

DEP SPECIFICATION

THERMALLY SPRAYED ALUMINIUM COATINGS

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DESIGN AND ENGINEERING PRACTICE

DEM1



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1. INTRODUCTION

1.1 SCOPE

This DEP specifies requirements and gives recommendations for thermal sprayed aluminium coatings for the purpose of corrosion control for both atmospheric conditions and beneath insulation or fireproofing as applied to onshore and offshore structures, equipment and piping.

Thermal sprayed aluminium (TSA) coatings are used when the period to first coating maintenance is 15 years or more, or where protection against corrosion under insulation (CUI) is required.

The following aspects of the thermal sprayed aluminium coating system are covered:

- surface preparation;
- thermal spraying;
- coating materials;
- prequalification;
- quality assurance and control, and;
- repair procedures.

This DEP contains mandatory requirements to mitigate process safety risks in accordance with Design Engineering Manual (DEM 1) – Application of Technical Standards.

This is a revision of the DEP of the same number dated February 2017; see (1.5) regarding the changes.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by Shell GSI, the distribution of this DEP is confined to Shell companies and, where necessary, to Contractors and Manufacturers/Suppliers nominated by them. Any authorised access to DEPs does not for that reason constitute an authorisation to any documents, data or information to which the DEPs may refer.

This DEP is intended for use in facilities related to oil and gas production, gas handling, oil refining, chemical processing, gasification, distribution and supply/marketing. This DEP may also be applied in other similar facilities.

When DEPs are applied, a Management of Change (MOC) process shall be implemented; this is of particular importance when existing facilities are to be modified.

If national and/or local regulations exist in which some of the requirements could be more stringent than in this DEP, the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable with regards to the safety, environmental, economic and legal aspects. In all cases, the Contractor shall inform the Principal of any deviation from the requirements of this DEP which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned, the objective being to obtain agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Contractor** is the party that carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project or operation of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer/Supplier** is the party that manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party that initiates the project and ultimately pays for it. The Principal will generally specify the technical requirements. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

The **Applicator** is the party that applies the thermal spray coating.

The word **shall** indicates a requirement.

The capitalised term **SHALL [PS]** indicates a process safety requirement.

The word **should** indicates a recommendation.

The word **may** indicates a permitted option.

1.3.2 Specific definitions

Term	Definition
Arc spray	A form of thermal spraying where two consumable metal wires are fed independently into the spray gun. These wires are charged and an arc is generated between them. The heat from this arc melts the incoming wire, which is then entrained in air jet from the gun and deposited onto a substrate.
Bend test	180° bending of a sample on a mandrel.
Companion coupon	Rectangular steel coupon, prepared for qualification of thermal spray coating materials and coated concurrently with the workpiece for quality control and inspection.
Dew point	The temperature of a given air/water-vapour mixture at which, under atmospheric pressure, condensation starts.
Flame spray	A form of thermal spraying where the wire spray material is melted in a gaseous oxygen-fuel flame and deposited onto a substrate.
Feather	Smooth tapered transition between thermal spray coating and the adjacent non-coated surface.
Holding period	Time between the completion of the final surface blasting and completion of the thermal spraying.
Overspray	The portion of the thermal spray deposit that is not deposited on the desired area of the workpiece.
Rust bloom	Discoloration indicating the beginning of rusting, bleeding through the interconnecting pores of the thermal spray coating.
Sealer	A thin paint coating, about 40 µm thick, that is absorbed into the pores of the thermal spray coating and seals the coating surface.
Soluble salt contaminants	Water-soluble salts, such as chlorides and sulphates, which contaminate the steel surface and cause rust bloom and premature coating failure.
Thermal spray	Application of metallic coating by means of arc- or flamespray equipment.
Topcoat	Paint coat applied over a sealed thermal spray coating.

1.3.3 Abbreviations

Term	Definition
AFC Drawing	Approved for Construction Drawing
CRA	Corrosion Resistant Alloy
DFT	Dry Film Thickness
ITP	Inspection and Test Plan
TSA	Thermally Sprayed Aluminium

1.4 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section or clause number is shown in brackets (). Other documents referenced by this DEP are listed in (10).

1.5 SUMMARY OF MAIN CHANGES

This DEP is a minor revision of the DEP of the same number dated February 2017. The following are the main, non-editorial changes.

Section/Clause	Change
2.1	DEM 1 clause added

1.6 COMMENTS ON THIS DEP

Comments on this DEP may be submitted to the Administrator using one of the following options:

Shell DEPs Online (Users with access to Shell DEPs Online)	Enter the Shell DEPs Online system at https://www.shelldeps.com Select a DEP and then go to the details screen for that DEP. Click on the "Give feedback" link, fill in the online form and submit.
DEP Feedback System (Users with access to Shell Wide Web)	Enter comments directly in the DEP Feedback System which is accessible from the Technical Standards Portal http://swwww.shell.com/standards . Select "Submit DEP Feedback", fill in the online form and submit.
DEP Standard Form (other users)	Use DEP Standard Form 00.00.05.80-Gen. to record feedback and email the form to the Administrator at standards@shell.com .

Feedback that has been registered in the DEP Feedback System by using one of the above options will be reviewed by the DEP Custodian for potential improvements to the DEP.

1.7 DUAL UNITS

This DEP contains both the International System (SI) units, as well as the corresponding US Customary (USC) units, which are given following the SI units in brackets. When agreed by the Principal, the indicated USC values/units may be used.

1.8 NON NORMATIVE TEXT (COMMENTARY)

Text shown in italic style in this DEP indicates text that is non-normative and is provided as explanation or background information only.

Non-normative text is normally indented slightly to the right of the relevant DEP clause.