

ANSI/AWS
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**Standard Guide
for Recording Arc Weld Material
Property and Nondestructive
Examination Data in
Computerized Databases**



American Welding Society

Keywords — arc weld, database, computerization, nondestructive examination data, procedure qualification record (PQR), welding procedures, welding procedure specification (WPS), standard formats, property data

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Standard Guide for Recording Arc Weld Material Property and Nondestructive Examination Data in Computerized Databases

Prepared by
AWS Committee on Computerization of
Welding Information

Under the Direction of
AWS Technical Activities Committee

Approved by
AWS Board of Directors

Abstract

This standard guide provides a format for the fields and types of mechanical property and nondestructive examination data that should be entered into a weld property database.



American Welding Society

550 N.W. LeJeune Road, P.O. Box 351040, Miami, Florida 33135

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Personnel

AWS Committee on Computerization of Welding Information

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<i>T. A. Siewert, 1st Vice Chairman</i>	NIST
<i>D. White, 2nd Vice Chairman</i>	MTS Systems Corporation
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<i>T. Wiesner</i>	Bechtel Group
<i>X. Xu</i>	American Welding Institute

Foreword

(This Foreword is not a part of ANSI/AWS A9.2-92, *Standard Guide for Recording Arc Weld Material Property and Nondestructive Examination Data in Computerized Databases*, but is included for information purposes only.)

This guide was developed in cooperation with ASTM Committee E 49 on Computerization of Material Property Data. As such, its form is similar to standards which they have developed in other materials areas. Information on arc welds is divided into two parts, one for weld identification and one for weld properties and nondestructive examination data. This standard includes information relating to the weld properties and nondestructive examination data. ANSI/AWS A9.1-92 contains the weld identification information.

The Committee on Computerization of Welding Information became an official AWS Committee in April 1989. This is the second standard that it has developed.

Comments and suggestions concerning this document are welcome. They should be sent to the Secretary, Committee on Computerization of Welding Information, American Welding Society, 550 N.W. LeJeune Road, P.O. Box 351040, Miami, FL 33135.

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Standard Guide for Recording Arc Weld Material Property and Nondestructive Examination Data in Computerized Databases

1. Scope, Purpose and Application

1.1 Scope. This document describes the types of mechanical property and nondestructive examination data that should be entered into an arc weld database.

1.2 Purpose. This document facilitates search strategies and reliable comparisons in computerized weld databases. The preparation of a Welding Procedure Specification (WPS) is facilitated by having Procedure Qualification Record (PQR) data in convenient formats.

1.3 Application. This document is limited to arc welding as defined in ANSI/AWS A3.0, *Standard Welding Terms and Definitions*.

2. Applicable Documents

2.1 AWS Standards

- (1) Standard Welding Terms and Definitions—A3.0
- (2) Filler Metal Specifications—A5.1 to A5.30
- (3) Standard Guide for Describing Arc Welds in Computerized Material Property and Nondestructive Examination Databases—A9.1
- (4) Standard Methods for Mechanical Testing of Welds—B4.0

2.2 ASTM Standards

- (1) E 527 Practice for Numbering Metals and Alloys (UNS)

(2) E 1313 Standard Guide for Development of Standard Data Records for Computerization of Material Property Data

(3) E 1338 Standard Guide for the Identification of Metals and Alloys in Computerized Material Property Databases

(4) E 1443 Definition of Terms Relating to Building and Accessing Materials Databases

3. Significance and Use

3.1 This document describes the fields which are needed to record the properties and results of nondestructive examination of a weld. A separate document (ANSI/AWS A9.1) has been developed to uniquely define the weld. Together, these documents will provide a mechanism to accurately and precisely store weld data for later searches or comparisons.

3.2 For effective manipulation by any possible search strategy, all possible data elements should be collected and stored. Supplementary fields (for example, comments, other information) are available to store any data that do not seem to fit a particular category but provide important information. These supplementary fields are the proper location for additional information such as special welding or test details.

3.3 A weldment is an assembly whose component parts are joined by welding. Weldments consist of a base metal, a fused region (weld), one or more additional

base metals (identical to or different from the first), and perhaps backing. A portion of the base metal adjacent to the fused region is affected by the heat of welding and is known as the heat-affected zone (HAZ). To completely characterize the properties of the weld, this document includes various property fields for the weld and the HAZ. The properties of the undisturbed base metal are listed in a base metal database.

3.4 The completeness of any database depends on its specific purpose. A single organization may include substantial detail (for example, names of welders, test technicians, or proprietary information) in its own database. Less detail may be included in a common database used by several organizations because of commercial and other considerations. However, comparisons of property data from multiple sources will be more effective as more data elements are included. Comparison is still possible if elements are missing but some degree of uncertainty will be present.

3.5 These guidelines and data format were designed for use in computerized material property databases. Utilization of the guidelines and data format will be most efficiently realized with computerized databases. The guidelines and data format are equally valid for other

situations where the properties of a metal are to be recorded.

4. Definitions

4.1 Data Element (Data Item). One individual piece of information used in describing a material property or test condition. For example, satisfactory (for test result) or butt (for joint type).

4.2 Field. Space in layout of information for an individual data element or item.

4.3 Record. The collection of data elements used to describe the weld in its entirety, all the data associated with one weld.

5. Weld Property Data

This weld property information section contains a list of the fields that should be considered for a welding database, the format or units for the data, examples of where information might fit best, and the types of unusual information that should be placed into a category such as "other information." Use this section for reference when designing a database or determining how to enter weld property information.

<u>Field Name</u>	<u>Field Type Values or Units</u>	<u>Examples</u>
5.1 Tensile Test*		
5.1.1 Testing Specification		
5.1.1.1 Specification Organization	string	ASTM
5.1.1.2 Specification Number	string	E 8
5.1.1.3 Specification Version	string	
5.1.2 Specimen Characteristics		
5.1.2.1 Condition	string	as welded or stress relieved
5.1.2.2 Type	string	all weld, transverse
5.1.3 Test Conditions		
5.1.3.1 Temperature	°C (°F)	
5.1.3.2 Strain Rate	mm/s (in./s)	
5.1.4 Specimen Dimensions		
5.1.4.1 Diameter (if round)	mm (in.)	
5.1.4.2 Width	mm (in.)	
5.1.4.3 Thickness	mm (in.)	
5.1.4.4 Gage Length	mm (in.)	
5.1.5 Yield Strength	MPa (ksi)	
5.1.5.1 Offset	percent	
5.1.6 Tensile Strength	MPa (ksi)	
5.1.7 Elongation (within gage length)	percent	
5.1.8 Reduction of Area	percent	
5.1.9 Fracture Appearance	string	shear, cup-cone
5.1.10 Failure Location	string	HAZ, base metal
5.1.11 Other Information (for example, special orientations or grips)	string	
5.2 Guided Bend Test*		
5.2.1 Testing Specification		
5.2.1.1 Specification Organization	string	AWS
5.2.1.2 Specification Number	string	D1.1
5.2.1.3 Specification Version	string	
5.2.2 Type of Weld	string	groove, surfacing
5.2.3 Orientation	string	transverse face, root, side

*Repeat field for the number of specimens

<u>Field Name</u>	<u>Field Type Values or Units</u>	<u>Examples</u>
5.2.4 Flaws	string	3 mm—HAZ
5.2.5 Result	string	satisfactory, unsatisfactory
5.2.6 Other Information (for example, bend test arrangement)		
5.3 Impact Energy Test*		
5.3.1 Testing Specification		
5.3.1.1 Specification Organization	string	ASTM
5.3.1.2 Specification Number	string	E 23
5.3.1.3 Specification Version	string	
5.3.1.4 Specification Designation	string	
5.3.2 Specimen Characteristics		
5.3.2.1 Condition	string	as welded, stress relieved
5.3.2.2 Type	string	Charpy V, dynamic tear
5.3.2.3 Specimen Orientation	string	longitudinal, transverse
5.3.2.4 Notch Location and Notch Orientation (relative to face of weld)	string	weld metal, HAZ
5.3.2.5 Specimen Size	string	full, half
5.3.2.6 Specimen Location	string	surface, centerline
5.3.3 Test Temperature	°C (°F)	
5.3.4 Absorbed Energy	J (ft-lb)	
5.3.5 Lateral Expansion	mm (mils)	
5.3.6 Shear	percent	
5.3.7 Criteria for Averaging Multiple Specimens	string	average, middle 3 of 5
5.3.8 Other Information	string	
5.4 Other Toughness Data (K_{Ic} , J_{Ic} , CTOD)* (If toughness tests other than notched bar impact tests have been conducted, they are to be reported in this section. For E 399 data, see format in addendum to E 1313.)	string	Drop Weight NDT Test
5.5 Hardness Test*		
5.5.1 Testing Specification		
5.5.1.1 Specification Organization	string	ASTM
5.5.1.2 Specification Number	string	E 18
5.5.1.3 Specification Version	string	

*Repeat field for the number of specimens

<u>Field Name</u>	<u>Field Type Values or Units</u>	<u>Examples</u>
5.5.1.4 Specification Designation	string	
5.5.2 Test Type	string	HRC, HB
5.5.3 Area Tested	string	weld metal, 3mm into HAZ from weld interface
5.5.4 Hardness Value	string	
5.5.5 Other Information (for example, special indenter or conversion from another scale)	string	
5.6 NDE Examination*		
5.6.1 Testing Specification		
5.6.1.1 Specification Organization	string	AWS
5.6.1.2 Specification Number	string	D1.1
5.6.1.3 Specification Version	string	
5.6.1.4 Specification Designation	string	
5.6.2 NDE Process or Method (see ANSI/AWS A2.4, Part C)	string	RT, PT
5.6.3 Result	string	satisfactory, unsatisfactory
5.6.4 Other Information (for example, Technician's ASNT Certification ASNT TC-1A Level)	string	
5.7 Macroscopic Examination*		
5.7.1 Testing Specification		
5.7.1.1 Specification Organization	string	AWS
5.7.1.2 Specification Number	string	D1.1
5.7.1.3 Specification Version	string	
5.7.1.4 Specification Designation	string	
5.7.2 Type of Weld		
5.7.2.1 Joint Type	string	butt
5.7.2.2 Weld Type	string	single V
5.7.3 Leg Length-1	mm (in.)	
5.7.4 Leg Length-2	mm (in.)	
5.7.5 Throat (measured)	mm (in.)	
5.7.6 Result	string	satisfactory, unsatisfactory
5.7.7 Other Information	string	
5.8 Shear Test*		

*Repeat field for the number of specimens

<u>Field Name</u>	<u>Field Type Values or Units</u>	<u>Examples</u>
5.8.1 Testing Specification		
5.8.1.1 Specification Organization	string	ASTM
5.8.1.2 Specification Number	string	A 370
5.8.1.3 Specification Version	string	1990
5.8.1.4 Specification Designation	string	
5.8.2 Type of Weld		
5.8.2.1 Joint Type	string	butt
5.8.2.2 Weld Type	string	single V
5.8.3 Result	string	satisfactory, unsatisfactory
5.8.4 Other Information (for example, special shape or dimensions)	string	
5.9 Creep, Creep-Rupture and Stress-Rupture Tests*		
5.9.1 Testing Specification		
5.9.1.1 Specification Organization	string	ASTM
5.9.1.2 Specification Number	string	E 139
5.9.1.3 Specification Version	string	
5.9.1.4 Specification Designation	string	
5.9.2 Type of Weld		
5.9.2.1 Joint Type	string	butt
5.9.2.2 Weld Type	string	single V
5.9.3 Specimen Characteristics		
5.9.3.1 Condition	string	as welded, stress relieved
5.9.3.2 Type	string	all weld metal, weldment
5.9.3.3 Gage Length Location	string	weld metal (WM), WM+HAZ, HAZ+BM, WM+HAZ+BM
5.9.4 Results of Tests Continued to Rupture		
5.9.4.1 Test Temperature	°C (°F)	
5.9.4.2 Stress	MPa (ksi)	
5.9.4.3 Test Duration	h	
5.9.4.4 Elongation	percent	
5.9.4.5 Maximum Extension	percent	
5.9.4.6 Reduction of Fracture	WM, HAZ, BM	

*Repeat field for the number of specimens

<u>Field Name</u>	<u>Field Type Values or Units</u>	<u>Examples</u>
5.9.5 Results from Creep Tests		
5.9.5.1 Test Temperature	°C (°F)	
5.9.5.2 Stress	MPa (ksi)	
5.9.5.3 Total Strain Versus Time (tabular)	string	in./in. versus h
5.9.5.4 Creep Versus Time	percent/h	
5.9.5.5 Total Creep	percent	
5.9.5.6 Minimum Creep Rate	percent/h	

5.10 Other Tests* (for example, fillet weld break and fillet weld shear)

*Repeat field for the number of specimens