

AWS B2.1-5A-226:1999
An American National Standard

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

**Gas Tungsten Arc
Welding (Consumable
Insert Root) followed
by Shielded Metal Arc
Welding of Chromium-
Molybdenum Steel
(M-5A/P-5A), 1/8 through
1/2 in. Thick, As-Welded
Condition, 1/8 through
1-1/2 in. Thick, PWHT
Condition, IN521,
ER90S-B3, and E9018-B3,
Primarily Pipe Applications**

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Key Words—Welding Procedure Specification, WPS, base metal, allowable joint designs, consumable insert, filler metal, pipe, chromium-molybdenum steel, manual welding, gas tungsten arc welding, shielded metal arc welding

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Approved by
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**Standard Welding Procedure Specification (WPS) for
Gas Tungsten Arc Welding (Consumable Insert Root)
followed by Shielded Metal Arc Welding of
Chromium-Molybdenum Steel (M-5A/P-5A),
1/8 through 1/2 in. Thick, As-Welded Condition,
1/8 through 1-1/2 in. Thick, PWHT Condition, IN521,
ER90S-B3, and E9018-B3, Primarily Pipe Applications**

Prepared by
AWS Committee on Welding Qualification

Under the Direction of
AWS Technical Activities Committee

Approved by
AWS Board of Directors

Abstract

This standard contains the essential welding variables for chromium-molybdenum steel in the thickness range of 1/8 through 1/2 in. in the as-welded condition, or 1/8 through 1-1/2 in. in the postweld heat treated (PWHT) condition, using manual gas tungsten arc welding with a consumable insert root, followed by shielded metal arc welding. It cites the base metals and operating conditions necessary to make the weldment, the filler metal specifications, and the allowable joint designs for groove welds. This welding procedure specification (WPS) was developed primarily for pipe applications.



American Welding Society

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Standard Welding Procedure Specification (WPS)

Gas Tungsten Arc Welding (Consumable Insert Root) followed by Shielded Metal Arc Welding of Chromium-Molybdenum Steel, (M-5A/P-5A), 1/8 through 1/2 in. Thick, As-Welded Condition, 1/8 through 1-1/2 in. Thick, PWHT Condition, IN521, ER90S-B3, and E9018-B3, Primarily Pipe Applications

Welding Research Council¹—Supporting PQR Numbers: 200704, 200705, 200706, 200716, 200717, 200718, 200719, 200740, 200741, 200742, 200743, 200744, 200745, 200797, 200827, 200836, 200838

Requirements for Application of Standard WPSs

Scope. The data to support this Standard Welding Procedure Specification (WPS) were 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, specifica-

tions, 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.

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