

Intertherm 181

Working Procedures

1. INTRODUCTION

Intertherm 181 is a “zinc free” inorganic silicate topcoat for use as part of a coating system over inorganic zinc silicate primers. In common with other silicate technologies, it cures by reaction with atmospheric moisture and confers enhanced corrosion protection and heat resistance properties at temperatures up to 400°C (752°F), and intermittent temperature surges up to 500°C (932°F).

Intertherm 181 is very much a specialist product that looks and behaves differently to the usual, more conventional, products used for high temperature applications. In addition, because of its ‘niche’ nature, most applicators will not have had previous experience in handling and applying this product on large scale complex structures.

This document gives detailed guidance on the use and application of Intertherm 181 and should be read in conjunction with the Intertherm 181 technical data sheet and material safety data sheet.

2. WHERE TO APPLY INTERTHERM 181

Most Intertherm 181 is applied at site. All applications should be carried out under cover, and appropriate arrangements made for handling and storage of coated steelwork.

Intertherm 181 and zinc silicate primer are capable of application in the steel fabrication shop or at an applicator’s works, provided that sufficient time is allowed for through drying (hard dry) before handling. Care should be taken during transport and erection to minimise damage.

3. SURFACE PREPARATION

Intertherm 181 should always be applied over a recommended anti-corrosive coating scheme which provides the required degree of corrosion protection to the steel surfaces. A list of compatible coatings is provided on the Intertherm 181 technical data sheet. Due to the use of this product at high “in-service” temperatures, these products are limited to inorganic zinc primers such as Interzinc 12 or Interzinc 22. For the use of other primers, please consult International Protective Coatings.

All surfaces to be coated should be clean, dry and free from contamination. Prior to paint application all surfaces should be assessed and treated in accordance with ISO 8504:1992.

Where necessary, remove weld spatter, and where required smooth weld seams and sharp edges.

All steel surfaces to be coated should be correctly prepared prior to application of the coating system. For suitable primers such as Interzinc 12 or Interzinc 22 this normally entails abrasive blast cleaning to Sa2½ (ISO 8501-1:1988) or SSPC-SP6 prior to application. In both cases, it is important to consult the relevant primer product technical data sheet for specific details of specification.

Prior to overcoating the inorganic zinc primer with Intertherm 181, one must ensure that:-

- Surface of the primer is clean, dry and free from contamination, soluble salts and zinc corrosion products. If necessary, the surface may require fresh water washing and scrubbing using bristle brushes.
- The zinc primer is fully cured.

For on site repair situations where the inorganic zinc primer shows extensive or widely scattered breakdown, or excessive zinc corrosion products, overall sweep blasting will be necessary. All weld seams and damaged areas should be blast cleaned to Sa2½ (ISO 8501-1:1988) or SSPC-SP6 and re-primed with the inorganic zinc primer.

Intertherm 181

Working Procedures

-
- 4. SURFACE PREPARATION – MAINTENANCE** Existing coating systems may be unsound, of unknown type, or be breaking down, and will have an unquantifiable effect on any subsequently applied coating system. Where such coatings exist, they should be removed by abrasive blast cleaning to Sa2½ (ISO 8501-1:1988) or SSPC-SP6, and the Intertherm 181 coating system re-applied.
-
- 5. STORAGE OF MATERIALS** Intertherm 181 should be stored in covered, dry conditions and kept in the temperature range of 0°C-40°C (32°F-104°F). Ideal application temperature is between 15°C and 25°C (59°F and 77°F), although it is feasible to apply at higher and lower ambient temperatures.
- At lower temperatures, material will become slightly thicker and may require warming up prior to application. At higher temperatures, materials will be more prone to settlement of the pigment, and when applied will flow more easily and dry faster.
-
- 6. STANDARD OF APPEARANCE** The appearance of Intertherm 181 may vary, depending upon the application conditions such as temperature and humidity, from a hard dry coating after 2 hours drying at high humidity to a softer coating which may take considerably longer to fully cure at low humidity and may, on occasion, be further characterised by a light, powdery surface deposit which can rub off.
- Intertherm 181 is not designed to provide a high degree of cosmetic appearance. Topcoats may be used in certain circumstances, consult International Protective Coatings.
-
- 7. ENVIRONMENTAL CONDITIONS FOR APPLICATION** Intertherm 181 cures by reaction with atmospheric moisture and, as such, environmental monitoring is essential for Intertherm 181 application and cure. The following parameters apply, and should be measured and recorded:-
- The surface onto which Intertherm 181 is to be applied must be clean, dry and free from contaminants.
 - Steel temperatures must always be 3°C (5°F) above the dew point.
 - Optimum conditions are those of high relative humidity, i.e. in excess of 65%. If relative humidity falls below 50%, then consideration should be given to raising the prevailing humidity by flooding the floor of the application area with water. Alternatively, hosing/spraying the surface of Intertherm 181 with water once the film has become surface dry – this process should start no later than 3 hours after completion of application.
- The characteristic appearance of the coating will depend on the cure conditions prevailing (see Section 6).
- Ambient conditions should be measured, in stable conditions, typically twice per day (or twice per shift). If conditions are subject to change, measurements should be taken, depending upon the speed of change.
-
- 8. MIXING OF INTERTHERM 181** This product is supplied in two components, a pigmented base component supplied in a drum, and a small volume of accelerator in a plastic bottle. The accelerator **must** be added to facilitate curing of this product.
- Due to the highly pigmented nature of Intertherm 181, sedimentation of the base component can occur over time and as a consequence of transportation, particularly where long distances are involved. Due to the fibrous nature of this material, it is not possible to sieve Intertherm 181, and therefore correct mixing is essential to ensure that all settled material is reincorporated before application is attempted.
- The importance of correct mixing cannot be over-emphasised.**
- Mixing must be carried out using mechanical mixers. These can vary from compressed

Intertherm 181

Working Procedures

air driven mixers for thin film coatings to paddle mixers for mixing heavy duty screeds. Site experience has shown that an air driven reversible drill, capable of achieving 800 r.p.m. and fitted with a suitable mixing blade (e.g. 3" Epimixer Blade, Ref. MR280B), will prove satisfactory for this purpose. It will be necessary to ensure that the air supply to the mixer is maintained at >75 p.s.i. to ensure that mixing efficiency is maintained.

The main points to remember when mixing Intertherm 181 are:-

- Do not mix more material than can be used within the pot life of the material.
- Open the base tin and pour off approximately two thirds of the superficial liquid to an empty, clean container.
- Thoroughly mix the base component until it is fully reincorporated.
- Slowly add the superficial liquid back into the base component with efficient mixing, ensuring that flooding does not occur.
- When the material is totally reincorporated and free from lumps, add the accelerator component slowly, making sure that it is thoroughly incorporated.
- Ensure that during the mixing of the material the sides of the containers are scraped to removed unmixed material from the sides. This should be done several times during the mixing operation.

Note: Intertherm 181 reacts with atmospheric moisture. Once the containers have been opened, it is recommended that the material be mixed and used soon as possible.

9. POT LIFE

With Intertherm 181 no significant increase in viscosity is observed after mixing, even after long periods. However, if the stated pot lives are exceeded, then the film formed on curing will have inferior properties and will not give the specified level of performance.

Intertherm 181 must not be applied after the stated pot life has been exceeded.

Pot life times for Intertherm 181 are as per below:-

10°C (50°F)	- 2 hours
15°C (59°F)	- 2 hours
25°C (77°F)	- 1½ hours
40°C (104°F)	- 1 hour

10. AIRLESS SPRAY APPLICATION OF INTERTHERM 181

Due to the product's fibre content and high 'structure' characteristics, which inhibit good flow, it is necessary to use a wide diameter paint line - ½ inch (12.5mm) is recommended with all inline filters removed.

Selection of the correct type of airless spray gun is important to achieving problem free application. The gun used should have the minimum amount of constrictions to paint flow, and preferably feed material close to the airless spray tip.

The preferred gun is a Silver Gun, Model 235-463, Series D (Graco), or an equivalent design where the paint is fed direct to the tip; alternative designs where paint is fed through the gun handle may result in dead spots developing, with consequent 'blockages' and 'packing' of the pigment occurring.

Tip size can be from a minimum of 19 thou (0.48mm) up to 30 thou (0.77mm), depending on application requirements, and also may be dictated by the occurrence of 'blocking'

Intertherm 181

Working Procedures

which can occur occasionally as a result of the fibrous nature of Intertherm 181 and therefore some content of oversize particles is considered normal.

Tip angles will depend on the profile and area of the steelwork to be sprayed but are preferable to be low, i.e. less than 50°, to assist better wet film formation and reduced potential overspray.

To enable optimum cure and film strength, it is necessary to apply a wet coat as free from overspray (dry spray) as possible by keeping the spray gun close to the substrate and using slow passes to give even coverage. If, due to the local environmental conditions and nature of the steel, dry spray is unavoidable this should be removed by dry brushing immediately before commencement of application to adjacent areas.

Although this product is designed for application direct from the tin without thinning in temperate conditions, under cold conditions or very warm conditions with hot steelwork it may be advisable to add thinners – up to a maximum of 10% by volume of International thinners, GTA007.

11. AIR SPRAY APPLICATION OF INTERTHERM 181

Conventional air spray with attached pressure pot should be through a DeVilbiss JGA gun, or an equivalent design with a 62 air cap and an AV-IS-AC fluid tip with a minimum of (71 thou (1.8mm) diameter, but preferably a 78 thou (2.0mm) diameter.

A½ inch (12.5mm) internal diameter paint line is recommended with all in-line filters removed. The pressure pot should have an internal paddle to enable continual stirring during spray application, and pot pressure should be kept as low as is possible.

When starting to apply, keep the fluid tip fully open at the commencement and adjust until optimum settings are obtained. In contrast to the airless spray method of application, due to the fluid tip size involved, no blockages should occur, providing the instructions for mixing have been carefully followed, but a greater tendency for dry spray formation will be apparent and the above comments concerning wet film formation are also valid – ventilation requirements and PPE should be carefully considered for this method of application.

Thinning requirements are as for airless spray with up to 10% required by volume of International thinners, GTA007.

12. INSPECTION OF DRY FILM

Once the coating has been allowed to dry, the integrity of the final film should be checked to monitor the effectiveness of curing, check for surface defects, and record film thickness. If defects are evident then the appropriate remedial measures should be taken.

Note: Intertherm 181 has not cured when it can be easily rubbed off down to the primer with only minimal finger pressure.

13. POSSIBLE FILM DEFECTS

The function of the Intertherm 181 is to provide corrosion protection to structures operating at high temperature. As these structures are often large, and complex in design, a number of potential film defects can occur. The manner of application should be such that these are avoided or minimised. A number of potential defects are detailed below, together with recommended remedial treatment.

Dirt Pick-up

Due to the highly pigmented nature of Intertherm 181, the final film has a degree of surface roughness which can, in certain circumstances, make it prone to dirt pick-up from air borne particulates and contaminates, e.g. dust, soot etc. While this does not cause any problems in terms of performance, cosmetic appearance may not prove acceptable if such films are to be permanently exposed.

Discolouration

Intertherm 181 has been designed as a functional coating to provide corrosion resistance

Intertherm 181

Working Procedures

in high temperature service. At temperatures greater than 250°C (482°F), certain shades may be prone to discolouration due to physical changes in the colouring pigments used. While this phenomenon may be an issue from a cosmetics standpoint, it will not be detrimental to anti-corrosive performance.

'Orange-peel' Difficult to avoid but can be minimised by good spray technique, thinning of the material and ensuring that the material is at a working temperature of 15°C-25°C (59°F-77°F).

*Overspray/
Dry Spray* Can be minimised by work planning and good spray technique, thinning, reduction of air pressure, increasing tip size and using less "passes" to achieve a wet film may assist. If the effect is severe, the surface must be cleaned by dry brushing prior to application to adjacent areas.

Pinholes May occur as a result of either application over zinc primers which show overspray/dry spray, and/or as a result of poor coalescence of Intertherm 181. Thinning Intertherm 181 may improve the degree of flow and hence reduce the degree of pinholing observed.

Ripples Can often be unavoidable on complex sections, but can always be minimised by good spray technique.

Sagging The result of excessive film thickness and poor spray technique. If the areas are greater than 100mm equivalent diameter, the coating should be removed and re-applied.

Soft Films Can occur when Intertherm 181 is applied in ambient conditions where the relative humidity during curing is less than 40%. Often films will become progressively harder with time, and provided care is taken to avoid mechanical damage, problems will be avoided.

Films which do not begin to show signs of becoming harder with time are indicative of lack of cure. This may be as a result of poor mixing, or even omission of the accelerator component. If this is suspected, the affected areas will require removal, and re-application of Intertherm 181.

Surface Cracking Can occur in excessively thick coats, especially in acute corners. If the cracks are of a hairline nature, similar to those seen in microscopic mudcracking of zinc silicate primers, confined to the surface, and cannot be observed by the naked eye at arms length, they are unlikely to cause problems in performance. However, if cracking is severe, and can be easily detected, due to delamination from the substrate, it will be necessary to completely remove the affected areas by abrasive blast cleaning, and re-application in accordance with the original specification.

14. MEASUREMENT OF DRY FILM THICKNESS An electronic d.f.t. gauge, capable of storing statistical data, is very strongly recommended, to enable a meaningful d.f.t. survey to be conducted. Gauges should be calibrated on smooth plate.

Method The thickness of the priming system must be measured and recorded prior to application of Intertherm 181. An average thickness must then be calculated, and subtracted from thickness readings taken after topcoat application.

Tolerances Specified thicknesses for Intertherm 181 are nominal, rather than minimum, values. There is no current industry standard for d.f.t. tolerances. In the absence of such a standard, the following tolerances per member are recommended:-

Individual dry film thicknesses of less than 80% of the nominal dry film thickness are not acceptable. Individual values between 80% and 100% of the nominal dry film thickness are acceptable, provided that the overall average (mean) is equal to or greater than the nominal dry film thickness.

Intertherm 181

Working Procedures

Care shall be taken to achieve the nominal dry film thickness and to avoid areas of excessive thickness. It is recommended that the maximum dry film thickness is not greater than 2 times the nominal film thickness. In the case of excessive maximum dry film thickness, expert agreement shall be found between the parties.

15. HANDLING OF INTERTHERM 181

Due to the low cohesive strength of this material in early stages of the cure process, greater care when handling is required. In order to minimise any damage if lifting is required in shop, steelwork should be moved by a crane using nylon slings, or padded strops as opposed to bare steel strops, chains etc.

If steel is being transported within 4 weeks of application, a similar procedure is advisable for handling on site with the use of padded strops etc., recommended.

16. REPAIR OF DAMAGE

Where mechanical damage is unavoidable, the following repair procedure should be adopted:-

- **Defective Topcoat Only**

In areas where the zinc primer remains intact, lightly sweep blast (SSPC-SP7) in order to remove the remaining topcoat and provide a degree of surface 'key' to the primer, then re-apply the topcoat as required.

Alternatively, abrade the defective area, wash down to remove all residual material and re-apply the topcoat as required.

- **Defective System**

For areas where the zinc silicate primer has been removed down to the steel surface, spot blast to Sa2½ and reinstate the full system as required.

Intertherm 181

Working Procedures

- 1. HEALTH & SAFETY** Intertherm 181 is intended for use only by professional applicators in industrial situations in accordance with the advice given in this leaflet and on containers, and should not be used without reference to the Material Health and Safety Data Sheets (MSDS) which International Protective Coatings has provided to its customers. If for any reason a copy of the relevant Material Health and Safety Data Sheets are not immediately available the user should obtain a copy before using the product.

Minimum safety precautions in dealing with all paints are:-

- Take precautions to avoid skin and eye contact (i.e. use overalls, gloves, goggles, face mask, barrier creams etc.)
- Provide adequate ventilation.
- If product comes in contact with the skin, wash thoroughly with lukewarm water and soap or suitable industrial cleaner. Do not wash with solvents. If the eyes are contaminated flush with water (minimum 10 minutes) and obtain medical attention at once.
- These coatings contain flammable materials, so keep away from sparks and open flames. Smoking should be prohibited in the area.

Observe all precautionary notices on containers.

Disclaimer

The information given in this sheet is not intended to be exhaustive and any person using the product for any purpose other than that specifically recommended in this sheet without first obtaining written confirmation from us as to the suitability of the product for the intended purpose does so at his own risk. Any warranty, if given, or specific Terms & Conditions of Sale are contained in International's Terms & Conditions of Sale, a copy of which can be obtained on request. Whilst we endeavor to ensure that all advice we give about the product (whether in this sheet or otherwise) is correct we have no control over either the quality or condition of the substrate or the many factors affecting the use and application of the product. Therefore, unless we specifically agree in writing to do so, we do not accept any liability whatsoever or howsoever arising for the performance of the product or for any loss or damage (other than death or personal injury resulting from our negligence) arising out of the use of the product. The information contained in this sheet is liable to modification from time to time in the light of experience and our policy of continuous product development.