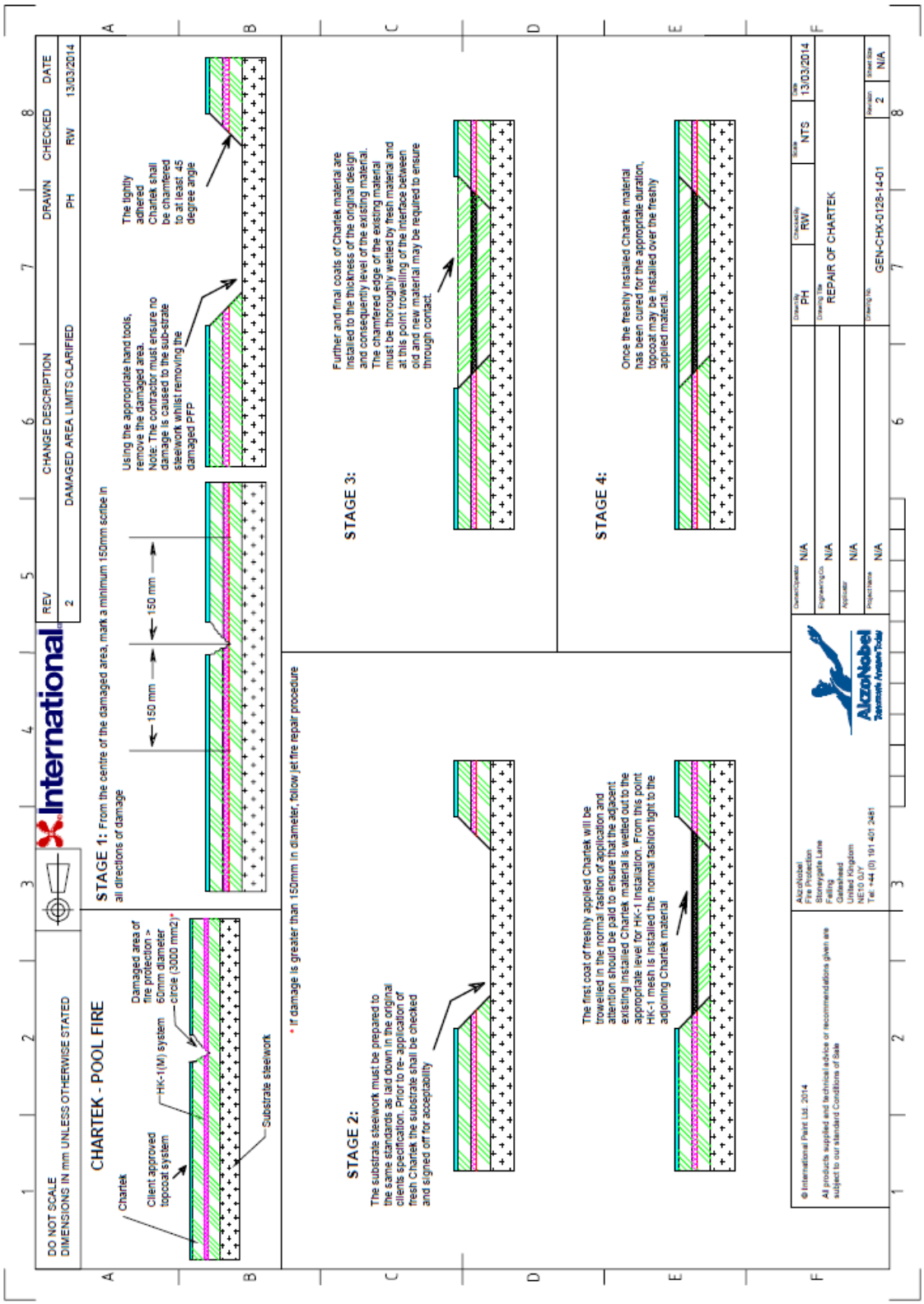
Further and final coats for Chartek material shall be installed to reinstate the thickness to that of the original design and consequently level of the existing material. The chamfered edge of the existing material must be thoroughly wetted by fresh material and at this point trowelling of the interface between old and new material may be required to ensure thorough contact and to achieve the appropriate level. It shall be ensured that the new Chartek is worked firmly to the existing material by trowelling and rolling.

### Stage 4

Once the freshly installed Chartek material has been cured for the appropriate duration, topcoat may be applied, blending into previously installed material and topcoat, ensuring that any interface area of new to old topcoat is clean, dry, free of contaminants and suitable for the overcoating process.



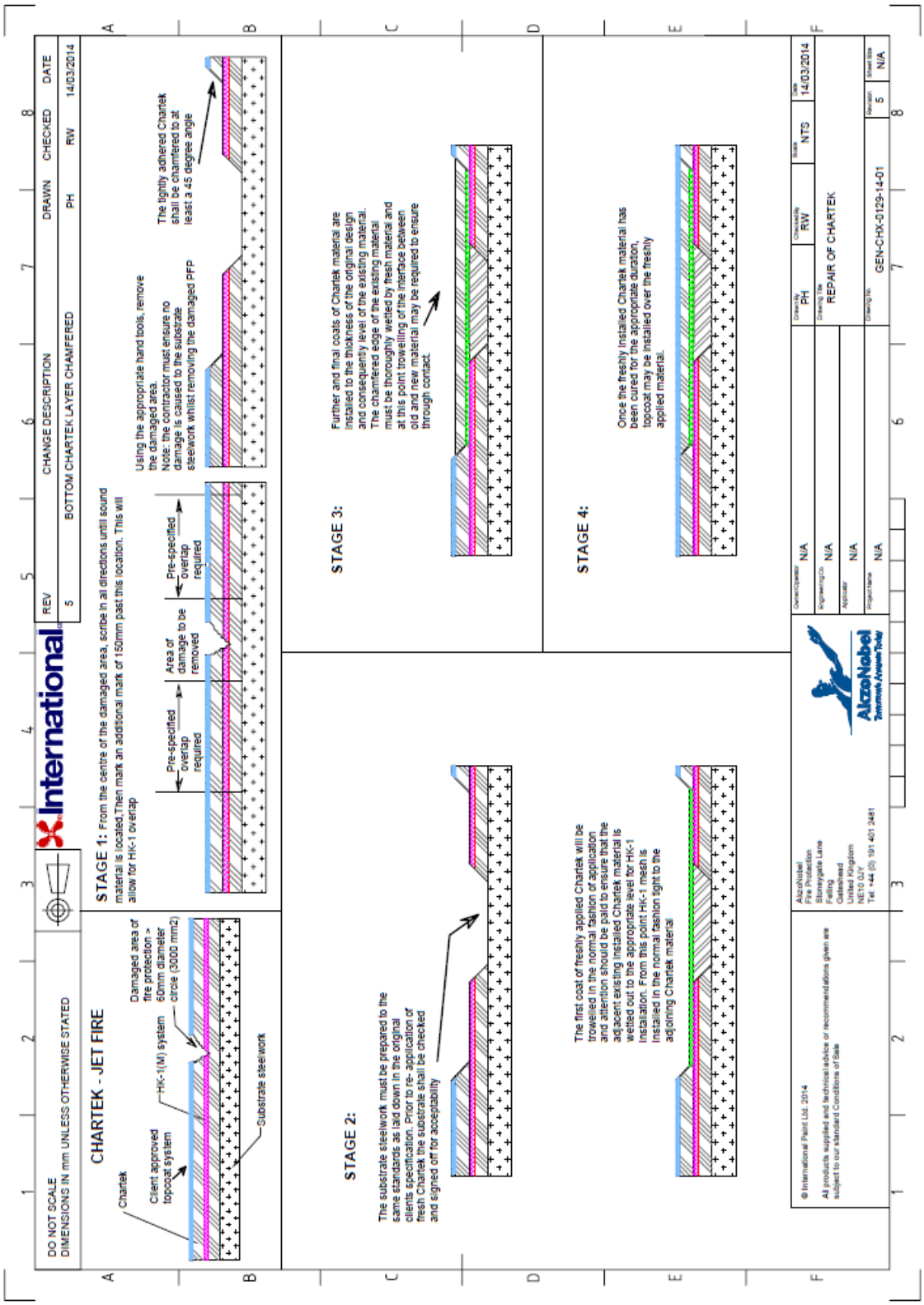
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# APPENDIX F – Technical Note TN/F/CT/148

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Technical Note TN/F/CT/148_Rev.1
03/05/12

## Chartek Abutment to Concrete

It is sometimes requested that Chartek is used to replace damaged concrete, or the extent of the fire protection is to be extended with Chartek where the existing fire protection is concrete.

**In all cases, the adjacent concrete shall be in suitably good condition and fit for its intended fire resistance rating.**

Regardless of whether the identified fire type is a hydrocarbon pool or jet fire, the abutment detail of Chartek to concrete shall remain the same.

Drawing GEN-CHX-0069-07-001 (forming part of this Technical Note) shows the Chartek to concrete abutment details that are "not acceptable" and the "recommended" approach.

The Chartek thickness, other than in the immediate vicinity of the joint, shall be commensurate with the fire type, fire duration and limiting core temperature of the substrate. The Chartek thickness will normally be supported by classification society "Fire Approval" certification.

Surface preparation (including the upstand when fitted), primer details, Chartek application, reinforcement, topcoat, etc shall be strictly in accordance with the current Chartek Application Manual.

It is the responsibility of the applicator to ensure that the correct joint detail is being adopted and is suitable for the Chartek and adjacent material.

International Paint should be consulted in all cases.

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Technical Note TN/F/CT/148_Rev.1
03/05/12

# Addendum to TN/F/CT/148

## Background

Technical note TN/F/CT/148 and drawing GEN-CHX-0069-07-001 provide International Paint recommendations for abutment to concrete/cementitious PFP with Chartek epoxy intumescent for repair scenarios where the existing PFP has failed.

## Technical Basis for TN/F/CT/148

Concern has been shown that there is little evidence of proof or performance for the fire protection of safety-critical items of plant offshore where this protection may be a combination of cementitious-type materials and epoxy intumescent, concern arising from their different insulation mechanisms in fire and their interaction. These scenarios are typically found where failing cementitious is replaced or repaired using an epoxy intumescent.

So that design recommendations can be made and supported by third party authorities, a joint-industry collaborative project was undertaken by MMI Engineering, and sponsored by the UK Health and Safety Executive, BP, Centrica Energy, Canadian Natural Resources, Marathon, Total and Shell to evaluate repair procedures where abutments to existing cementitious are made with epoxy intumescent. The method for evaluating the abutments involves exposing the materials to a jet fire test in accordance with ISO 22899-1. Chartek 7 was used in these tests.

A 12mm thick layer of Chartek 7, representative of a typical design for providing 60 minutes protection to a division (140°C max temp rise) or max 400°C rise in a load bearing structural member, was applied to a standard jet fire box to evaluate abutment on a flat plate and web edge section to a 38mm thickness of cementitious PFP material. 3 join methods were evaluated, butt joins, stepped joins and chamfered joins. The resulting jet fire tests confirmed that either stepped or chamfered joins give adequate performance when compared to a 'continuous' Chartek layer, but that due to the enhanced performance of the chamfered join on the more onerous web edge, this would give the most robust performance in jet fire and forms the HSE report recommendation for abutments between Chartek 7 and cementitious PFP materials.

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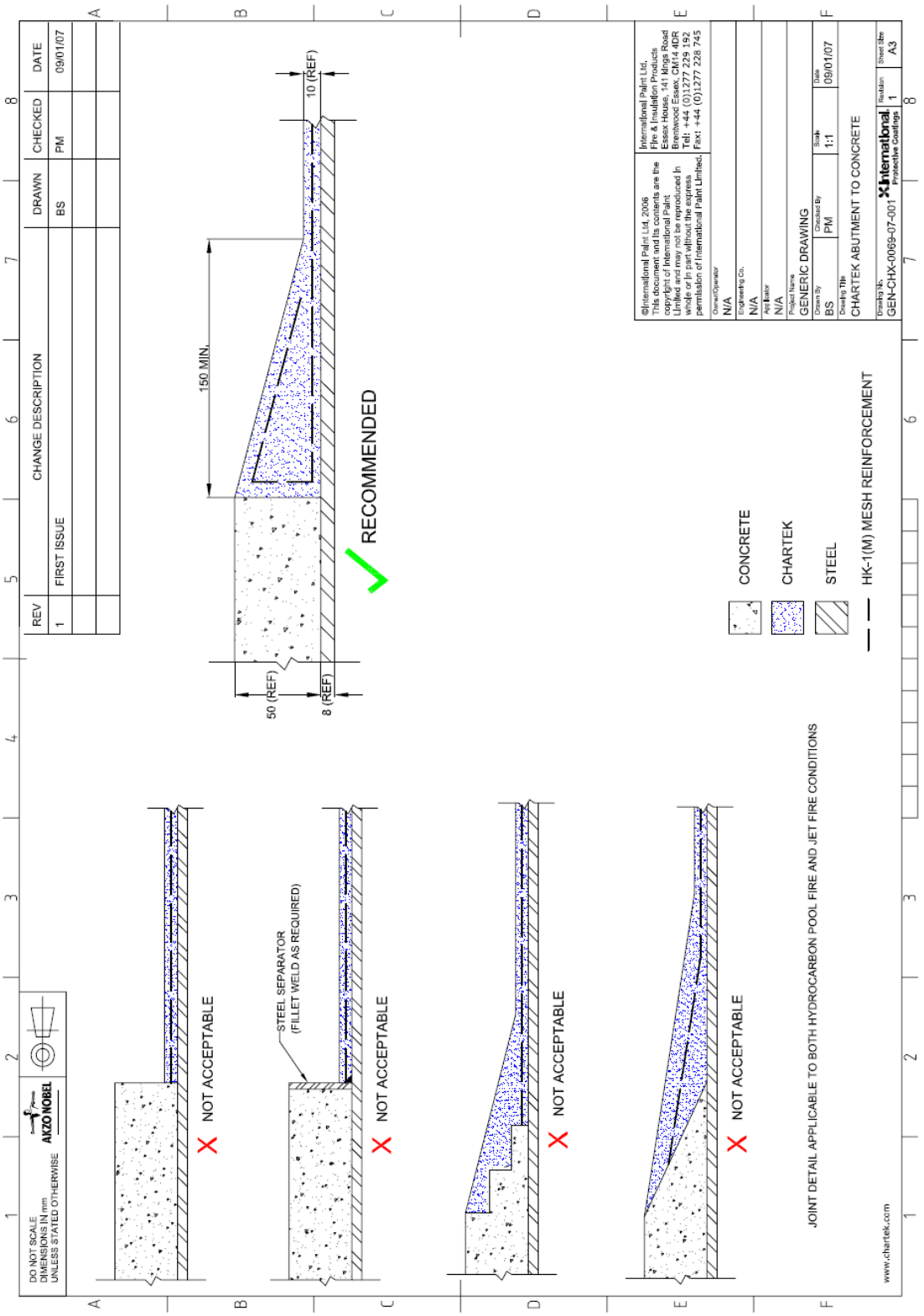
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This test programme has been used to produce the HSE Information Sheet, 12/2007, 'Advice on acceptance criteria for damaged Passive Fire Protection (PFP) Coatings'.

International Paint has applied for and is awaiting design approval from Lloyds for this method when repairing damaged or failed cementitious with Chartek 7.

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APPENDIX G – Technical Note TN/F/CT/207

International.

Worldwide Protective Coatings
Technical Note TN/F/CT/207_Rev.1
22/11/12

# Use of Water-Jetting to Remove Virgin and Charred Chartek

## Introduction

Although there are many methods to remove Chartek, however many of these are either not sensitive enough to selectively remove required areas (i.e. charred areas) or to safely encapsulate light and powdery residue (i.e. post reacted Chartek).

Water-jetting offers benefits in these areas, although not as productive as dry grit blasting or as selective as heat induction methods.

## Procedure for using High Pressure Water-jetting for removal of Chartek

*Water Jetting Equipment Required*

Optimum pressure: 30,000 psi; Optimum flow rate: 7 gpm.

*Containment of Debris*

Cover the ground underneath the material to be removed and surrounding area with a containment mesh and/or containment liner to collect debris during the removal process. Refer to Technical Note TN/F/CT/101 for disposal information.

*Material Removal*

Loosely adhered fireproofing and char can be removed with a water pressure ≤15,000 psi. Remove remaining intact char and un-intumesced material with Ultrahigh-Pressure Water-jetting conforming to NACE No. 5 / SSPC-SP12 UHP WJ 2/M (>30,000 psi). No corrosion inhibitors are to be used in the water. Inhibitors may leave a deposit on the metal surface which can interfere with adhesion of the coatings. The existing fire protection material must be completely removed from the surface revealing substrate outlined in the application manual prior to the reinstallation of Chartek. Areas of Chartek not damaged by fire may be feathered back using UHP equipment. Prior to re-installing Chartek to the correct thickness all surfaces must be the same colour as virgin Chartek with no browning evident.

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*Repair*

Allow the steel to dry. Remove excessive flash rusting by wire brushing. Surface to be primed with an acceptable primer; Interseal 670HS is recommended at 75 -125 microns (3 -5 mil) thickness. The repair system is to be installed in accordance with Technical Notes TN/F/ CT/085 and TN/F/CT/151.

## Case History

*Test Location*

Aquablast Corp., 77 Orchard Rd. Ajax, Ontario

*Substrates*

Three W10 X 49 columns 10 ft long were coated with Chartek 1709 at 12, 16 and 20 mm, respectively. The specimens were exposed to fire per RWS time/temperature curve for 30 minutes before the test was terminated. Specimens were shipped to the above test location for the removal of char using UHP water jetting. (See SSPC-SP 12/NACE No. 5, WJ 2)

*Water Jetting Equipment Used*

Jetech 150J 3 W-UH 40K pumping unit powered by 175 hp Deutz Turbo Diesel

Jetech lance with self rotating nozzle head with three 0.021 sapphire nozzles

Ultra High Pressure Water Jetting with a max pressure of 40,000 psi.

Optimum pressure: 30,000 psi; Optimum flow rate: 7 gpm.

*Material Removal*

Aquablast started the removal process using High Pressure Water Jetting with water pressure of approximately15,000 psi to remove loose char on the 20 mm specimen (practice specimen). After seeing what affect it had on the intact char and un-intumesced material, pressure was then increased to 30,000 psi Ultra High Pressure Water Jetting. A second trial was done with a rotary nozzle but was not as effective as the standard nozzle. Aquablast recommended that 30,000 psi at 7 gpm was the optimum pressure and flow rate to remove the Chartek. Higher pressures would only stress their equipment with no increase in productivity.

The bottom two feet of the columns were not affected by the fire test and, as such, the Chartek was harder to remove. Removal on the outside flange for the first top half of the 16 mm specimen (600 sq in



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area) was done in approximately 2 minutes. Bottom half of the outside flange (600 sq in area) took approximately 6 minutes. Removal of intact Chartek was performed in a sweeping motion resulting in layers of material being removed. The motion is required in order to disbond the unreacted Chartek from the steel.

The following link will take you to the video page.
http://www.greenmanvideo.com/html/chartek_part_1.html

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APPENDIX H – Technical Note TN/F/CT/009

International

Worldwide Protective Coatings
Technical Note TN/F/CT/009_Rev.4
11/01/13

## Heat Bridging and Coatbacks

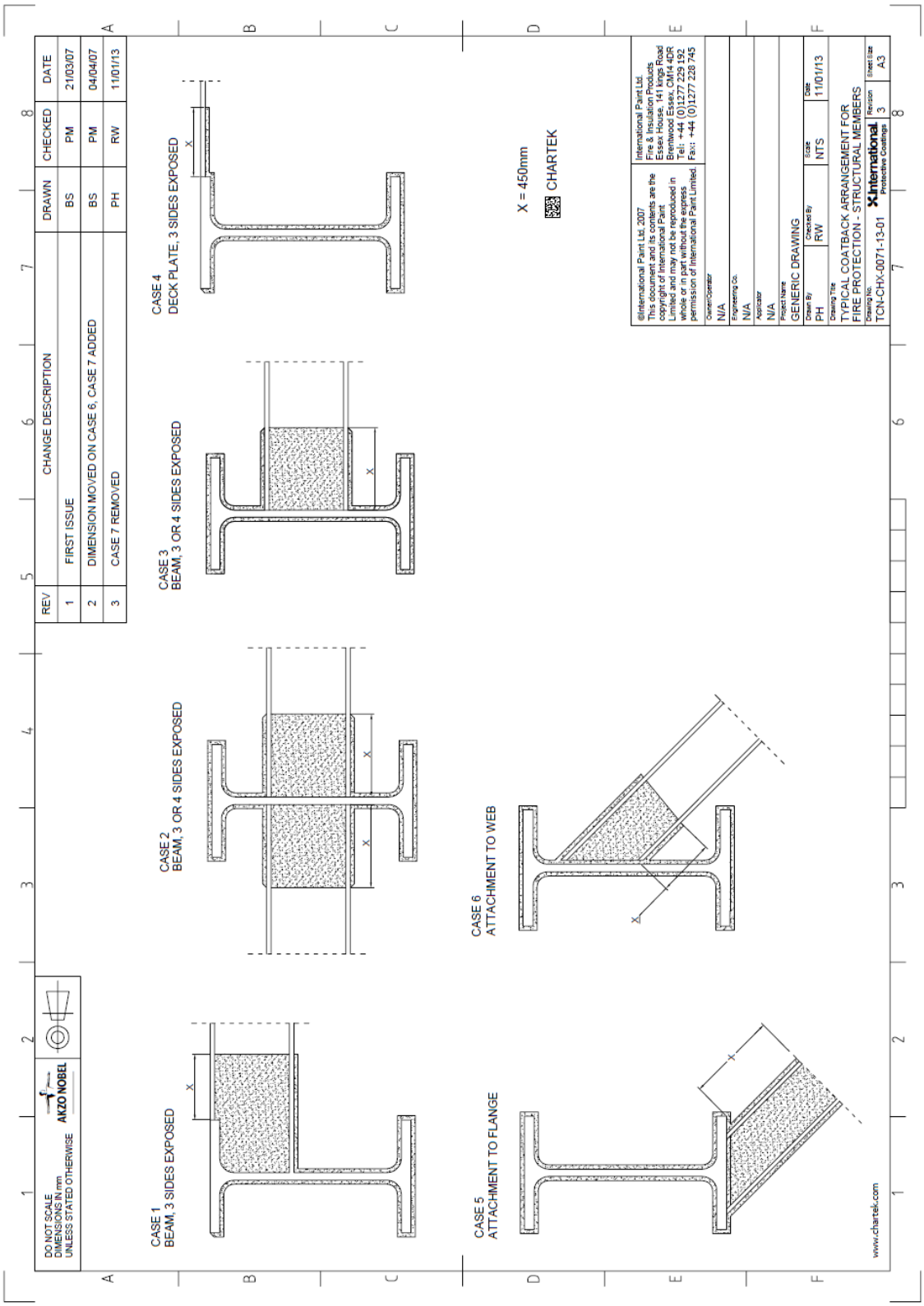
| | SOURCE |
|---|---|
| Where fire divisions are pierced for passage of:<br>• electric cables;<br>• pipes;<br>• trunks;<br>• structural members;<br>Or other purposes, the arrangements should be such to ensure that the fire resistance is not impaired. | HSE<br>Offshore Installations;<br>Guidance on design;<br>Construction & Certification |
| In approving structural fire protection details, the Administration shall have regard to the risk of heat transmission at inter-sections and terminal points of required thermal barriers. | SOLAS<br>Reg 26; 26.4;<br>(Part 3 Fire Safety Measures for Passenger Ships). |
| In the construction of any insulated 'A' class division, measures are to be taken to prevent the transmission of heat to uninsulated boundaries at the inter-sections and terminal points of the division by continuing the insulation along the horizontal and vertical boundaries for the distance stated on the Certificate of Approval for the material or, if no such distance is stated, for 450mm. | LR Rules & Regulations Ships:<br>Part 6, Chapter 4; 18.4.7. |
| In the construction of any insulated 'A' or 'H' class division, measures are to be taken to prevent the transmission of heat to uninsulated boundaries at the inter-sections and terminal points of the division by continuing the insulation along the horizontal and vertical boundaries for the distance stated on the Certificate of Approval for the material or, if no such distance is stated, for 450mm. | LR Rules & Regulations<br>Fixed Offshore Installations:<br>Part 8, Chapter 1, 3.2.6. |

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| | SOURCE |
|---|---|
| In the construction of any insulated 'A' class division, measures are to be taken to prevent the transmission of heat to uninsulated boundaries at the inter-sections and terminal points of the division by continuing the insulation along the horizontal and vertical boundaries for the distance stated in the Certificate of Approval for materials or, if no such distance is stated, for 450mm and 550mm respectively. | LR Rules & Regulations Mobile Offshore Units: Part 6, Chapter 4, 3.2.6. |
| 202 Heat transmissions at intersections and terminal points of required thermal barriers in fire rated divisions shall be specially considered. | DNV-OS-D301 Sec.1 |
| **Guidance Note:** Any such heat bridge should be insulated to the same rating as the thermal barrier for a distance of not less than 450mm. | |
| Structural fire protection details are to avoid the risk of heat transmission at intersections and terminal points of required thermal barriers. The insulation of a deck or bulkhead is to be carried past the penetration, intersection or terminal point for a distance of at least 450 mm in the case of steel and aluminium structures. If a space is divided with a deck or a bulkhead of "A" class standard having insulation of different values, the insulation with the higher value is to continue on the deck or bulkhead with the insulation of the lesser value for a distance of at least 450 mm. | ABS Rules for Building and Classing Mobile Offshore Drilling Units 2012, Part 5, Chapter 1, Section 1, 3.13 |
| **Drawing No. TCN-CHX-0071-07-01_Rev1 dated 21.03.07, which forms part of this Technical Note, shows typical coatback arrangements for the fire protection of structural members that are preferred by International Paint and are acceptable to the Classification Societies and Approval Authorities.** | Drawing No. TCN-CHX-0071-07-01_Rev1 dated 21.03.07 |



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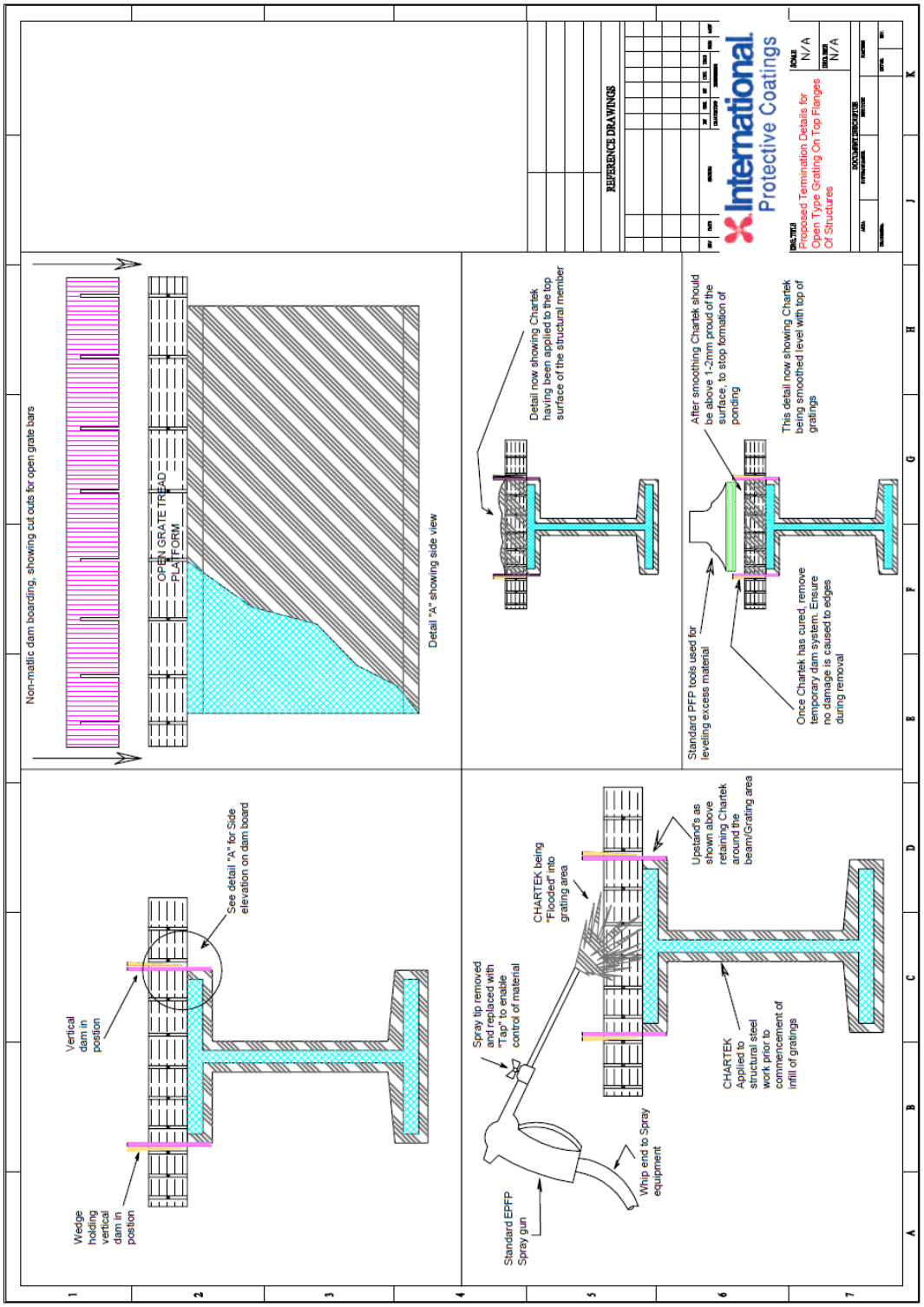



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# APPENDIX I – Grating detailing

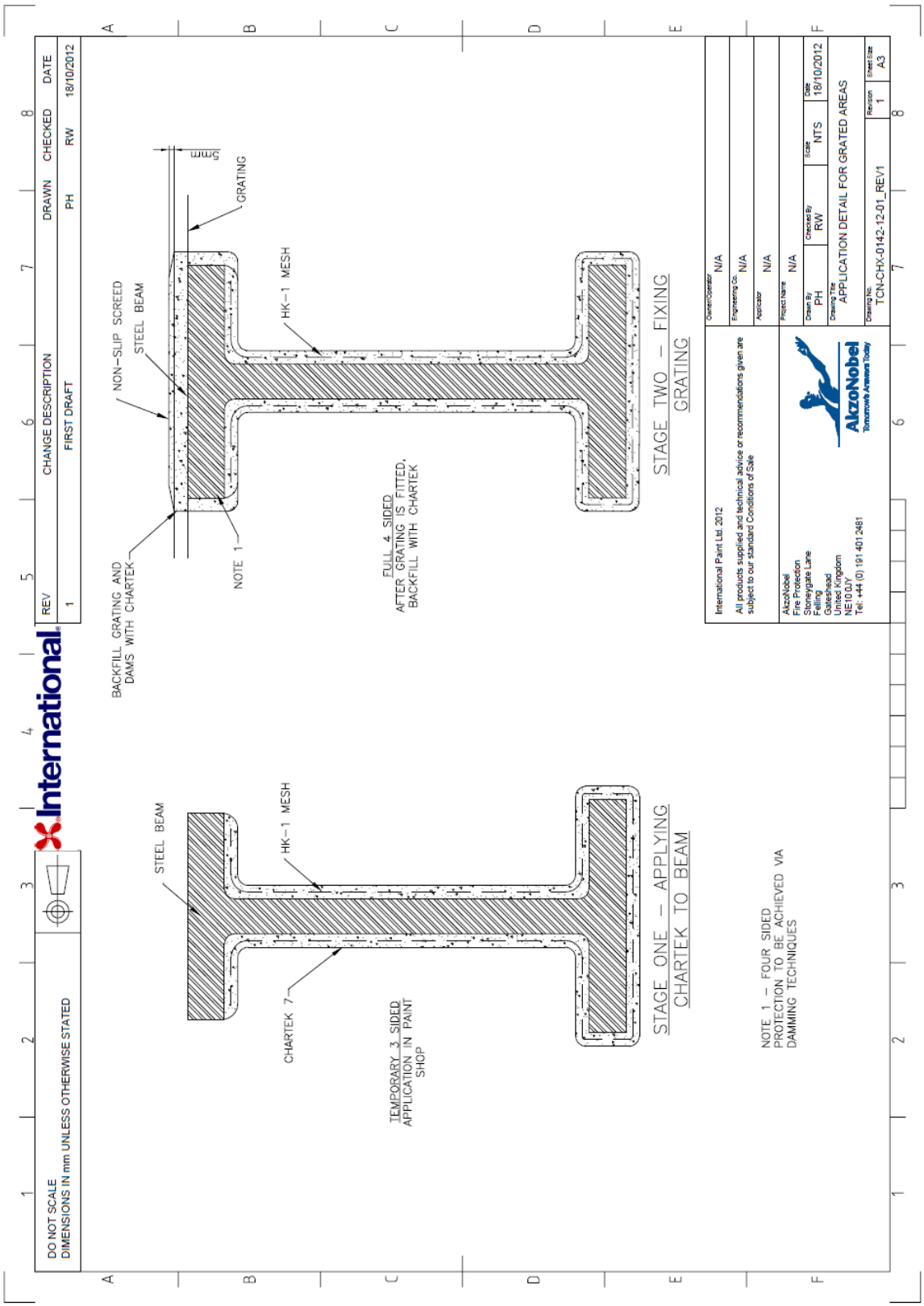





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# APPENDIX J – Definitions and Abbreviations

## Definitions and Abbreviations

International Protective Coatings

**FLASH POINT**

The minimum temperature at which a product, when confined in a Setaflash closed cup, must be heated for the vapours emitted to ignite momentarily in the presence of a flame (ISO 3679:1983).

**VOLATILE ORGANIC CONTENT (VOC)**

Volatile Organic Content (VOC) is the weight of organic solvent per litre of paint.

Legislative requirements differ from country to country, and from region to region, and are constantly being reviewed. Two values are quoted for VOC on the product data sheet which have been determined practically in the laboratory using the following published test methods:-

**UK - PG6/23(92), Appendix 3**

This test method was published in February 1992, by the UK Department of the Environment as part of the Secretary of State's Guidance Note (PG6/23(92)), issued as a guide to local authorities on the appropriate techniques to control air pollution, in order to achieve the objectives laid down in the Environmental Protection Act 1990. The method described in Appendix 3 includes guidance on the method of measuring VOC of coatings, as applied to demonstrate compliance with Clause 19 of the Guidance Note.

**USA - EPA Federal Reference Method 24**

The Environmental Protection Agency (EPA), published procedures for demonstration of compliance with VOC limits under Federal Reference Method 24 "The Determination of Volatile Matter Content, Density, Volume Solids and Weight Solids of Surface Coatings". This method was originally published in the Federal register in October 1980, and coded 40 CFR, Part 60, Appendix A, and amended in 1992 to incorporate instructions for detailing with multi-component systems, and a procedure for the quantitative determination of VOC exempt solvent.

It is recommended that users check with local agencies for details of current VOC regulations, to ensure compliance with any local legislative requirements when proposing the use of any coating.

**WORKING POT LIFE**

The maximum time during which the product supplied as separate components should be used after they have been mixed together at the specified temperature (ISO 9514:1922).

The values quoted have been obtained from a combination of laboratory tests, and application trials, and refer to the time periods under which satisfactory coating performance will be achieved.

Application of any product after the working pot life has been exceeded will lead to inferior product performance, and must **NOT** be attempted, even if the material in question appears liquid in the can.

**SHIPPING WEIGHT**

The shipping weights quoted refer to the total weight of the product supplied plus the weight of the can. These weights are quoted for individual components, and do not take into account any additional packaging weight attributable to cartons, etc.

**SHELF LIFE**

The shelf life quoted on the product data sheets is generally a conservative value, and it is probable that the coating can be applied without any deterioration in performance after this period has elapsed. However, if the specified shelf life has been exceeded, it is recommended that the condition of the material is checked before any large scale application is undertaken using materials beyond the quoted shelf life.

For further information consult International Protective Coatings.

**Important Note**

*The information given in this manual is for general guidance only and is not guaranteed as being wholly accurate or complete. Unless otherwise agreed in writing, all products supplied and technical advice given by us are subject to our standard conditions of sale, a copy of which is available upon request.*



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## Definitions and Abbreviations

**TOLERANCES**

The numerical information quoted in this data manual has been derived from laboratory test data obtained under controlled conditions for the products described. Whilst every effort has been made to ensure accuracy, this information will be subject to minor variations obtained in normal manufacturing tolerances, and any fluctuations in ambient conditions during the application and curing periods.

**GLOSS LEVEL**

Typical gloss values have been determined in accordance with ISO 2813:1978 using a 60° gloss head. The categories used in the data sheet are:

| Finish (Sheen) | Gloss (60° Head) |
|---|---|
| Matt | 0-15 |
| Eggshell | 16-30 |
| Semi-Gloss | 31-60 |
| Gloss | 61-85 |
| High Gloss | >85 |

In practice, the level of sheen and surface finish will be dependent upon a number of factors, including application and the condition of the surface to be overcoated.

**DRY FILM THICKNESS (DFT)**

The measured thickness of the final dried film applied to the substrate.

**WET FILM THICKNESS (WFT)**

The initial thickness of the wet coating applied to the substrate.

**VOLUME SOLIDS**

The volume solids figure given on the product data sheet is the percentage of the wet film, which remains as the dry film, and is obtained from a given wet film thickness under specified application method and conditions. These figures have been determined under laboratory conditions using the test method described in the Oil & Colour Chemists (OCCA) Monograph No. 4 - Determination of the Solid Content of Paint (by Volume). This method is a modification of ASTM D-2697 which determines the volume solids of a coating using the recommended dry film thickness of the coating quoted on the product data sheet, and a specified drying schedule at ambient temperature, i.e. 7 days at 23°C ± 1°C.

**DRYING TIME**

The drying times quoted in the product data sheet have been determined in the laboratory using a typical dry film thickness, the ambient temperature quoted in the relevant product data sheet, and the appropriate test method, i.e.

Touch Dry (ISO 1517-73)- The surface drying state of a coating when Ballotini (small glass spheres) can be lightly brushed away without damaging the surface of the coating.

Hard Dry (ISO 9117-90) - The condition of the film in which it is dry throughout its thickness, as opposed to that condition in which the surface of the film is dry but the bulk of the coating is still mobile.

This through drying state is determined by the use of a "mechanical thumb" device which, when applied using a specified gauge, under specified pressure, torsion and time, does not mark or damage the film.

The drying times achieved in practice may show some slight fluctuation, particularly in climatic conditions where the substrate temperature differs significantly from the ambient air temperature.

**OVERCOATING INTERVAL**

The product data sheet gives both a "minimum" and a "maximum" overcoating interval and the figures quoted at the various temperatures are intended as guidelines, consistent with good painting practices. Certain terms require elaboration as follows:

**Minimum**

The "minimum overcoating time" quoted is an indication of the time required for the coating to attain the necessary state of dryness and hardness to allow the application of a further coat of paint. It assumes:

(i) the coating has been applied at the normal recommended thickness.



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(ii) environmental conditions both during and after application were as recommended for that particular coating, especially in respect of temperature, relative humidity and ventilation.

(iii) the paint used for overcoating is suitable for that purpose.

(iv) an understanding of the "method of application". For example, if a coating can be applied by both brush or spray it is expected that overcoating may be carried out more rapidly if sprayed and it is the "lowest" figure that is quoted.

If the above conditions are not met, the quoted minimum overcoating times are liable to variation and will invariably have to be extended.

**Maximum**

The "maximum overcoating time" indicates the allowable time period within which overcoating should take place in order to ensure acceptable intercoat adhesion is achieved.

**Extended**

Where an "extended" overcoating time is stated, the anticipated level of intercoat adhesion can only be achieved if:

(i) the coating has been applied in accordance with good painting practices and at the specified film thickness.

(ii) the aged coating has the "intended" surface characteristics required for long term overcoatability. For example, an over-applied epoxy MIO may not have its usual "textured" surface and will no longer be overcoatable after ageing unless it is abraded.

(iii) the condition of the coating to be overcoated must be in intact, tightly adherent, clean, dry and free from all contaminants. For example, the rough textured surface of an MIO may require "extensive" cleaning, especially in an industrial and/or coastal environment.

(iv) coatings having a glossy surface which could have a detrimental effect on the adhesion of subsequent coats should be treated by light surface abrasion, sweep blasting, or other suitable processes which will not cut through or detract from the performance of the underlying coating.

It should be recognised that the level of intercoat adhesion obtained is also dependent upon the chemistry of the "topcoat". By their nature, primers or undercoats with acceptable pigment levels will have inherently better adhesion than finish coats with lower pigment contents.

The measurement of ultimate "adhesive strength" can often be a difficult process, and interpretation of results can be subjective. Excellent adhesion does not necessarily mean good performance, nor does relatively poor adhesion necessarily mean poor performance.

Although the adhesion of coatings applied to aged/cured coatings may be deemed satisfactory for the specified end use, actual numerical values obtained for adhesion may be less than with coatings applied within "minimum/short" overcoating intervals. For further additional information on individual products, or coating schemes, consult International Protective Coatings.

Although the adhesion of coatings applied to aged/cured coatings may be deemed satisfactory for the specified end use, actual numerical values obtained for adhesion may be less than with coatings applied within "minimum/short" overcoating intervals. For further additional information on individual products, or coating schemes, consult International Protective Coatings.



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# APPENDIX K – Examples of plural application equipment known to be suitable for field application

Depending on the specific factors of an application, the stated optimum density (SG of 1.0 g/cm$^3$) and other key physical properties can be achieved when applied with the appropriate plural spray equipment by a Qualified Applicator.

International Paint has demonstrated this applied density consistently in application trials as part of product evaluation.

Since the introduction of Chartek the product has been applied in many environments. It is the sole responsibility of the Qualified Applicator to ensure that their plural spray application equipment is suitable for the specific job, and it is also the sole responsibility of the Qualified Applicator to ensure that:

- Equipment used for application of product is designed for application of two component epoxy intumescent products and at the appropriate mix ratio for the product to be applied; and
- The equipment is operated at the optimum settings, regularly monitored, to achieve consistent application at the design parameters, this includes final applied density and mix ratio within the required limits.
- The equipment is appropriately maintained

Over several years of field experience with Chartek, International Paint recognise that due to differences in equipment and equipment operating processes, as well as application environment and production rates, the density of applied product can vary, and on occasion the stated optimum applied density may be exceeded.

Consequently Qualified Applicators are encouraged to ensure that equipment is fit for the intended purpose and operated at the optimum settings to achieve the optimal applied density. It is the sole responsibility of Qualified Applicators to satisfy themselves of the practical applied density of Chartek utilising their chosen application equipment when considering material consumption for a Chartek project.



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Plural equipment

| Manufacturer | Equipment model | Contact |
|---|---|---|
| Spray Pump Inc. | SP5000 Fireproofing Systems | 719 East Pierce St.<br>Baytown, TX 77520<br>Tel: 281-422-0319<br>Fax: 281-420-2384<br>Contact: Willie Harrington |
| Spray-Quip, Inc. | 398105C | 1754 Des Jardines<br>Houston, TX 77023<br>Tel: 713-923-2771<br>Fax: 713-923-7822<br>Contact: Herb Chilman |
| WIWA | Wiwa 333 duo mix | 107 N. Main St.<br>P.O. Box 398<br>Alger, OH 45812<br>Tel: 419-549-5180<br>Fax: 419-549-5173<br>Contact: Jeffrey Wold<br><br>Wilhelm Wagner GmbH & Co. KG<br>Gewerbestraße 1–3<br>D-35633 Lahnau, Germany<br>Tel: +49 6441 609-0<br>Fax: +49 6441 609-50<br>E-mail: info@wiwa.de<br>Internet: www.wiwa.com |
| Covercat | Covercat 352, 452 | Hyperion Equipment Ltd.<br>Unit 5 Orde Wingate Way<br>Primrose Hill Industrial Estate<br>Stockton-on-Tees |



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| | | |
|---|---|---|
| | | TS19 0GA.<br>UK<br>Tel: +44 (0) 1642 672 661<br>E-mail: sales@covercat.com |
| ECCO Finishings | Model Type 2K HV-PFP Fixed Ratio. | Ecco Finishing Supplies Ltd<br>*Unit 5 6, Letitia Industrial Estate*<br>*Middlesbrough, Cleveland, TS5 4BE*<br>01642 245 595<br>01642 219 760 |
| GRACO | "GRACO XM PFP sprayer" with part number 262869 | Worldwide Headquarters<br>Graco Inc.<br>88-11th Avenue N.E.<br>Minneapolis, MN 55413<br>Tel: 612-623-6000 Fax: 612-623-6777<br><br>Graco N.V.<br>Industrieterrein-Oude Bunders<br>Slakweidestraat 31<br>3630 Maasmechelen<br>Belgium<br>Tel: 32 89 770 700<br>Fax: 32 89 770 777 |

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