

**Recommended
Practices for Welding of
Chromium-Molybdenum
Steel Piping and
Tubing**



American Welding Society



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Key Words — Chromium-molybdenum steel pipe,
chromium-molybdenum steel tubing

ANSI/AWS D10.8-96
An American National Standard

Approved by
American National Standards Institute
Date

Recommended Practices for Welding of Chromium-Molybdenum Steel Piping and Tubing

Supersedes AWS D10.8-86

Prepared by
AWS Committee on Piping and Tubing

Under the Direction of
AWS Technical Activities Committee

Approved by
AWS Board of Directors

Abstract

This document presents recommendations for welding chromium-molybdenum steel pipe and tubing to itself and to various other materials. Subjects covered in detail are filler metal selection, joint design, preheating, and postheating. Particular emphasis is placed on the importance of maintaining interpass temperature and dangers inherent in interrupted heating cycles.



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International Standard Book Number: 0-87171-500-7

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Foreword

(This Foreword is not a part of ANSI/AWS D10.8-96, *Recommended Practices for Welding of Chromium-Molybdenum Steel Piping and Tubing*, but is included for information purposes only).

The chromium-molybdenum (Cr-Mo) steels considered in this document contain from one-half to nine percent chromium and some molybdenum. These elements increase the corrosion and oxidation resistance of steel and impart greater strength and microstructural stability at elevated temperatures.

Since such alloy additions also increase hardenability, steps must be taken to prevent cracking during and after solidification by reducing stresses, limiting hydrogen content, and assuring adequate ductility. These steps include limiting the addition of those elements which increase hardenability, preheating, using filler metals and processes which minimize the addition of hydrogen to the weld, and postweld heat treatment (PWHT).

When these alloys are used in a corrosive environment, care should be taken to eliminate crevices and reduce hardness. When the service conditions include exposure to high temperatures, consideration must also be given to the need for increased creep strength and possible problems due to temper embrittlement and stresses resulting from differential thermal expansion. In addition, when joining different chromium-molybdenum steels to each other or to austenitic chromium-nickel stainless steels, consideration must be given to dilution during welding, diffusion of elements during service, and differences in thermal expansion and corrosion resistance.

The selection of base metals is beyond the scope of this document; however, the selection of filler metals for various base metal combinations and suggested preheating and postweld heat treating temperatures are included. This recommended practice discusses the special considerations which are advisable when preheating and post heating. A more complete treatment of this subject is to be found in ANSI/AWS D10.10, *Recommended Practices for Local Heating of Welds in Piping and Tubing*. Also not discussed in detail are the methods of root-pass welding. These are treated fully in ANSI/AWS D10.11, *Recommended Practices for Root Pass Welding of Pipe Without Backing*.

Comments and suggestions are welcome. They should be addressed to the Secretary, Committee on Piping and Tubing, American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

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