Introduction

The following general application procedure is applicable to cryogenic vertical storage vessels supported on steel saddles or concrete plinths and shall be read in conjunction with the specific requirements of the client as detailed in the guideline specification prepared for the project.

For insulated steelwork, Promat FENDOLITE® MII is applied over the Foamglas and bonding to the vapour barrier is achieved by a keycoat. For uninsulated steelwork, Promat FENDOLITE® MII is applied over the primer and bonding is achieved by a layer of PROMAT® PSK 101.

Separate specifications for vessel skirt protection are available:

- Cryogenic (EIDS 007)

Unless directed to the contrary in this proposal, Promat FENDOLITE® MII shall be mixed and applied in accordance with the current Promat FENDOLITE® MII & FENDOLITE® TG Energy Industries Application Manual.

During the Promat FENDOLITE® MII application process the vessel should be loaded to its maximum limit on-line or loaded with an inert substance (water). The load should not be removed until at least 5 days after the final Promat FENDOLITE® MII application.

Priming requirements

To ensure long term corrosion protection of the vessel and its supports and unless noted otherwise in the specification, Promat recommend that all surfaces are blast cleaned to SA 2½ in accordance with SIS 05 59 00 : 1967 and are primed and painted with a two-pack epoxy system, applied and cured in accordance with the manufacturer's recommendations.

Inspection of the primed steel surface

All uninsulated steel surfaces to be protected shall be free from oil, grease, dirt, dust, grime or any other material likely to impair adhesion of either PROMAT® PSK 101.

Application of PROMAT® PSK 101

Apply one coat of PROMAT® PSK 101 to uninsulated primed steel surfaces at a wet film thickness of 100-150 microns (55-82 microns DFT) and allow to cure and dry. The purpose of PROMAT® PSK 101 coating is to create adequate bonding of the Promat FENDOLITE® MII to the primer.

Application of foamglas insulation

The calculation of the required foamglas insulation thickness is beyond the scope of this document and should be calculated / recommended by others. The thickness of insulation shall be sufficient to provide an interface temperature (foamglas / Promat FENDOLITE® MII) of at least 4 °C. Installation of the foamglas shall be carried out strictly in accordance with the manufacturers recommendations and be followed by a suitable vapour barrier.

Application of continuous keycoat

In order to protect the vapour barrier which must be applied over the thermal insulation, Promat require the application of a continuous keycoat to all insulated surfaces. The thickness of the Keycoat

shall be 6mm and is not included in the required Promat FENDOLITE® MII thickness. The Keycoat shall be made from Promat FENDOLITE® MII mixed with a 50 / 50 mixture of PROMAT® SBR Bonding Latex and potable water. Once applied, this coating shall be left for a period of 24 to 36 hours (dependent upon environmental conditions) before proceeding further.

Application of Promat FENDOLITE® MII collars and bands

The purpose of Promat FENDOLITE® MII collars and bands is to ensure that the wire reinforcement is consistently "stood off" the vessel and in the correct position.

To vessels on concrete plinths

Collars and bands shall be formed using Promat FENDOLITE® MII which shall be spray applied as a series of horizontal collars around the vessel from the top tan line to within 500mm of the base, at which point, vertical bands shall be spray applied from the base to join the lowest horizontal collar. Vertical bands shall also be spray applied on the dished end/domed top of the vessel to join the uppermost horizontal collar. The collar and vertical bands on the vessel body should be at 500mm – 1000mm centres, whilst the bands on the dished end (domed top) should be at 500mm centres.

The collars and bands should be 200 - 300 mm in width and may be levelled off (if necessary) to approximately 50% of the specified Promat FENDOLITE® MII thickness using a wooden float fitted with spacers or a suitable alternative. The collars/bands may be applied in more than one pass if necessary. The surface must be left with a rough texture. The Promat FENDOLITE® MII must be left for **at least 24 hours** to gain strength before proceeding further.

To vessels on support legs / columns

Collars and bands shall be formed using Promat FENDOLITE® MII which shall be spray applied as a series of horizontal collars around the vessel at 500mm – 1000mm centres. At the dished ends (domed top and bottom), the collars are replaced with vertical bands at 500mm centres.

The collars and bands should be 200 - 300 mm in width and may be levelled off (if necessary) to approximately 50% of the specified Promat FENDOLITE® MII thickness using a wooden float fitted with spacers or a suitable alternative. The collars/bands may be applied in more than one pass if necessary. Apply first coat of Promat FENDOLITE® MII to steel support legs. The surface of collars and bands and the first coat on the legs must be left with a rough texture. The Promat FENDOLITE® MII must be left for **at least 24 hours** to gain strength before proceeding further.

Installation of mesh retention system

Promat assume that welding is not permitted on vessels and therefore the mesh support system outlined below does not rely on welded fixings. The proposed system is based on the concept of a monolithic reinforcement of sufficient tensile strength to support the Promat FENDOLITE® MII with a safety factor. Promat FENDOLITE® MII bonds well to a variety of substrates but for calculation purposes, it has been assumed that Promat FENDOLITE® MII is not bonding to the vessel. The tensile strength of the Promat FENDOLITE® MII has also been ignored.

Mesh type

Promat recommend the use of 100mm x 100mm x 2mm galvanised hexagonal mesh. On support legs, Promat recommend the use of 50mm x 50mm PROMAT® Plastic Coated Galvanised Mesh, available in 1m x 25m rolls.

Installation of mesh

To vessels on concrete plinths:

- Prepare a top floating ring (nominal 0.3D circumference) from a single galvanised steel wire of diameter 5mm (wire strength 540N/mm²) which will be of sufficient strength to support the weight of the mesh plus any tensioning forces applied during installation of the mesh system.
- Attach 4 equally spaced lengths of mesh reinforcement to this ring using 1.6mm galvanised wire ties or galvanised hog rings at 150mm intervals ensuring a two mesh aperture overlap of the ring and drop the free ends to the vessel base.
- Using either a stainless steel strap and clip or galvanised wire, secure the mesh at the base by carefully tensioning the strap or wire on to the vertical collars previously applied. Excessive force is not required.
- Attach further lengths of mesh to the top and bottom rings and join to previously installed mesh (ensuring a two mesh aperture overlap is maintained) using 1.6mm galvanised wire ties or galvanised hog rings at 150mm centres on a staggered pitch, until all vessel surfaces are covered in mesh.

Note: Do not allow more than three layers of mesh to overlap at any one point.

To vessels on support legs/columns:

- Prepare two floating rings (nominal 0.3D circumference) from galvanised steel wire of diameter 5mm (wire strength 540N/mm²) which will be of sufficient strength to support the weight of the mesh plus any tensioning forces applied during installation of the mesh system.
- Place one ring on top of the vessel and attach at least 4 equally spaced drop wires to secure the bottom floating ring in place.
- Attach a length of mesh reinforcement to the top ring using 1.6mm galvanised wire ties or galvanised hog rings at 150mm centres ensuring a two mesh overlap, drop it down the vessel and secure in a similar fashion to the bottom floating ring and drop wires as required.
- Attach further lengths of mesh to the top ring, joining to previously installed mesh using 1.6 mm galvanised wire ties or galvanised hog rings at 150mm centres on a staggered pitch until all vessel surfaces are covered with mesh. Ensure a two mesh aperture overlap is maintained at all joins.
- Fit mesh reinforcement to steel support legs as required and overlap by two mesh apertures on to vessel mesh system securing with 1.6mm galvanised wire or galvanised hog rings.

Note: Do not allow more than three layers of mesh to overlap at any one point.

Refer to the following EIDS for more information on the protection of storage legs:

- Steel legs (EIDS 021)
- Stainless steel legs (EIDS 044)
- Concrete encased steel legs (EIDS 046)

Application of subsequent coat(s) of Promat FENDOLITE® MII

Mix and spray apply Promat FENDOLITE® MII in the normal manner to the specified thickness on the vessel and its supports. Application may commence at the base of the vessel and proceed upwards or may commence at the top of the vessel and proceed downwards, but it application commences from the top of the vessel, **it is essential that any day joints are cut back to create a positive rake of not less than 30°**. Where possible, the Promat FENDOLITE® MII should be applied as a single coat to the required thickness. It may be applied in more than one pass, however (i.e. a pass of material may be left for up to two hours to stiffen before application of another pass). If the material is allowed to set, the next layer is defined as another coat. The final coat shall be at least 8mm thick to avoid cracking.

Promat FENDOLITE® MII **must not be trowelled flush with the reinforcing mesh** as this can create a plane of weakness. The suggested finishing technique is to level the surface with a steel float to close down the surface.

Water shedding and sealing of Promat FENDOLITE® MII / steel junctions

Top surfaces shall be sloped to shed water. All terminations of Promat FENDOLITE® MII against steel must be sloped to shed water. Promat FENDOLITE® MII / steel junctions shall be sealed by cutting a 'U' into the material and applying a polysulphide or silicone based mastic sealer.

NOTE: Promat recommend that the mastic seal is not applied until after final surface treatment.

Final surface treatment

Promat propose that on curing and drying of the Promat FENDOLITE® MII, the surface is treated with a Promat approved topcoat paint system. The selected topcoat system must be applied strictly in accordance with the manufacturer's recommendations. It is necessary to maintain the correct environment conditions as stipulated in our current Promat FENDOLITE® MII & Promat FENDOLITE® TG Energy Industries Application Manual immediately before, during and after the particular application. Refer to Energy Industries Data Sheet EIDS 033 - Sikalastic (Decothane) Application Procedure.

NOTE: Ideally, all repair work should be carried out prior to application of the final surface treatment (refer to the current Promat FENDOLITE® MII & FENDOLITE® TG Application Manual).

The information given in this Application Procedure is based on practical experience, independent and other tests and represents, in Promat's opinion, the best technical advice available. Since the products are applied under circumstances beyond our control, Promat can accept no direct or consequential liability, whether in contract or in tort, for the interpretation of such recommendations and reserves

the right to modify the recommendations as necessary. Should it be unclear as to the meaning of any of the instructions given above, or if further information is required, please consult Promat.