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**Guide for the
Protection of
Steel with Thermal
Sprayed Coatings
of Aluminum and
Zinc and their
Alloys and
Composites**



American Welding Society



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Guide for the Protection of Steel with Thermal Sprayed Coatings of Aluminum and Zinc and Their Alloys and Composites

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AWS Committee on Thermal Spraying

Under the Direction of
AWS Technical Activities Committee

Approved by
AWS Board of Directors

Abstract

This guide presents an industrial process for the application of thermal spray coatings (TSC) on steel. It covers safety, job/contract description, background and requirements, selection of TSCs, TSC operator qualification, materials and equipment, application-process method with quality-control check points, Job Control Record, maintenance and repair of TSCs, records, debris containment and control, and warranty.



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Table of Contents

	Page No.
<i>Personnel</i>	iii
<i>Foreword</i>	iv
<i>List of Tables</i>	vii
<i>List of QC Check Points</i>	vii
<i>List of Figures</i>	vii
<i>Acronyms and Conversion Factors Used in this Publication</i>	viii
1. General	1
1.1 Scope	1
1.2 Definitions	1
2. Safety	2
2.1 General	2
2.2 Thermal Spray Powder	2
3. Job and Contract Description	2
3.1 General	2
3.2 Thermal Spray Boundary (TSB)	2
3.3 Job Control Record (JCR)	3
3.4 Selection of TSC	3
3.5 TSC Inspector	3
3.6 TSC Operator Qualification	3
4. Background and Requirements	3
4.1 Background	3
4.2 Requirements	3
5. Materials	4
5.1 Thermal Spray Wire and Powder	4
5.2 Abrasive Blasting Media	6
5.3 Sealer and Intermediate Topcoat	7
5.4 Profile Tape for Anchor-Tooth Depth Measurement	8
5.5 Bend and Companion Coupons	8
5.6 Tensile-Bond Test Specimens	8
5.7 Gases	8
6. Equipment for Thermal Spraying	9
6.1 Thermal Spray Guns	9
6.2 Air Compressors	9
6.3 Air Dryers	9
7. Quality Control Equipment	9
7.1 Surface Preparation	9
7.2 TSC Application	9
8. Application-Process Method	9
8.1 Surface Preparation	9
8.2 New Steel Substrate	10
8.3 Contaminated Steel Substrate	10
8.4 Post-Blasting Substrate Condition and Thermal Spraying Period	12
8.5 Thermal Spraying	13

	Page No.
8.6 Sealing	15
8.7 Intermediate and Top Coats	15
9. Maintenance and Repair (M&R) of Thermal Spray Coatings	16
9.1 Solvent Clean	16
9.2 Scrape Off Loosely Adherent Paint/TSCs	17
9.3 Cleaning, Manual and Blast	17
9.4 Feather	17
9.5 Light Abrasion	17
9.6 Apply TSC	17
9.7 Seal and Topcoat	17
10. Records	17
11. Debris Containment and Control	17
12. Utility Services	17
13. Work Procedures and Safety	18
14. Warranty	18
14.1 Thermal Spray Coating Contractor's Warranty	18
14.2 Thermal Spray Coating Materials	18
Annex A — Sample Job Control Record (JCR) for Thermal Spray Coatings (TSC)	19
Annex B — Recommendations for the Selection of Thermal Spray Coatings of Aluminum and Zinc and Their Alloys and Composites for the Protection of Steel in Various Environments and Service	22
Annex C — Thermal Spray Operator Qualification and Certification	27
Annex D — Sample Thermal Spray Operator Qualification Form	30
Thermal Spray Specifications and Related Documents	(Inside Back Cover)

List of Tables

Table	Page No.
1	Inspection and Acceptance Tests — Shop and Field 4
2	TSC Inspection and Acceptance Tests — Laboratory 4
3A/B	Nominal Feedstock Required 5
4A/B	Nominal Wire Feedstock Spray Rates and Coverage 6
5	Nominal Powder Flame Feedstock Spray Rates and Coverage 6
6	Blasting Media and Mesh Size Recommended for TSCs on Steel Substrates 7
7	Sealer, Intermediate, and/or Topcoat Specification 8
8	Flame- and Arc-Spray Standoff Distances and Spray-Pass Widths (Nominal) 13
9	Maintenance and Repair (M&R) Actions for TSCs 16
B1	Estimated Service Life of Aluminum and 90/10 Aluminum MMC TSCs 23
B2	Estimated Service Life of Zinc and 85/15 Zn TSCs 24
C1	Tensile-Bond Qualification Requirements for Thermal Spray Operators 28
C2	Typical Tensile-Bond Values in Laboratory and Production Spraying 29

List of QC Check Points

1	Oil and Grease Contamination 10
2	Masking 11
3	Clean Dry Air 11
4	Clean Blasting Media 11
5	Near-White Metal Finish and Anchor-Tooth Profile 12
6	Thermal Spray Equipment Set-Up 13
7	TSC Application 15
8	Seal Coat Thickness 15
9	Intermediate and Top-Coat Thickness 16

List of Figures

Figure	
1	TSC Thickness for Greater Than The Specified Profile Depth 14
B1	Estimated Service Life of Al and Al MMC TSCs 25
B2	Estimated Service Life of Zn and 85/15 Zn/Al TSCs 25
C1	TSC Bend Test: Pass and Fail Examples 28

Guide for the Protection of Steel with Thermal Sprayed Coatings of Aluminum and Zinc and Their Alloys and Composites

1. General

1.1 Scope. This guide covers the application of thermal spray coatings (TSC) for the protection of steel with aluminum, zinc and their alloys, mixtures, and composites. This scope of this guide includes the major elements of an industrial process instruction covering job description, safety, consumable materials, surface-preparation and thermal spray equipment, quality control (QC) equipment, TSC operator training and qualification, a step-by-step surface preparation and thermal spraying application method with quality control checkpoints, maintenance and repair of thermal spray coatings, and a job control record. Nominal TSC feedstock spray rates and coverage information for a common planning base are presented for purchasers and contractors. A TSC selection guide for various service environments and the operator qualification requirements are presented in appendices. This guide is modelled on the thermal spray method of MIL-STD-2138A(SH), *Metal Sprayed Coating Systems for Corrosion Protection Aboard Naval Ships*.¹

1.2 Definitions. The following define abrasive blast cleaning methods for various surface finishes.

Abrasive Blast Cleaning:

NACE No. 1: White-Metal Blast-Cleaned Surface Finish. Defined as a grey-white (uniform metallic) color, slightly roughened to form a suitable pattern for coatings. This surface is free of all oil, grease, dirt, mill scale,

rust, corrosion products, oxides, paint, and other foreign matter. (NACE No. 1 is comparable to SSPC-SP 5, *White Metal Blast Cleaning*.)²

SSPC-SP 5: White-Metal Blast Cleaning. These blast-cleaned surfaces must have a uniform, grey-white metallic color and must be free of all oil, grease, dirt, mill scale, rust, corrosion products, oxides, old paint, stains, streaks, or any other foreign matter.³

NACE No. 2: Near-White Blast Finish. This is defined as a surface from which all oil, grease, dirt, rust scale, and foreign matter have been completely removed except for slight shadows, streaks, or discolorations (of oxides bonded with metal). At least 95% of any given surface area has the appearance of NACE No. 1, and the remainder of the area is limited to slight discolorations. (NACE No. 2 is comparable to SSPC-SP 10 *Near-White-Metal Blast Cleaning*.)

SSPC-SP 10: Near-White-Metal Blast Cleaning. A near-white metal blast-cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining as noted. Staining shall be limited to no more than 5% of each square inch of surface area and may consist of light

1. Military specifications are available from Standardization Order Desk, 700 Robbins Avenue, Building #4, Section D, Philadelphia, PA 19111-5094.

2. *Visual Standard for Surfaces of New Steel Centrifugally Blast Cleaned with Steel Grit and Shot*, TM0175-75. Available from National Association of Corrosion Engineers, 1440 South Creek Drive, P.O. Box 218340, Houston, TX 77084.

3. *Steel Structures Painting Manual*, Volume 2. Available from Steel Structures Painting Council (SSPC), 4400 Fifth Avenue, Pittsburgh, PA 15213-2683.