

STEEL



LIBERTY

AISI 4330V

Nickel Chrome Molybdenum (NiCrMo) steel

AISI 4330V is a Nickel Chrome Molybdenum (NiCrMo) hardened and tempered high strength alloy steel for applications in the oil and gas industry.

It is typically used for oil tools and drilling jars due to its combination of high strength and exceptional impact properties.

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Scope

The specification defines the requirements for AISI 4330V hot rolled NiCrMo bars hardened and tempered to meet either 135ksi, 150ksi or 155ksi minimum yield strength.

Steel manufacture

Steel is manufactured via Electric Arc Furnace, followed by Ladle Refining and Vacuum Degassing and is either cast into bottom-poured wide end up ingots, or Continually Cast.

Heat treatment

- Furnaces surveyed and calibrated per AMS 2750.
- Austenitised and liquid quenched.
- Tempered to meet selected strength variant. Supplied either stress free or stress relieved.

Note at larger sizes a normalising process may be required.

Chemical analysis

| C | Si | Mn | P | S | Cr | Mo | Ni | Al | V |
|------|------|------|-------|--------|------|------|------|-------|------|
| 0.28 | 0.20 | 0.75 | - | - | 0.75 | 0.35 | 1.65 | 0.015 | 0.05 |
| 0.33 | 0.30 | 1.00 | 0.015 | 0.0015 | 1.00 | 0.50 | 2.00 | 0.035 | 0.10 |

General delivery conditions

- Applicable bar diameters: 1-12".
- Surface conditions: Black/Peeled/Smooth Turned. Straightness: 1mm in 500mm, 1/8 in 5". Enhanced straightness may be available on request.

Mechanical properties

| | 135ksi Variant 1-10" (Mid Radial) 10-12.5" (1" below) | | | 150ksi variant 1-10" (Mid Radial) 10-12.5" (1" Below) | | | 155ksi variant 1-10" (Mid Radial) 10-12.5" (1" Below) | |
|--------------------------|---|-------------|------------------|---|-------------|-----------------|---|-------------|
| | Minimum | Maximum | | Minimum | Maximum | | Minimum | Maximum |
| 0.2 % Proof stress (ksi) | 135 | | | 150 | | | 155 | |
| UTS (ksi) | 145 | | | 160 | | | 165 | |
| % Elongation | 14 | | | 14 | | | 14 | |
| % reduction of area | 50 | | | 45 | | | 45 | |
| Hardness HRC | 30 | 36 | | 34 | 40 | | 34 | 40 |
| Hardness HBW | 286 | 341 | | 319 | 371 | | 319 | 371 |
| | Average | Min. Single | | Average | Min. Single | | Average | Min. Single |
| CVN @ 23°C (J) | 65 | 65 | | 54 | 54 | | 54 | 54 |
| CVN @ -40°C | 50 | 50 | CVN @ -20 °C (J) | 32 | 30 | CVN @ -20°C (J) | 27 | 20 |

Machining tolerances

For 'Machining Quality Bar' to ASTM A29 Tolerances the minimum machining allowance should be as follows:

| Ordered Surface condition | Minimum stock removal |
|---------------------------|-----------------------|
| Peeled/Smooth Turned | 1 % per side |
| Black | 1.6 % per side |

API 6A

Each bar length will be 100 % ultrasonically tested per ASTM A388, with acceptance criteria in accordance with API 6A PSL 3&4.

Note: Above a rolled size 10.25" the central 20 % of the bar will be excluded from ultrasonic testing.

Reduction ratio

Reduction ratio will meet 4:1 as a minimum.

Structure

Grain size will be ASTM 5 or finer.

Technical Support

We have a comprehensive technical support team available to advise on grade selection and product range to achieve the maximum benefit. Customer Technical Support provide specialist advice and help with day-to-day problem solving.

Works based metallurgists and the full resources of our Steel Research and Development Laboratories are available to assist with longer-term developments.

For further information, enquiries or any technical guidance on our range of Oil & Gas products please contact the Commercial Department at the address below.

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