

Specification - Material Specification

Material : X20CrMo13

Description: all related operations

Version Status

Version	Date	List Of Modification	Status
00		Document Preparation	For Construction

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1- Scope of Application

This document describes the general requirements for qualifying the material of X20CrMo13 (Material Number = 1.4120) in the following condition:

- Forged and rolled steel bars

2- Referenced Document

- Forged and rolled steel bars → TLV9243/02

3- General Requirements

This section describes the general requirements for forged and rolled steel bars.

- ❖ Tests marked with “**Mandatory**” shall be carried out as specific tests in all cases. Those marked with “**Optional**” shall be carried out as specific tests only if mentioned in TPD document of each products.

3-1- Forged and rolled steel bars

- **Chemical composition (Mandatory):**

Element	C	Si	Mn	Cr	Ni	Mo
Min	0.17	0.10	0.30	12.0	*	0.80
Max	0.22	0.50	0.80	13.0	0.80	1.20

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- **Mechanical properties:** Mechanical properties are to be determined using longitudinal specimens taken from a depth corresponding to 1/3 of the material thickness.

- **Tensile test at room temperature (in the quenched and tempered condition) (Mandatory):**

0.2%-Proof Strength (MPa)	Tensile Strength (MPa)	Elongation (l=5d) (%)	Reduction of area (%)
600-750	Min 950	Min 15	Min 50

- **Impact energy at room temperature (in the quenched and tempered condition) (Mandatory):** Average of 3 ISO V specimens

Impact energy (J)
Min 20

- **Condition (Mandatory):** Cracks, other material discontinuities as well as pronounced linear series of inclusions are only permissible within the range of dimensional tolerances and even then must be located entirely within that material that is to be removed by machining.

Allowances and tolerances: The allowances and tolerances stipulated in the dimensional standards stated in the order apply. Surface decarburization, surface and other material defects shall not exceed the tolerable range of dimensions and the machining allowance; in the case of machined bars, this applies to the nominal dimension.

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▪ **Non-destructive Evaluation (Mandatory):**

- All bars shall be subjected to ultrasonic examination using the pulse-echo technique and a frequency of 2MHz.
- Evaluation of indications shall employ the DGS (distance gain size) technique. The following types of indications are not permissible:
 - a) Scattered individual indications with an equivalent flat bottom hole size ≥ 2 mm in diameter.
 - b) All individual indications with back wall echo attenuation of more than 10%.
 - c) All indications with linear or planar elongation as well as localized clusters of indications, regardless of the size of the individual indications involved.

▪ **Guidelines on the temperatures for heat treatment (Mandatory):**

Heat treatment : quenching and tempering		
Quenching Temperature (°C)	Type of cooling	Tempering Treatment (°C)
980-1030	oil	≥ 650

- If it is necessary to straighten bars after heat treatment, stress relief shall be performed subsequently at 50 °C below the tempering temperature and using a slow cooling down gradient.