Specification for Steel Plates, Quenched-and-Tempered, for Offshore Structures

API SPECIFICATION 2Y
FIFTH EDITION, DECEMBER 2006

EFFECTIVE DATE: JUNE 1, 2007

REAFFIRMED, JUNE 2025



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Upstream Segment

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FOREWORD

This specification is under the jurisdiction of the API Subcommittee on Standardization of Offshore Structures.

The purpose of this specification is to provide standards for the purchase of quenched-and-tempered steel plate suitable for use in welded offshore structures.

Nothing in this specification should be interpreted as indicating a preference by the committee for any material or process. In the selection of materials and processes, the purchaser must be guided by his experience and by the service for which the plate is intended.

Changes from the previous edition are noted by bars in the margins.

Shall: As used in a standard, "shall" denotes a minimum requirement in order to conform to the specification.

Should: As used in a standard, "should" denotes a recommendation or that which is advised but not required in order to conform to the specification.

Suggested revisions are invited and should be submitted to the Standards and Publications Department, API, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001, standards@api.org.

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Specification for Steel Plates, Quenched-and-Tempered, for Offshore Structures

1 Scope

1.1 COVERAGE

This specification covers two grades of high strength steel plate for use in welded construction of offshore structures, in selected critical portions which must resist impact, plastic fatigue loading, and lamellar tearing. Grade 50 is covered in thicknesses up to 6 in. (150 mm) inclusive, and Grade 60 is covered in thicknesses up to 4 in. (100 mm) inclusive.

1.1.1 It is intended that steel produced to Grade 50 of the basic API Spec 2Y, without Supplementary Requirements, be at least equivalent in minimum performance and, therefore, in service application, to the corresponding grades listed in Sections 5 through 7 of API Spec 2H and API Spec 2W.

1.1.2 API Spec 2Y steels are intended for fabrication primarily by cold-forming and welding. The welding procedure is of fundamental importance and it is presumed that procedures will be suitable for the steels and their intended service. Because of the characteristic high YS/TS ratio of quenched-and-tempered steels, users may want to consider welding consumables which avoid undermatched weld metal. Conversely, the steels should be amenable to fabrication and welding under shipyard and offshore conditions.

1.2 POST MANUFACTURING HEATING

1.2.1 Due to the inherent characteristics of quenched-and-tempered material, plates manufactured to this Specification cannot be formed or postweld heat treated at temperatures above the tempering temperature used during manufacture without some risk of sustaining irreversible and significant losses in strength and toughness. If warm-forming is to be required, the tensile and notch toughness properties of the finished component shall be verified and the properties shall conform to the requirements of the specification. The plates may be post-weld heat treated at a temperature higher than that used during manufacture, providing the test coupons are subjected to a thermal cycle to simulate such fabrication operations, as described in Supplementary Requirement S9. Verification or simulation is not necessary for heating at temperatures not exceeding 400°F (205°C).

1.2.2 The primary use of these steels is in tubular joints, stiffened plate construction, and other intersections where portions of the plates will be subject to tension in the thickness direction (Z-direction). Supplementary Requirement S4 provides for through-thickness (Z-direction) testing of the plates by the manufacturer and specifies limits for acceptance. Supplementary Requirement S1 provides for ultrasonic examination of the plates by the manufacturer and specifies limits for acceptance.

1.2.3 For applications where through-thickness properties are important but Z-direction testing has not been specified, Supplementary Requirement S5 provides a low-sulfur chemistry intended to reduce the size and number of sulfide inclusions in the plate. Supplementary Requirement S5 is neither a substitute for Supplementary Requirement S4, Through Thickness Testing, nor a guarantee of a minimum level of through-thickness ductility.

1.2.4 The notch toughness requirements specified in Section 7 are suitable for application below water, or above water in areas of temperate climate (14°F [–10°C] minimum service temperature). Cold-formed materials have less toughness due to straining than that of the original flat plates, especially in those areas aged by the attachment welding of stubs and braces. The requirements for plates in Section 7 take into consideration typical losses in toughness due to straining and aging. Supplementary Requirements S7 and S8 deal with the strain-aging problem, and consideration should be given to invoking Supplementary Requirement S7 and/or S8 when the strain exceeds 5% or when (Nitrogen × % strain) exceeds 0.040.