

ANSI/AWS B2.1-1-206-96 (R2007)
An American National Standard

**Standard Welding Procedure
Specification (SWPS) for**

**Shielded Metal Arc
Welding of Carbon
Steel (M-1/P-1/S-1,
Group 1 or 2),
1/8 through 1-1/2 inch
Thick, E6010 (Vertical
Downhill) Followed by
E7018 (Vertical Uphill),
As-Welded or PWHT
Condition, Primarily
Pipe Applications**

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Key Words—Welding Procedure Specification,
base metal, allowable joint designs,
filler metal, carbon steel, manual
welding, shielded metal arc welding

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**Approved by the
American National Standards Institute
May 28, 1996**

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Specification (SWPS) for
Shielded Metal Arc Welding of Carbon Steel
(M-1/P-1/S-1, Group 1 or 2),
1/8 through 1-1/2 inch Thick,
E6010 (Vertical Downhill) Followed
by E7018 (Vertical Uphill),
As-Welded or PWHT Condition,
Primarily Pipe Applications**

Prepared by the
American Welding Society (AWS) B2 Committee on Welding Procedure and Performance Qualification

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This standard contains the essential welding variables for carbon steel in the thickness range of 1/8 through 1-1/2 inch, using manual shielded metal arc welding with E6010 (vertical downhill) followed by E7018 (vertical uphill). It cites the base metals and operating conditions necessary to make the weldment, the filler metal specifications, and the allowable joint designs for fillet and groove welds. This WPS was developed primarily for pipe applications.



American Welding Society

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

Standard Welding Procedure Specification (SWPS)

Shielded Metal Arc Welding of Carbon Steel (M-1/P-1/S-1, Group 1 or 2), 1/8 through 1-1/2 inch Thick, E6010 (Vertical Downhill) Followed by E7018 (Vertical Uphill), As-Welded or PWHT Condition, Primarily Pipe Applications

Welding Research Council—Supporting PQR Numbers:

001001, 001009, 001021, 001022, 001028, 003016, 003017, 008001, 103004, 106004, 106005, 106006, 107020, 107021, 107022, 200018, 200108, 200109, 200110, 200111, 200112, 200113, 200114, 200115, 200116, 200117, 200118, 200119, 200120, 200121, 200122, 200123, 200124, 200125, 200126, 200142, 200143, 200144, 200145, 200514, 200516, 200517, 200518, 200519, 200611, 200614, 200615, 200617, 200618, 200619, 200620, 200702, 200703, 500001, 500002, 500006, 500007, 500008, 500021, 500023, 500024, 500028, 500029, 500119, 119C, 192A, 193B, 197A, 198A, 199A

Requirements for Application of Standard WPSs

Scope. The data to support this Standard Welding Procedure Specification (WPS) have been derived from the above listed Procedure Qualification Records (PQRs) which were reviewed and validated under the auspices of the Welding Research Council. This Standard WPS is not valid using conditions and variables outside the ranges listed. The American Welding Society considers that this Standard WPS presents information for producing an acceptable weld using the conditions and variables listed. The user needs a significant knowledge of welding and accepts full responsibility for the performance of the weld and for providing the engineering capability, qualified personnel, and proper equipment to implement this Standard WPS.

Application. This Standard WPS is to be used only as permitted by the applicable fabrication document(s) [such as code, specification, or contract document(s)]. The fabrication document(s) should specify the engineering requirements such as design, need for heat treatment, fabricating tolerances, quality control, and examination and tests applicable to the end product.

User's Responsibility. A Standard WPS does not replace or substitute for fabrication codes, specifications, contract requirements, or capability and judgment

on the part of the user. A Standard WPS is to be used only as permitted by the applicable fabrication code, specification, or contract document.

The ability to produce production welds having properties suitable for the application depends upon supplementing the Standard WPS with appropriate performance qualification tests and sound engineering judgment. The user is responsible for the quality and performance of the final product in accordance with the provisions of the fabrication document(s).

Supplementary Instructions. To adapt this Standard WPS to a specific application, a user may issue supplementary instructions. Such instructions may consist of tighter fit-up tolerances, higher minimum preheat temperature or any other instructions necessary to produce a weldment that meets the requirements of the fabrication document(s). These instructions shall not be less restrictive than provided in the Standard WPS.

Safety. Safety precautions shall conform to the latest edition of ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*, published by the American Welding Society.

This specification may involve hazardous materials, operations, and equipment. The specification does not purport to address all of the safety problems associated with its use. It is the responsibility of the user to establish appropriate safety and health practices. The user should determine the applicability of any regulatory limitations prior to use.