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Intertherm 3070 Application Guidelines

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SCOPE AND PURPOSE

The International Paint Application Guidelines have been produced and revised in line with the Worldwide Protective Coatings Product Range. The purpose of the guidelines is to ensure that complex subsea equipment is adequately protection against corrosion through careful application of Intertherm 3070. Successful in-service performance depends upon following the correct guidelines for surface preparation and paint application.

The responsibilities for achieving the specific standards outlined, and for carrying out surface preparation and paint application, rest with the Contracting Company. Under no circumstances do these responsibilities rest with International Paint. We will generally provide for the presence of a Technical Service Representative at key stages during the performance of the contract. The role of the International Paint Technical Service Representative is advisory only unless otherwise specified in the terms and conditions of the contract. The information contained herein presents guidelines for the application of Intertherm 3070 to subsea equipment and piping.

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1. SPECIFICATION

1.1 Surface Preparation

In common with most protective coatings schemes, the performance level of Intertherm 3070 is ultimately determined by degree of surface preparation. The higher the degree of surface preparation achieved, the greater the potential for long-term performance. For optimum performance, all surfaces to be coated should be clean, dry and free from contamination including dirt, salts, oil and grease.

Prior to paint application all surfaces should be assessed and treated in accordance with ISO 8504:2000. Where necessary, remove weld spatter and smooth weld seams and sharp edges (see Appendix 1).

To achieve optimum protection with Intertherm 3070 the allowable salt contamination level is a maximum of 5µg/cm² (50mg/m²), in order to prevent premature failure due to osmotic blistering.

All steel surfaces to be coated should be correctly prepared prior to application of the coating system. Abrasive grit blast the steel to be coated to a minimum of ISO Standard 8501-1:2007 Sa2½ or SSPC SP10. A sharp and angular surface profile of between 50 and 75 microns (2-3mils) is required.

1.2 Typical Specifications

Three coat system:

<u>Coat</u>	<u>Product</u>	<u>DFT (microns)</u>			<u>DFT (mils)</u>		
		Spec	<i>Min</i>	<i>Max</i>	Spec	<i>Min</i>	<i>Max</i>
Full	Intertherm 3070	120	<i>100</i>	<i>150</i>	4.8	<i>4</i>	<i>6</i>
Full	Intertherm 3070	120	<i>100</i>	<i>150</i>	4.8	<i>4</i>	<i>6</i>
Full	Intertherm 3070	120	<i>100</i>	<i>150</i>	4.8	<i>4</i>	<i>6</i>

Two coat system:

<u>Coat</u>	<u>Product</u>	<u>DFT (microns)</u>			<u>DFT (mils)</u>		
		Spec	<i>Min</i>	<i>Max</i>	Spec	<i>Min</i>	<i>Max</i>
Full	Intertherm 3070	175	<i>115</i>	<i>225</i>	7	<i>4.6</i>	<i>9</i>
Full	Intertherm 3070	175	<i>115</i>	<i>225</i>	7	<i>4.6</i>	<i>9</i>

It should be noted that stripe coating is also recommended for this type of coating. Stripe coats are commonly used to build up film thickness in hard to reach areas. The number of stripe coats may vary depending on item complexity. See also Section 4.11.

It is the responsibility of the applicator to achieve the correct DFT.

To meet the requirement for Norsok M-501 Edition 6 System 7-C or DNV RB-401 (design of cathodic protection) the total DFT must be 350 microns (14 mils).

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1.3 Over-coating Intervals

The tables below detail the over-coating intervals for a three- or two-coat system where stripe coats are included; the application can be carried out beginning with a stripe coat OR a full coat but the total time for over-coating remains the same. The times given are the minimum intervals that coats should be allowed to cure before the next application step is carried out:

Three-coat system:

	10°C	15°C	25°C	40°C
Application step:	Allow to cure for:			
Stripe coat	6 hours	2 hours	1 hour	1 hour
Full coat 1	30 hours	25 hours	15 hours	10 hours
Stripe coat	6 hours	2 hours	1 hour	1 hour
Full coat 2	30 hours	25 hours	15 hours	10 hours
Full coat 3	n/a	n/a	n/a	n/a
Total time required for over-coating	72 hours	54 hours	32 hours	22 hours

Two-coat system:

	10°C	15°C	25°C	40°C
Application step:	Allow to cure for:			
Stripe coat	6 hours	2 hours	1 hour	1 hour
Full coat 1	30 hours	25 hours	15 hours	10 hours
Full coat 2	n/a	n/a	n/a	n/a
Total time required for over-coating	36 hours	27 hours	16 hours	11 hours

The use of stripe coats is recommended for this product. In the event that stripe coating is not practiced, over-coating intervals will be further reduced.

Refer to the Intertherm 3070 datasheet for pot life and curing requirements.

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2. ENVIRONMENTAL CONDITIONS FOR APPLICATION

Intertherm 3070 may be applied at ambient temperatures down to 10°C (50°F).

- Prior to application Intertherm 3070 should be at a minimum temperature of 15°C (59°F).
- During application and up to the first 48 hours after application of the final coat, the steel temperature must be a minimum 10°C (50°F)
- During application and up to the first 48 hours after application of the final coat, the relative humidity must not exceed 50% for temperatures in the range 10-20°C (50-68°F), or exceed 80% for temperatures greater than 20°C (68°F). Good practice is to monitor conditions throughout the day.
- Application should not take place when the surface temperature is less than 3°C (5°F) above the dew point.
- Dehumidification, air conditioning and/or heating equipment may be necessary to control environmental conditions but care should be taken when choosing heating methods, as some heaters can increase the local relative humidity.

For application at temperatures higher than 40°C (104°F), consult your regional International Paint Technical Department.

3. TECHNICAL INSPECTION

All parties involved in the coating work must agree an inspection procedure prior to work commencing; this should outline how and when both work and inspection will be undertaken. Prior to commencing the project, the contractor(s) must be provided with copies of the relevant product data sheets. Attention should be drawn to pack sizes, mix ratios, thinning restrictions, required application conditions etc. Inspection equipment for measurement of profile depth, humidity, wet and dry film thickness, etc., should be of suitable type and should be within calibration limits.

Measurement of dry film thickness is described in ISO Standard 2808:1991 - Method 6A or SSPC PA2.

Holiday testing should be carried out after DFT verification to ensure the coating is free from voids according to NACE SP0188-2006 Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.

Curing

The fully cured coating system should be uniform in colour and gloss and be free of any runs, sags, porosity, pinholes, fisheyes, soft spots and debris.

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4. GENERAL NOTES

4.1 Steel Condition

Before work commences it is essential that equipment and piping are clean, dry and in a condition suitable for surface preparation and application of the Intertherm 3070 system. The following minimum requirements apply:-

- Oil and grease must be removed from all surfaces to be coated.
- Any hot work or welding must be completed before surface preparation commences.

4.2 Steelwork Preparation

Preparation grades of welds, cut edges and surface imperfections are described in ISO 8501-3. Preparation to P3 grade of this standard will provide surfaces which will ensure optimum paint performance. Please see Appendix 1 concerning rectification of fabrication faults.

4.3 Heating

If heating is necessary to satisfy the painting specification, it should be by means of a heat exchange system, i.e. air should not pass directly through a combustion chamber.

4.4 Lighting

Lighting during painting must be electrically safe and provide suitable illumination for all work. As a general guide, lighting may be considered suitable if this text can be read at a distance of 30 centimetres from the eye.

Ideally, the lighting should be powerful mains supplied spotlight with background lighting on at all times in the interests of safety. Powerful mains spotlighting must be provided when inspection work is being carried out.

4.5 Storage of Product at Point of Application

Unmixed material (in closed containers) should be stored in dry, shaded conditions away from sources of heat and ignition. Intertherm 3070 should be brought up to 15°C (59°F) prior to mixing and application.

4.6 Weather Shelters

Weather shelters should be made available to cover application equipment during mixing and application of material. This should also prevent contamination from entering the area where application is underway.

4.7 Abrasive Grit Blasting

The steel surface should be grit blasted to a minimum standard ISO 8501-1:2007 Sa2½ or SSPC SP10.

Air used for blasting must be clean, oil free and dry. The pressure should be at least 7kg/cm² at the nozzle.

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Abrasives used for blasting must be dry and free from dirt, oil, and grease and suitable for producing the standard of cleanliness and profile specified. The abrasive must therefore be in accordance with the specifications given in ISO 11126 - Parts 1 to 8 and each delivery should carry a certificate of conformity to this specification.

If blasting abrasive is supplied on site without a certificate of conformity, the material should be tested by the yard or contractor in accordance with the methods given in ISO 11127 - Parts 1 to 7.

Particular attention should be given to ISO 11127 - Part 6, where the level of water soluble contaminants must not give a conductivity value greater than 25mS/m, and ISO 11127 - Part 7, where the level of water soluble chlorides must not exceed 0.0025% by weight.

Iron or steel abrasives can be used for in-situ open blasting. Specifications for metallic abrasives are given in ISO 11124 - Parts 1 to 4 and the corresponding test methods in ISO 11125 - Parts 1 to 7. If used, careful and thorough cleaning must be carried out at all stages of the operation to ensure that no abrasive remains on the steel as this may subsequently corrode. Non-metallic abrasives **must** be used for stainless steel surfaces.

Measurement on site of the blast profile should be by profile gauge or other mutually agreed instruments.

Measurement of surface profile using comparators is described in ISO 8503-2. A medium 'G' type comparator should be used and a value of 55-95 microns (2.2 to 3.8 mils) is acceptable when measured by:

ISO 8503-3: Focusing microscope

ISO 8503-4: Stylus

When using a needle gauge such as the Elcometer 123, a value of 75-100 microns (3 – 4 mils), taking a maximum of 10 determinations, is ideal.

4.8 Cleaning

Prior to initial blasting inspection, the bulk of spent grit should be removed. Any substandard areas should be identified and should be brought up to the specified standard.

Following provisional approval of the blast standard, **ALL** remaining traces of grit and dust should be removed from all areas by vacuuming; sweeping alone is not acceptable. Blowing down with compressed air is not recommended due to the potential for contamination.

Final approval of a substrate for coating application should be confirmed after final cleaning.

4.9 Mixing

The material (Part A, Resin) should first be pre-mixed in its own container to ensure proper dispersion of contents. Scraping the sides and bottom of the container is required. The hardener component, Part B, should then be combined with the resin component, Part A. This can be carried out in the container product is supplied in. The combined components should be thoroughly mixed until uniform throughout. Excessive rpm's will induce air into the mixture and is not recommended. The temperature of the material should be monitored during mixing.

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4.10 Paint Application

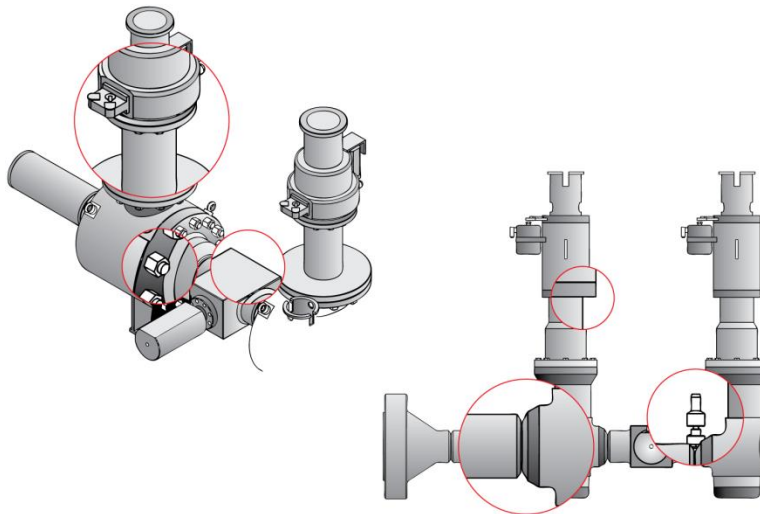
The available air pressure and capacity for spray equipment should be at least 5.5kg/cm² and 1.4m³/min (80 psi and 50cfm). It is recommended that airless spray pump ratios of 40:1 or greater should be used.

Tips should be the size stipulated on the product technical data sheet or as agreed with the International Paint representative on site. In general it is recommend that a smaller tip is used for painting complex areas as this helps reduce the likelihood of excessive DFT building up.

4.11 Stripe Coating

Stripe coating is an essential part of good painting practice. Typical areas where stripe coats must be applied include edges, welds, seam areas, areas of difficult access, nuts and bolts and small fitments of awkward configuration. In general, stripe coats should be applied by brush or roller.

Note: The above list is not comprehensive. Typical key areas requiring stripe coating are indicated below:



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5. REPAIR PROCEDURES

Under this heading are repairs to areas damaged either at the initial coating stage or prior to entering service. In general, a minor repair will relate to an area of less than 1m² (or 5% of the total) but this will depend on the specific contract, and equipment size and nature of the damage. Principal requirements are:

The area to be repaired must be fresh water washed and dry.

Remove any corrosion by means of hand tools, i.e. disc sander and grinder to effectively roughen the coating surface to SSPC SP11 standard. Abrade the area immediately surrounding the repair to provide a key for subsequent paint application. Apply the paint system in accordance with the guidelines. If small areas are involved and application is by brush, several coats may be required to achieve the correct dry film thickness.

To repair an area of equipment that does not meet minimum thickness or exceeds over-coating interval, brush-off blast, abrade (coarse grit), or grind the affected area to remove gloss and obtain a suitable surface roughness profile. Feather edges of repair site to achieve a smooth transition between repair and surrounding coating. Clean to remove any dust or debris prior to re-coating and solvent wipe. Allow solvent to evaporate. Apply Intertherm 3070 by airless spray or brush (depending upon the size of the affected area) to obtain the proper thickness or to cover any discontinuities.

Holiday testing should be carried out after DFT verification to ensure the coating is free from voids according to NACE SP0188-2006 Discontinuity (Holiday) Testing of New Protective Coatings on Conductive Substrates.

Disposable solvent resistant brushes 2.5 to 10cm (1 to 4 inches) in width should be used for touch-ups and hard to reach areas only.

6. HEALTH & SAFETY*

*The following safety information is given for guidance only. It is imperative that, prior to the commencement of any coating project, local Regulations regarding Health and Safety be consulted.

6.1 Introduction

The solvent vapour and aerosol droplets/particulates produced during airless spray and curing of this material may form an explosive mixture with air and additionally may contain materials which may necessitate personal protection against potential health hazards. A summary of the main precautions to be taken includes:-

- Assessment of risk of explosion or fire
- Provision of a suitable breathing environment for workers.
- Prevention of skin irritation problems.

6.2 Elimination of Ignition Sources

Safety is the overriding consideration with this type of coating work, and the Site Safety Department must be made fully aware of all aspects of the operation.

In enclosed areas, welding, cutting or grinding in the immediate vicinity should be forbidden until paint fumes are totally dispersed. Lights, including hand torches, must be certified by the manufacturer as flash proof and suitable for use in solvent laden atmospheres.

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Smoking must be prohibited in the area or near to extraction systems.

No electrical junction boxes should be allowed in the area where application is carried out.

Airless spray equipment must be earthed (because of the danger of static electricity build-up). Mobile telephones, electrical cameras, and any equipment that is not intrinsically safe, must not be used in the area or near to extraction systems.

6.3 Solvent Vapour and Paint Mists - Protection of Painting Personnel


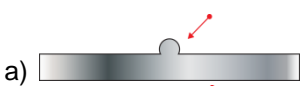


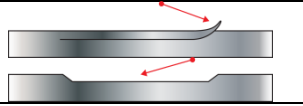
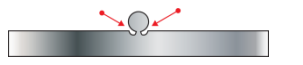
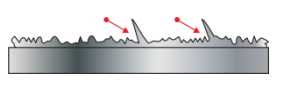

No ventilation system can reduce solvent vapour levels to below the Occupational Exposure Limit for solvents whilst coating is in operation. In enclosed areas, painters should, therefore, wear air fed hoods or pressure fed masks with additional eye protection. (Please note: air fed hoods which provide a curtain of air across the visor are available. These help to prevent settlement of spray mist on the visor). Normal protective clothing must be worn, e.g. overalls, gloves, and suitable footwear of non-spark type.


6.4 Skin Irritation

Any small areas of skin not protected by clothing, e.g. wrists or neck, can be treated with a non-greasy barrier cream. (Petroleum jelly is not recommended as this can assist the transport of solvents into the skin). Any areas of skin accidentally contaminated with paint must be thoroughly washed with soap and water. A skin conditioner that is designed to replace the natural oils in the skin can be used.

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APPENDIX 1 – FABRICATION RECTIFICATION

Item	Problem & solution	
Sharp Edge	Remove sharp edges or gas cutting edges with grinder or disc sander to achieve a radius of 1.5mm-2.0mm	
Weld Spatter	<p>a) Remove spatter observed before blasting by grinder, chipping hammer etc.</p> <p>b) For spatter observed after blasting: Remove with chipping hammer /scraper etc. Where spatter is sharp, use disc sander or grinder until obtuse</p> <p>c) Obtuse spatter – no treatment required</p>	<p>a) </p> <p>b) </p> <p>c) </p>
Plate Lamination	Any lamination to be removed by grinder or disc sander	
Undercut	Where undercut is to a depth exceeding 1mm and a width smaller than the depth, repair by welding or grinding may be necessary	
Manual Weld	For welding bead with surface irregularity or with excessive sharp edges, remove by disc sander or grinder	
Gas Cut Surface	For surfaces of excessive irregularity, remove by disc sander or grinder	

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