ASTM A320 L7M Stud Bolts specification

4140 Alloy Steel Bolts for Low - Temperature Pressure Service

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Title

This material shall comply with the material technical specifications for alloy steel and stainless steel bolts for low - temperature service in ASTM A320 Gr L7M.

Scope

This technical specification defines the requirements for materials of bolts for low - temperature pressure service. The material must meet the requirements of API 6A and NACE MR - 01 - 75 CLASS I for Grade L7M (including supplementary requirement S4, adopting the requirements of the Charpy impact test in ASTM A320. Latest edition). The content described herein is the minimum requirement for the material. When there are differences between these requirements and relevant standards, the relevant standards shall be adopted first.

Process

The bolt material must be heat - treated when supplied. The heat treatment must comply with the relevant requirements in Section 4.3 "Heat Treatment" of ASTM A320.

Chemical Composition

The allowable deviation range of the chemical composition shall be in accordance with ASTM A320. (Maximum values, except for the ranges given separately).

Element	Composition Range	Deviation
Carbon (C)	0.38 - 0.48%	± 0.02%
Manganese (Mn)	0.75 - 1.10%	± 0.01%
Phosphorus (P)	0.035%	± 0.005%
Sulfur (S)	0.040%	± 0.005%
Silicon (Si)	0.15 - 0.35%	± 0.02%
Chromium (Cr)	0.80 - 1.10%	± 0.05%
Molybdenum (Mo)	0.15 - 0.25%	± 0.02%

Mechanical Properties

Parameter Name	Performance Parameter
Tensile Strength (min)	100000 (Psi) / 689.4 (Mpa)
Yield Limit (min)	80000 (Psi) / 551.5 (Mpa)
Elongation (min)	18%
Reduction of Area (min)	50%
Hardness HB (HRC) (max)	237 (22)

Low - Temperature Impact Test Requirements

1. The bolt detection shall be carried out in accordance with the "Impact Performance" requirements in ASTM A320.
2. No requirement for bolts with a diameter less than or equal to 1/2".
3. Test temperature: (100°F) - 73°C. The minimum value of a single sample is 20FT - LBF (27 Joules).

Test Pieces

The test piece material must be from the same heat as the material to be verified and must have the same process and heat treatment conditions as the material to be verified. The test sample must comply with the standard of API

6A 406 test samples. The test shall be carried out in accordance with the requirements of API 6A, ASTM A370, and A320 and records shall be made. The impact and hardness tests shall be carried out in accordance with the standards of ASTM A370 and ASTM A320.

Nondestructive Testing

Each piece of material must be visually inspected. Each piece of material must comply with the requirements of ASTM A320 and Section 8 "8. Workmanship, 10. Threads, 11. Inspection". If nondestructive testing is not required, it shall be specified in the purchase order.

Marking

The product marking shall comply with Section 14 "Product Marking" in ASTM A320. Bolts with a diameter less than 3/8" and studs with a diameter less than 1/4" do not need to be marked.

Certification

Unless otherwise specified in the order, the supplier must provide LTE Company with a certificate containing the following contents:

1. Order number, part number, lot number, heat number, as well as part name and part quantity;
2. Chemical analysis report;
3. Mechanical properties and hardness (HB) and low - temperature impact report;
4. Heat treatment process type (including time and temperature) report;
5. Confirmation of consistency in handling and shipping;
6. Nondestructive testing certification report (if required by the contract);