



# Standard Specification for Supplementary Requirements for Seamless and Electric-Resistance-Welded Carbon Steel Tubular Products for High-Temperature Service Conforming to ISO Recommendations for Boiler Construction<sup>1</sup>

This standard is issued under the fixed designation A 520; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope

1.1 This specification provides the requirements which are to supplement and supersede the requirements of ASTM specifications for seamless and electric-resistance-welded carbon steel tubular products suitable for high-temperature service, when these tubular products are to be used in applications conforming to ISO Rules.

1.2 The tubular specifications<sup>2</sup> which may invoke this specification are:

Seamless Carbon Steel Pipe for High-Temperature Service	A 106
Electric-Resistance-Welded Carbon Steel Boiler Tubes	A 178/A 178M
Seamless Carbon Steel Boiler Tubes for High-Pressure Service	A 192/A 192M
Seamless Medium-Carbon Steel Boiler and Superheater Tubes	A 210/A 210M
Electric-Resistance-Welded Carbon Steel Boiler and Superheater Tubes for High-Pressure Service	A 226

1.3 The values stated in inch-pound units are to be regarded as the standard.

## 2. Manufacture

2.1 If rimmed steel or other than killed steel is used in the manufacture of electric-resistance-welded tubes to the requirements of Specification A 178/A 178M, the strip shall be rolled in single width and shall not be slit longitudinally except to trim the edges.

## 3. Mechanical Property Requirements Mechanical Property Requirements

3.1 The yield strength values at the indicated elevated temperatures shall not be less than those given in **Table 1**. The yield strength corresponding to a permanent offset of 0.2 % of the gage length of the specimen or to a total extension of 0.5 % of the gage length under load shall be determined.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel, and Related Alloys and is the direct responsibility of Subcommittee A01.09 on Carbon Steel Tubular Products.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 01.01.

3.2 For information purposes, **Table 2** lists the maximum allowable stresses which have been used in the creep and stress-rupture ranges for material to these specifications under ASME Boiler Code rules. These stresses were developed by applying to the basic creep and stress-rupture data, design criteria at least as conservative as those in the ISO Recommendations.

## 4. Number of Tests Required at Room Temperature

4.1 For lots of 400 tubes or under, one tube for each 50 tubes or 2 % of the total number of tubes, at the option of the manufacturer, shall be submitted to a tensile test, a flattening test, and a flaring or flanging test. For lots of more than 400 tubes, one additional tube out of each 100 tubes or part thereof shall be tested.

4.2 The flaring and flanging tests apply only for tubes of outside diameter not greater than 6 in. (152.4 mm) and a wall thickness not greater than 0.350 in. (8.89 mm).

4.3 A lot is defined as a group of tubes of the same diameter and wall thickness from metal of the same specification and of the same manufacturer.

## 5. Hydrostatic Test and Nondestructive Electric Test

5.1 Each tube shall be subjected to a hydrostatic or NDE test.

5.2 In case of a hydrostatic test, the test pressure shall be 1.5 times the design pressure (at least 1000 psi) (6.89 mPa), but the pressure shall not be greater than that calculated in accordance with Eq 1:

$$P = 2S \times t/D \quad (1)$$

where:

$P$  = test pressure,

$D$  = specified outside diameter,

$t$  = specified nominal wall thickness, and

$S$  = stress = 40 % of minimum specified tensile strength at room temperature as specified in the order.

5.3 The nondestructive electric test shall be as allowed and in accordance with the applicable standard (Specifications A 106, A 178, A 192, A 210, or A 226).