

**AWS C2.16/C2.16M:2017**  
**An American National Standard**



# **Guide for Thermal Spray Operator Qualification Programs**



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**An American National Standard**

**Approved by the**  
**American National Standards Institute**  
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# **Guide for Thermal Spray Operator Qualification Programs**

**4th Edition**

**Supersedes AWS C2.16/C2.16M:2002**

Prepared by the  
American Welding Society (AWS) C2 Committee on Thermal Spraying

Under the Direction of the  
AWS Technical Activities Committee

Approved by the  
AWS Board of Directors

## **Abstract**

This guide contains recommendations for establishing a thermal spray operator qualification program. Information related to training, knowledge and skill testing, and coating system inspection methods is provided. Example thermal spray operator qualification tests (TSOQT) parameters and forms are provided, to address common engineering and corrosion control applications using arc, flame, atmospheric plasma, and high velocity oxygen fuel (HVOF) spray processes.



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## Foreword

This foreword is not part of this standard but is included for information purposes only.

The purpose of this document is to provide a guide for companies, agencies, and institutions, to create a program for qualifying thermal spray operators. Such qualification programs are frequently employer or site specific, to address a unique set of thermal spray processes, procedures, equipment, coating systems, and customer or contract requirements. The objective is to share common and best practices related to the structure, execution, and maintenance of qualification programs.

Previous editions of the document are as follows:

ANSI/AWS C2.16-78, *Guide for Thermal Spray Operator and Equipment Qualification*

ANSI/AWS C2.16-92, *Guide for Thermal Spray Operator Qualification*

AWS C2.16/C2.16M:2002, *Guide for Thermal Spray Operator Qualification*

This edition has been extensively revised and reformatted to clarify the intent and readability. Because of this, the vertical line in the margin or underlined text in clauses, tables, or figures common to AWS standard revisions has not been applied to indicate editorial or all technical changes from the previous edition.

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, AWS C2 Committee on Thermal Spraying, American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.



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# Table of Contents

	Page No.
<i>Personnel</i> .....	v
<i>Foreword</i> .....	vii
<i>List of Tables</i> .....	xi
<i>List of Figures</i> .....	xi
<i>List of Forms</i> .....	xi
<b>1. General Requirements</b> .....	<b>1</b>
1.1 Scope .....	1
1.2 Exclusion .....	1
1.3 Units of Measurement .....	1
1.4 Safety .....	1
<b>2. Normative References</b> .....	<b>2</b>
<b>3. Terms and Definitions</b> .....	<b>2</b>
<b>4. Qualification Program Definition</b> .....	<b>3</b>
4.1 Objectives .....	3
4.2 Specification .....	4
4.3 Implementation .....	4
4.4 Verification .....	6
<b>5. Qualification Requirements</b> .....	<b>6</b>
5.1 Functions of the Qualified Operator .....	6
5.2 Candidate Requirements .....	6
5.3 Qualification Process .....	6
5.4 Period of Validity .....	7
5.5 Revocation .....	8
5.6 Reinstatement .....	8
5.7 Renewal .....	8
5.8 Requalification .....	8
5.9 Responsibility .....	8
<b>6. Training Requirements</b> .....	<b>8</b>
6.1 Process Theory .....	8
6.2 Hands-On Training .....	8
6.3 Inspection and Testing .....	9
6.4 Troubleshooting .....	9
<b>7. Knowledge Testing</b> .....	<b>9</b>
7.1 General Knowledge .....	9
7.2 Process Determination .....	10
7.3 Equipment Operation .....	10
7.4 Process Qualification .....	10
<b>8. Skill Testing</b> .....	<b>10</b>
8.1 General .....	10
8.2 Workpiece Preparation .....	11
8.3 Equipment Preparation .....	11
8.4 Process Execution .....	11

8.5 Process Documentation .....	12
8.6 Process Qualification .....	12
<i>Nonmandatory Annexes</i> .....	<i>13</i>
<i>Annex A (Normative)—Thermal Spray Process Qualification Tests</i> .....	<i>13</i>
<i>Annex B (Informative)—Example Forms</i> .....	<i>19</i>
<i>Annex C (Informative)—Bibliography</i> .....	<i>25</i>
<i>Annex D (Informative)—Requesting an Official Interpretation on an AWS Standard</i> .....	<i>29</i>
<i>List of AWS Documents on Thermal Spraying</i> .....	<i>31</i>

## List of Tables

<b>Table</b>		<b>Page No.</b>
1	Example Thermal Spray Operator Qualification Designations . . . . .	5
2	Designated Example Coating Systems. . . . .	7
3	Recommended Test Piece (TP) Quantities. . . . .	12
A.1	Example Thermal Spray Process Acceptance Criteria. . . . .	16
A.2	Tensile-Bond Qualification Requirements for Thermal Spray Operators . . . . .	17

## List of Figures

<b>Figure</b>		<b>Page No.</b>
1	Example of a Test Rig for the Preparation of HVOF Coating Specimens. . . . .	5
A.1	Test Piece for Atmospheric Plasma Spraying of Metals and Alloys . . . . .	13
A.2	Test Piece for Flame-Sprayed Self-Fluxing Alloy Coating . . . . .	14
A.3	Test Piece for Flame- and Arc-Sprayed Aluminum and Zinc Alloy Coating. . . . .	14
A.4	Example of an Almen Gage . . . . .	15
A.5	Example of an Almen Gage with Specimen . . . . .	15
A.6	Thermal Spray Coating Bend Test: Pass/Fail Examples . . . . .	17

## List of Forms

<b>Form</b>		<b>Page No.</b>
B.1	Thermal Spray Process and Spray Parameters for Plasma Spraying. . . . .	20
B.2	Thermal Spray Process and Spray Parameters for Arc Spraying. . . . .	21
B.3	Thermal Spray Process and Spray Parameters for Flame Spraying. . . . .	22
B.4	Thermal Spray Process and Spray Parameters for HVOF Spraying . . . . .	23
B.5	Example Thermal Spray Operator Qualification Certificate . . . . .	24

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# Guide for Thermal Spray Operator Qualification Programs

## 1. General Requirements

**1.1 Scope.** This guide contains recommendations for establishing, conducting, and maintaining a thermal spray operator qualification program. Such programs generally include training, knowledge and skill testing, and documentation requirements. The skill tests described in this guide relate to flame spraying, arc spraying, atmospheric plasma spraying, and high velocity oxygen fuel (HVOF) spraying.

While this guide does not preclude the possibility to establish a qualification program for operators of automatic thermal spray equipment, the examples in this guide assume the objective is to qualify operators who develop process parameters, apply the thermal spray process, and evaluate the effectiveness of the coating process.

This document is not to be used as a stand-alone document for operator qualification or certification. An operator would not be “qualified in accordance with AWS C2.16/C2.16M” as this document does not address relevant acceptance standards. However, a qualification program can state that it follows the guidelines of AWS C2.16/C2.16M.

Although this guide is not written with mandatory requirements, mandatory language, such as the use of “shall,” will be found in those portions of the document where failure to follow the instructions or procedures could produce inferior, misleading, or unsafe results.

**1.2 Exclusion.** AWS C2.16/C2.16M does not preclude an employer or contractor from continuing to qualify thermal spray operators in accordance with any established qualification program or the requirements of standards such as:

- (1) AWS C2.19, *Specification for the Application of Thermal Spray Coatings to Machine Elements for OEM and Repair*.
- (2) MIL-STD-1687, *Thermal Spray Processes for Naval Ship Machinery Applications*.
- (3) Various original equipment manufacturers’ (OEM) or after-market repair, thermal spray process, and spray specifications.
- (4) ISO 14918, *Thermal spraying—Approval testing of thermal sprayers*.

**1.3 Units of Measurement.** This guide makes use of both U.S. Customary Units and the International System of Units [SI]. The latter are shown within brackets [ ] or in appropriate columns in tables and figures. The measurements may not be exact equivalents; therefore each system must be used independently.

**1.4 Safety.** Safety and health issues and concerns are beyond the scope of this standard and therefore are not fully addressed herein. Safety and health information is available from the following sources:

American Welding Society:

- (1) ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*
- (2) AWS Safety and Health Fact Sheets
- (3) Other safety and health information on the AWS website

Material or Equipment Manufacturers:

- (1) Safety Data Sheets supplied by materials manufacturers
- (2) Operating Manuals supplied by equipment manufacturers