

**HIGH STRENGTH, LOW ALLOY STEEL—SAE J410 JUN84**

**SAE Recommended Practice**

Report of the Iron and Steel Technical Committee, approved January 1947, last revised October 1969, corrected June 1984. *COPIED FROM 1992 HANDBOOK*

**NOTE:** This document is being replaced by SAE J1392 for sheet and strip product and by SAE J1442 for plate, bar, and shape products. (June 1984)

**Introduction**—High strength, low alloy steel represents a specific group of steels in which enhanced mechanical properties and, in some cases, resistance to atmospheric corrosion are obtained by the addition of moderate amounts of one or more alloying elements other than carbon. Different types are available, some of which are carbon-manganese steels and others which contain further alloy additions, governed by special requirements for weldability, formability, toughness, strength, and economics. Descriptions of the different grades are given in the paragraph entitled General Information. These steels may be obtained in the form of sheet, strip, plates, structural shapes, bars, and bar size sections.

These steels are especially characterized by their mechanical properties, obtained in the as-rolled condition. They are not intended for quenching and tempering, and the purchaser should not subject them to such treatment without assuming responsibility for the ensuing mechanical properties. For certain applications these steels are sometimes annealed, normalized, or stress relieved with some influence on mechanical properties.

Where these steels are used for fabrication by welding, care must be exercised in selection of grade and in the details of the welding process. Certain grades may be welded without preheat or postheat.

**Application**—These steels, because of their high strength-to-weight ratio, abrasion resistance and, in the case of certain compositions, improved atmospheric corrosion resistance, are adapted particularly for use in mobile equipment and other structures where substantial weight savings are generally desirable. Typical applications are truck bodies, frames, structural members, scrapers, truck wheels, cranes, shovels, booms, chutes, and conveyors.

**Mechanical Properties**—The mechanical properties of these steels are shown in Table 1. For larger sizes than shown in the table, consultation with suppliers on availability and characteristics is suggested.

**NOTE:** Permissible use of yield point—Present steel industry practice is to express the yield of these materials as yield point rather than yield strength, and determination is by drop of beam, dividers, or other method, covered in ASTM A 370, Methods and Definitions for Mechanical Testing of Steel Products. Unless otherwise specified, this recommended practice is acceptable for material supplied in this report, and use of an extensometer is not required. The yield point shall meet the requirements shown for yield strength in Table 1A.

High strength, low alloy steel may be specified annealed or normalized, or otherwise specially prepared for special forming properties. In those cases mechanical properties should be agreed upon between supplier and purchaser.

**Bend Test**—Longitudinal bend test specimens shall stand being bent at room temperature through 180 deg without cracking on the outside

of the bent portion. The inside diameter of the bend shall have a relationship to the thickness of the specimen as prescribed in Table 1B.

The bend test requirements in Table 1B are for mill acceptance purposes and are made on prepared test specimens. They have no relationship to shop bending practices (see General Information) and are not to be

**TABLE 1A—MINIMUM MECHANICAL PROPERTIES\***

Grade	Form	Yield Strength, <sup>b</sup> psi min	Tensile Strength, psi min	Elongation, % min	
				2 in	8 in
942X	Plates, shapes, bars To 4 in incl	42 000	60 000	24	20
945A, C	Sheet and strip	45 000	60 000	22	—
	Plates, shapes, bars To 1/2 in incl	45 000	65 000	22	18
	1/2-1-1/2 in incl	42 000	62 000	24	19
945X	1-1/2-3 in incl	40 000	62 000	24	19
	Sheet and strip	45 000	60 000	25	—
	Plates, shapes, bars To 1-1/2 in incl	45 000	60 000	22	19
950A, B, C, D	Sheet and strip	50 000	70 000	22	—
	Plates, shapes, bars To 1/2 in incl	50 000	70 000	22	18
	1/2-1-1/2 in incl	45 000	67 000	24	19
	1-1/2-3 in incl	42 000	63 000	24	19
950X	Sheet and strip	50 000	65 000	22	—
	Plates, shapes, bars To 1-1/2 in incl	50 000	65 000	—	18
955X	Sheet and strip	55 000	70 000	20	—
	Plates, shapes, bars To 1-1/2 in incl	55 000	70 000	—	17
960X	Sheet and strip	60 000	75 000	18	—
	Plates, shapes, bars To 1-1/2 in incl	60 000	75 000	—	16
965X	Sheet and strip	65 000	80 000	16	—
	Plates, shapes, bars To 3/4 in incl	65 000	80 000	—	15
970X	Sheet and strip	70 000	85 000	14	—
	Plates, shapes, bars To 3/4 in incl	70 000	85 000	—	14
980X	Sheet and strip	80 000	95 000	12	—
	Plates to 3/8 in incl	80 000	95 000	—	10

\* Mechanical properties to be determined in accordance with ASTM A 370.  
<sup>b</sup> Yield strength to be measured at 0.2% offset.

**TABLE 1B—180 DEG BEND TEST REQUIREMENTS, RATIO OF BEND DIAMETER TO THICKNESS**

Grade	Sheet and Strip	Plates, Shapes, Bars—Thickness of Material, in						
		To 3/8 incl	3/8-1/2 incl	1/2-3/4 incl	3/4-1 incl	1-1-1/2 incl	1-1/2-2 incl	2-4 incl
942X	—	1	1	1	1-1/2	2	2-1/2	3
945A	1	1	1	2	2	2	3	3
945C	1	1	1	2	2	2	3	3
945X	1	1	1	1	1-1/2	2	2-1/2	—
950A	1	1	1	2	2	2	3	3 <sup>a</sup>
950B	1	1	1	2	2	2	3	3 <sup>a</sup>
950C	1	1	1	2	2	2	3	3 <sup>a</sup>
950D	1	1	1	2	2	2	3	3 <sup>a</sup>
950X	d51	1	1	1	1-1/2	2-1/2	3	—
955X	1	1	1-1/2	1-1/2	2	3	3-1/2 <sup>b</sup>	—
960X	1-1/2	1-1/2	2	2	2-1/2	3	—	—
965X	2	2	2-1/2	3	—	—	—	—
970X	3	3	—	—	—	—	—	—
980X	3	3	—	—	—	—	—	—

<sup>a</sup> Thickness 2-3 in inclusive.  
<sup>b</sup> Applicable to webs of structural shapes.

**CANCELLED**