

SHAPE MATERIAL
(ASTM A572 Gr 50 with special requirements)

As announced, effective May 1, 1997, structural steel shapes will be commercially available with special requirements. Please consult your steel supplier for specifics.

Steel shapes ordered to this technical bulletin shall conform to the following:

1. Meet all requirements of ASTM A572/A572M-94c *Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel* Grade 50;
2. The steel shall be made to a practice producing nitrogen not greater than 0.012% or steel shall be made to a practice producing nitrogen not greater than 0.015% and nitrogen binding elements shall be added;
3. Chemical Requirements:

The heat analysis shall conform to the requirements in Table 1;

Test reports shall include the chemical analysis for tin for information. When the amount of tin is less than 0.02%, the analysis may be reported as "<0.02%";

The carbon equivalent (CE) shall not exceed 0.50% except steel shapes not included in Groups 4 or 5 shall be supplied with a maximum of 0.45% if the carbon content is greater than 0.12%. The carbon equivalent shall be calculated using the following formula:

$$CE = C + (Mn + Si)/6 + (Cu + Ni) / 15 + (Cr + Mo + V + Cb)/5$$

TABLE 1 Chemical Requirements

<u>Element</u>	<u>Composition, %</u>
Carbon, max	Refer to ASTM A572
Manganese	0.50 - 1.50 ^a
Silicon, max	Refer to ASTM A572
Vanadium ^b	Refer to ASTM A572
Columbium ^b	Refer to ASTM A572
Phosphorous, max	0.035
Sulfur, max	0.045

<u>Element</u>	<u>Composition, %</u>
Copper, max	0.60
Nickel, max	0.45
Chromium, max	0.35
Molybdenum, max	0.15

^a Minimum manganese for Group 1 shapes is 0.30%. The ratio of manganese to sulfur shall not be less than 20 to 1.

^b Columbium plus vanadium is not to exceed 0.15% maximum. Nitrogen when added as a supplement to vanadium shall be reported and the minimum ratio of vanadium to nitrogen shall be 4 to 1.

4. Tensile Requirements:

Yield Point, ksi [Mpa]		50 - 65 [345 - 450]
Yield to Tensile Ratio, max	0.85	

SUPPLEMENTARY REQUIREMENTS

These requirements shall not apply unless specified in the order.

Standardized supplementary requirements for use at the option of the purchaser are listed in Specification A6/A6M. Those that are considered suitable for use with this specification are listed by title:

- S1. Vacuum Treatment
- S2. Product Analysis
- S5. Charpy V-Notch Impact Test
- S8. Ultrasonic Examination
- S14. Bend Test

ADDED SUPPLEMENTARY REQUIREMENTS

In addition, the following optional supplementary requirements are also suitable for use with this specification.

- S79. Maximum Tensile Strength
S79.1 The maximum tensile strength shall be 90 ksi [620 Mpa].
- S91. Fine Austenitic Grain Size
S91.1 The steel shall be killed with a fine austenitic grain size.
- SX3. Charpy V-Notch Impact Test for Group 4 and 5 Structural Shapes
- SX3.1 When Group 4 and 5 structural shapes are used as members subject to primary tensile stress and when such members are spliced using full penetration welds, the steel shall be impact tested in accordance with Specification ASTM A6, supplementary requirement S5, modified in accordance with SX3.2.
- SX3.2 Charpy V-Notch impact tests shall be conducted in accordance with Specification ASTM A673/A673M with the following exceptions for Group 4 and 5 rolled shapes:

The center longitudinal axis of the specimens shall be located as near as practical to midway between the inner flange surface and the center of the flange thickness at the intersection with the web mid-thickness (see Fig. 1).
- SX3.3 The frequency of testing shall be Frequency P in Specification ASTM A673/A673M with the following exception for rolled shapes produced from ingots:

Tests shall be conducted from a location representing the top of each ingot or part of an ingot used to produce the product represented by these tests.

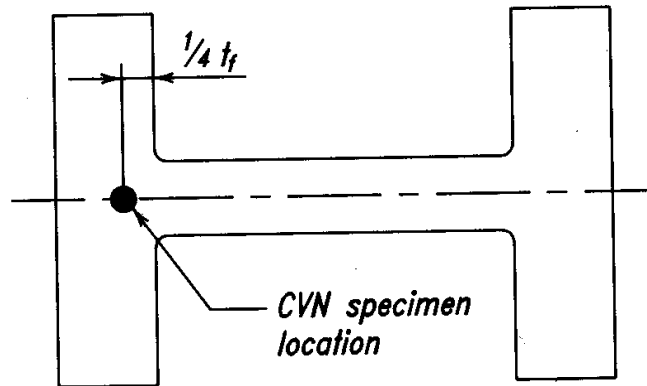


Fig. 1 Location from which Charpy impact specimen shall be taken for Group 4 and 5 structural shapes.

- SX3.4 The test result shall meet a minimum average value of 20 ft-lb [27J] absorbed energy at +70°F [+21°C] if the steel is intended for ordinary use in buildings such as static loading. For unusual applications such as dynamic loading, highly restrained connections, low temperature or any combination of these conditions, the purchaser should consider more restrictive Charpy V-notch requirements for specification in the contract documents.