

AWS C2.23M/C2.23:2003,
NACE No. 12, SSPC-CS 23.00
An American National Standard

**Specification for
the Application of
Thermal Spray
Coatings (Metallizing)
of Aluminum, Zinc,
and Their Alloys and
Composites for the
Corrosion Protection
of Steel**



American Welding Society

Key Words—Aluminum, aluminum metal matrix composite, arc spray, flame spray, steel protection, thermal spray coating, zinc, zinc/aluminum alloy

**AWS C2.23M/C2.23:2003,
NACE No. 12, SSPC-CS 23.00
An American National Standard**

**Approved by
American National Standards Institute
March 17, 2003**

Specification for the Application of Thermal Spray Coatings (Metallizing) of Aluminum, Zinc, and Their Alloys and Composites for the Corrosion Protection of Steel

Prepared by
AWS C2 Committee on Thermal Spraying

Under the Direction of
AWS Technical Activities Committee

Approved by
AWS Board of Directors

Abstract

This specification presents an industrial process for the application of thermal spray coating (TSC) on steel. It covers safety, job reference standards, equipment setup and preparation, surface preparation, aluminum and zinc application, and sealer and topcoat application.



NACE International
1440 South Creek Drive
Houston, TX 77084-4906



SSPC: Society for Protective Coatings
40 24th Street, 6th Floor
Pittsburgh, PA 15222-4643



American Welding Society

550 N.W. LeJeune Road, Miami, Florida 33126

Table of Contents

	Page No.
<i>Personnel</i>	iii
<i>Foreword</i>	v
<i>List of Tables</i>	ix
<i>List of Figures</i>	ix
1. Scope	1
1.1 General.....	1
1.2 Safety	1
1.3 Units of Measure.....	2
2. Referenced Documents	2
3. Definitions	3
4. Summary of Practice	3
5. Surface Preparation Requirements	4
5.1 Surface Finish	4
5.2 Angular Profile Depth.....	4
5.3 Angular Profile Depth Measurement Schedule	4
6. TSC Requirements	4
6.1 Feedstock and TSC Thickness	4
6.2 TSC Thickness	6
6.3 TSC Thickness Measurement Schedule	6
6.4 TSC Tensile Bond and Measurement Schedule	6
6.5 Bend Test	7
6.6 TSC Finish	7
6.7 TSC Porosity.....	7
6.8 TSC QC Measurement Procedures and Instruments	7
7. TSC Application Procedure	7
7.1 General.....	7
7.2 Thermal-Spray Equipment Setup.....	7
7.3 Post-Blasting Substrate Condition and Thermal Spraying Period.....	8
7.4 TSC Flash Coat.....	9
8. TSC Application.....	9
8.1 Preheat	9
8.2 Thermal Spraying	9
9. Application of Sealers and Topcoats.....	10
9.1 General.....	10
9.2 Sealer	10
9.3 Topcoat	10
9.4 Applying Paints.....	10
10. Records.....	10
11. Debris Containment and Control.....	10

	Page No.
12. Work Procedures and Safety	10
13. Documentation	10
13.1 TSC Applicator’s Application Procedure	10
13.2 Job Reference Standard (JRS)	10
14. Contract Pre-Award Evaluation, Demonstration, and Validation	11
15. TSC Applicator Warranty	11
15.1 TSC Applicator Warranty	11
15.2 Materials Used	12
Further Reading	12
<i>Mandatory Annex</i>	<i>13</i>
<i>Annex I—Application Process Method.....</i>	<i>13</i>
<i>Nonmandatory Annexes</i>	<i>21</i>
<i>Annex A—Model Procurement Specification</i>	<i>21</i>
<i>Annex B—Model Job Control Record</i>	<i>29</i>
<i>Annex C—Procedure for Calibration of Portable Test Instruments to the ASTM C 633 Test Method</i>	<i>33</i>
<i>Annex D—Guidelines for the Preparation of Technical Inquiries for AWS Technical Committees</i>	<i>35</i>
<i>List of AWS Documents on Thermal Spraying</i>	<i>37</i>
<i>List of NACE International/SSPC Documents on Thermal Spraying</i>	<i>37</i>

List of Tables

Table		Page No.
1	TSC System Requirements and Acceptance Tests	5
2	Blasting Media and Mesh Size Found Suitable for TSCs on Steel Substrates	6
3	Minimum Tensile Bond Requirements	7
4	Bend-Test Cracking Threshold: Mandrel Diameter vs. TSC Thickness	7
I1	Flame- and Arc-Spray Standoff Distances and Spray Widths, Nominal	17

List of Figures

Figure		Page No.
1	Thermal Spray Coating Process	1
2	Job Reference Standard Illustration	4
3	Line and Spot Measurements	6
4	TSC Bend Test: Pass and Fail Examples	8
5	Thickness and Tensile-Bond Measurements for JRS Qualifications	11
I1	Key Production and Quality Control Checkpoints (QCCPs) for Applying Thermal Spray Coatings	13
I2	Proper Spray Gun Adjustment	18
I3	Line and Spot Measurements	18
C1	Calibration Fixture	33

Specification for the Application of Thermal Spray Coatings (Metallizing) of Aluminum, Zinc, and Their Alloys and Composites for the Corrosion Protection of Steel

1. Scope

1.1 General. This standard is a procedure for the application of metallic Thermal Spray Coating (TSCs) of aluminum, zinc, and their alloys and composites for the corrosion protection of steel. Required equipment, application procedures, and in-process quality control (QC) checkpoints are specified. This standard may be used as a procurement document. Annex A presents a fill-in-the-blanks model procurement specification. The flow diagram in Figure 1 provides an overview of the thermal spray coating process presented in this standard.

Not included in this standard are requirements for design and fabrication, thermal spray equipment qualification, coating selection, and operator and inspector certification. For successful thermal spray application, the steel structure and components should be designed and fabricated according to NACE Standard RP0178. Additional consideration should be given to weldments whose oxyfuel cut edges may affect hardness which may preclude adequate profile depth.

1.2 Safety. The basic precautions for thermal spraying are essentially the same as for welding and cutting.

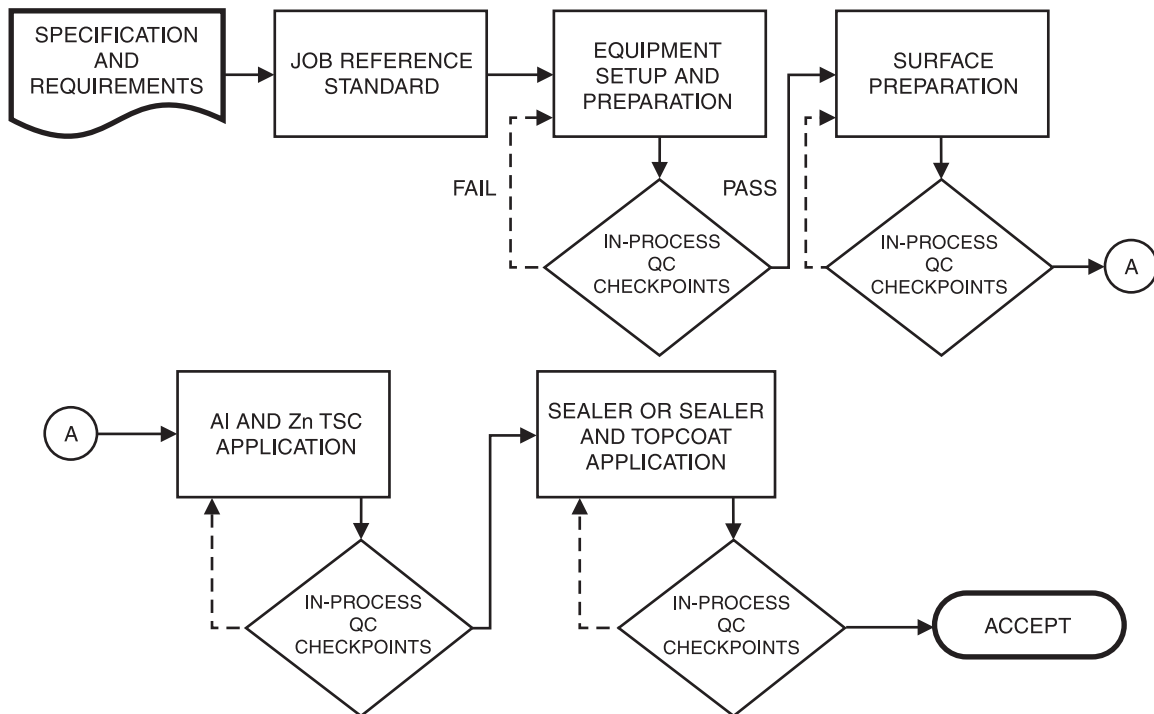


Figure 1—Thermal Spray Coating Process