

**Petroleum -  
Australian Production Unit**



# **TENG-S75-1001 - Coatings for Structures, Piping and Equipment**

**Revision 7  
May-2017**

This document may contain proprietary and/or confidential information. This document is a controlled document. The controlled copy is maintained electronically by the Global Operations and Maintenance Planner. Any printed copy of this document is an uncontrolled copy.

## Table of Contents

1.	Intent .....	7
2.	Application of This Standard .....	7
2.1	Purpose .....	7
2.2	Precedence .....	7
3.	Coatings for New Construction and Maintenance.....	8
3.1	Health, Safety, Environment and Community .....	8
3.1.1	General.....	8
3.1.2	Materials .....	8
3.1.3	Handling of Chemicals .....	9
3.1.4	Containment of Chemicals .....	9
3.2	Quality Control.....	10
3.2.1	General.....	10
3.2.2	Pre-qualification Criteria .....	11
3.2.3	Work Method Statements.....	12
3.2.4	Inspection and Test Plans .....	12
3.2.5	Daily Inspection Reports .....	13
3.2.6	Non-Conformance and Non-Conformance Reports.....	13
3.2.7	Coating System Inspection .....	13
3.2.8	Inspection Equipment.....	13
3.2.9	Test Reference Panels.....	14
3.2.10	Test Reference Areas .....	14
3.2.11	Resolution of Conflicting References .....	14
3.3	Pre-Production Qualification .....	15
3.4	Coating System Selection .....	16
3.4.1	Coating System Identification Sequence .....	16
3.4.2	Optimal and Sub-Optimal Coating Systems .....	17
3.4.3	Approved Coating Systems for Offshore and Onshore Facilities and Marine Structures .....	18
3.4.4	Lining Systems for Onshore Piping, Vessels and Tanks .....	20
3.4.5	Coating Systems for FPSO Facilities .....	21
3.4.6	Climate .....	22
3.4.7	Protective Coatings Table .....	23
3.4.8	Manufacturer's Standard Coatings .....	23
3.4.9	Statutory Requirements .....	23
3.5	Surface Preparation .....	24
3.5.1	Surfaces to be Coated.....	24
3.5.2	Surfaces Not to be Coated .....	24

<b>TENG-S75-1001</b>	<b>Revision 7</b>
3.5.3 Precautions when treating Stainless Steel (including Duplex).....	25
3.5.4 Friction grip surfaces .....	26
3.5.5 Edge Preparation of Steel .....	26
3.5.6 Pre-Clean .....	26
3.5.7 Blast Cleaning .....	26
3.5.8 Abrasive blasting of stainless steel (including duplex).....	28
3.5.9 Preparation of Hot Dip Galvanized Members Items for Coating .....	29
3.5.10 Wet Abrasive Blast Cleaning.....	29
3.5.11 HP Water Jet Cleaning.....	29
3.5.12 UHP Water Jet Blasting .....	30
3.5.13 New Steel Surfaces Unable to be Blast Cleaned.....	30
3.5.14 Surface Contaminants after Blast .....	30
3.5.15 Cleaning Existing Corroded/Pitted Structure .....	31
3.6 Coating Application .....	32
3.6.1 Materials.....	32
3.6.2 Mixing .....	32
3.6.3 Climate Conditions .....	32
3.6.4 Method .....	33
3.7 Inspection.....	36
3.7.1 Pre Blast.....	36
3.7.2 Post Blast .....	36
3.7.3 During Painting.....	36
3.7.4 After Painting .....	37
3.7.5 Repairs .....	38
3.8 Colour Coding .....	39
3.8.1 General.....	39
3.9 Galvanizing .....	40
3.9.1 General.....	40
3.9.2 Repairs .....	40
3.10 Thermal Spray Aluminium (TSA).....	41
3.10.1 General.....	41
3.10.2 Repairs .....	42
Appendix 1. Definitions.....	43
Appendix 2. Applicable Technical Standards.....	46
Appendix 3. Colour Schedule.....	52
Appendix 3.1. Safety Equipment and Safety Hazards .....	52
Appendix 3.2. Plant Colour Scheme .....	53
Appendix 3.3. Colours for Piping .....	56
Appendix 4. Surface Preparation Standards.....	59

<b>TENG-S75-1001</b>	<b>Revision 7</b>
Appendix 5. Approved Coating and Lining Systems – Generic Descriptors .....	60
Appendix 6. Approved Coatings Linings and Associated Coating Products and Suppliers .....	65
Appendix 7. Application Notes for Visco-Elastic Coatings .....	70
Appendix 8. Revision 6 Coating Systems Table Reference .....	78

In areas where inorganic zinc or organic zinc is used as a primer, the surface shall be pressure cleaned with potable water at 1500 to 2500psi when the primer remains exposed in excess of 48 hours prior to any top coating being applied. After completion of the pressure washing ALL areas shall be dry before proceeding with painting.

Applying a mist or part coat of primer to hold the blast is not permitted.

#### • 3.6.4.3 Edge Coating and Stripe Coats

A stripe coat shall be applied to edges, welds, bolt heads, nuts, washers, studs, lap joints, crevices formed by plates, holes and difficult to reach areas.

A stripe coat shall be applied as necessary for the primer and subsequent coat(s) so that the minimum DFT of each is achieved. The stripe coat for primers shall be applied after the primer coat is applied. Stripe coats shall otherwise be applied before the application of each coat.

Stripe coats may be applied by brush, as appropriate and have a colour distinct from underlying and subsequent coatings. The stripe coat shall be fully cured prior to the application of the next coating and not cause excessive film thickness.

The requirement for stripe coating can be waived for shop-coated steelwork where all surfaces are fully accessible for spray application and it can be demonstrated that the minimum DFT is consistently achieved on vulnerable surfaces.

#### • 3.6.4.4 Crevices and Gaps

Crevices and gaps remaining after application of the primer and intermediate coatings excluding the topcoat shall be filled using a two-pack, marine-grade solvent free epoxy filler recommended by the coating manufacturer for this purpose that is compatible with subsequently applied coatings.

Epoxy filler shall be applied after the first coat of epoxy high build, and sealed with a stripe coat of epoxy high build prior to the application of the remainder of the coating system.

Gaps between back to back angles or other sections shall be filled on upward facing locations that have the potential to hold water, salt and/or dirt.

Unsealed joints without any principal gap, shall be filled, using a compatible gun-grade polyurethane or polysulphide filler after application of the first coat of epoxy high build, followed by stripe coating and then topcoat.

#### • 3.6.4.5 Personnel Protective Coatings for Hot Surfaces

Hot surfaces (>60°C to <260°C) and cryogenic lines pose contact burn risks to personnel. In addition, there may be a requirement to improve conservation of energy (heat loss) around plant (such as steam-lines, valves, tanks, piping, heat exchangers, diffusers, pumps, evaporators, distillation equipment, glycol lines, HVAC lines & etc.) with the use of Thermal Insulation Coatings. These coatings can also find usage in reducing solar radiation on building roofs and accommodation units.

Such coatings final properties need to comply with ASTM C 1055 [Standard Guide for Heated System Surface Conditions That Produce Contact Burn Injuries]

Only applicators trained to apply the product shall be employed on projects that include these products.

Authorisation for use of Thermal Insulation materials is a mandatory requirement for mechanical and production process related equipment, not limited to pipework, vessels, valves, pumps, and instrumentation. Approvals shall be sought from the relevant BHPB Petroleum Process, Mechanical and Instrument and Automation Engineers, which may require the utilisation of the Management of Change process.

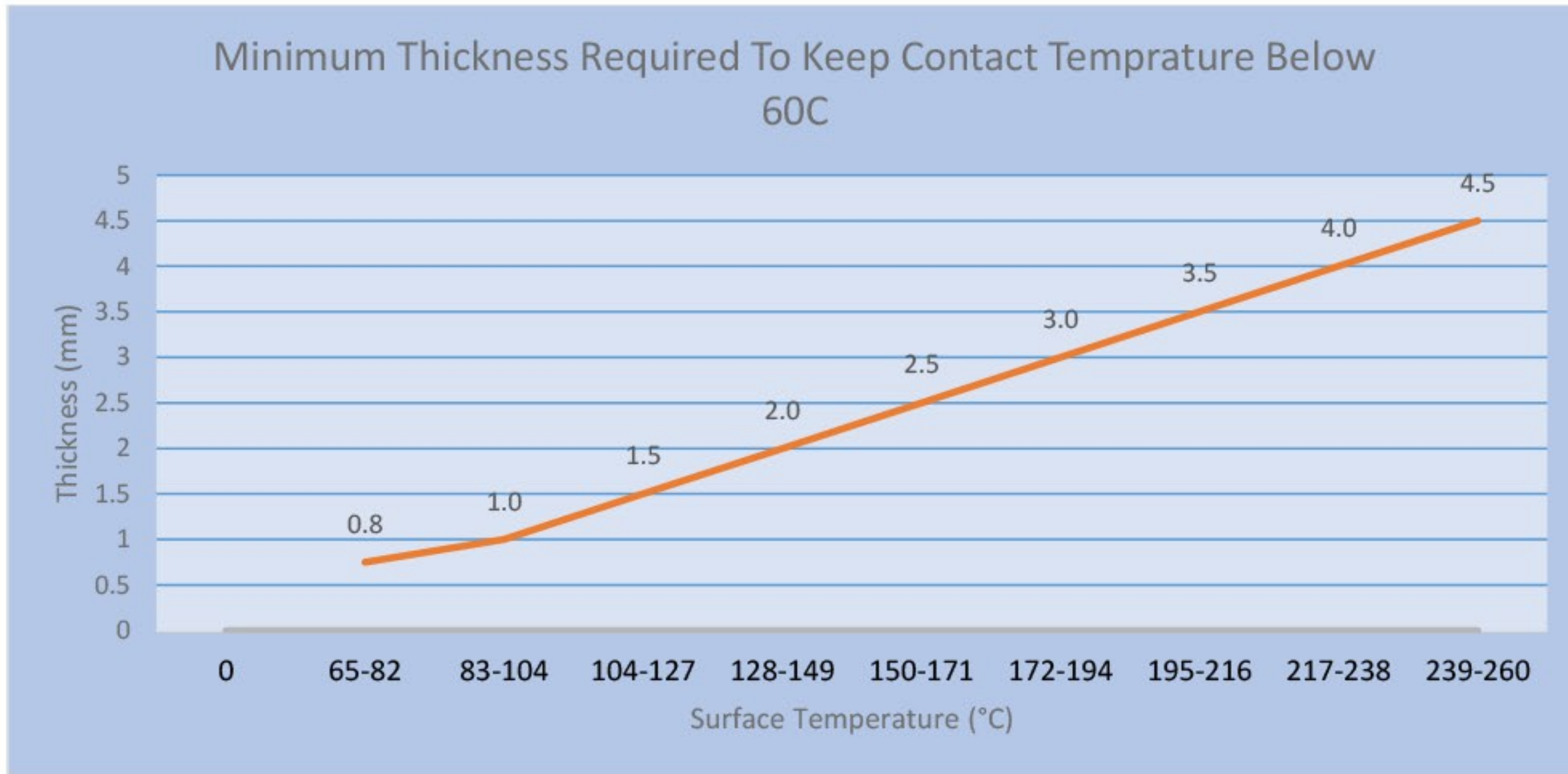
These coatings need to be applied in accordance with the suppliers' recommendations and at a thickness (using multiple coats) that will provide the required thermal insulation to maintain less than 60°C contact temperature (see Table 9 below). Coating layers must be applied to the recommended thickness and allowed to dry in accordance with the Coating Manufacturers recommendations.

Testing surface temperature after coating must be conducted with a surface temperature contact probe or gauge (not with IR remote gauge)

In low corrosivity environments (ISO 12944 Part 5 C1 to C3) these products can be applied directly to the metal (or pre-painted) surface. In higher corrosivity environments (ISO 12944 Part 5 C4 to C5M) a primer suitable for

the temperature range of that performance environment shall be used.

**Table 9: RELATIONSHIP OF THERMAL PROTECTIVE COATING DFT TO OPERATING SURFACE TEMPERATURE**



GENERIC TYPE	SUPPLIER	PRODUCT
Glass Cloth Reinforced Epoxy Lining for H <sub>2</sub> SO <sub>4</sub> (to 40°C) <sup>1</sup>		Archco-Rigidon System 701ESR
Vinyl Ester Filler	Corrocoat	Corroglass 602
VE Lining Primer		Corroglass 632 VE Primer
Vinyl Ester Lining (hand application)		Corroglass 602 /632/652
Vinyl Ester Vessel Lining (spray application)		Polyglass VEF
Vinyl Ester Wear Lining		Armagel
Vinyl Ester Vessel Lining (spray application)	International Paints	Interline 1064
Corrosion Inhibiting paste (< 120°C)	Polygard	RG 2400 LT
Corrosion Inhibiting Paste (120°C - 176°C)		RG 2400 ET
Garnet abrasive (60 - 120µm profile)	GMA	Premium Blast
Garnet abrasive (50 - 70µm profile)		Speed Blast
Liquid Insulation (Personnel Protective Coating for Hot Surfaces (60°C - 260°C)	Metaltec Coatings Australia	Metaltec TC
Liquid Insulation (Thermal insulation for Tanks and process piping (-40°C - 260°C)		Metaltec TC
Liquid Insulation (Thermal insulation for coated subsea piping (-40°C - 260°C)		Metaltec TC
Liquid Insulation (Personnel Protective Coating for Cold Surfaces (-40°C - 0°C)		Metaltec TC
Liquid Insulation for roofs		Metaltec TC

## Notes:

- (1) Refer to BHP Billiton Petroleum SME