



## SPECIFICATIONS

European Standards:

- Symbol: X19CrMoNbVN11-1
- Numerical designation: 1.4913

AIR : Z 20 CDNb 11

## COMPOSITION

Carbon.....	0.20
Chromium.....	11.00
Molybdenum.....	0.70
Niobium.....	0.40
Vanadium.....	0.18

## TYPICAL MECHANICAL PROPERTIES

### HEAT TREATMENT REFERENCE

- Oil quench or air cool from 1125°C. Temper at 675/700°C:
  - UTS: 1000 N/mm<sup>2</sup>
  - 0.2 % Yield strength: 800 N/mm<sup>2</sup>
  - Elongation (5d): 12 %
- Creep and yield strength:

## APPLICATIONS

- Aerospace industry: clamp rings, cooled turbine discs.
- Marine and land-based machines: gas turbine rotors and blades, various steam turbine components, fasteners for high temperature environments.
- Tooling for alloy die-casting (e.g. nozzles, goosenecks etc)

## CHARACTERISTICS

- High resistance to thermal shock
- Good creep properties.
- Suitable for nitriding.

Temperature (°C)	Average load in N/mm <sup>2</sup> causing creep fracture in:		Mean stress in N/mm <sup>2</sup> producing 0.2% elongation by successive loads held for 10 mins
	100 hrs	1000 hrs	
500	550	520	570
550	480	420	475
600	370	300	370
650	260	170	250

## HEAT TREATMENT

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- We normally supply this steel in the heat treated condition ready for use.

## PHYSICAL PROPERTIES

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- Density: 7,8
- Critical points:
  - Ac 1: 795°C
  - Ac3: 890°C
- Mean coefficient of expansion in m/m.°C:
  - between 20°C and 200°C:  $10.9 \times 10^{-6}$
  - between 20°C and 400°C:  $11.7 \times 10^{-6}$
  - between 20°C and 600°C:  $12.4 \times 10^{-6}$
  - between 20°C and 800°C:  $13.0 \times 10^{-6}$
- Modulus of elasticity in N/mm<sup>2</sup>:
  - at 20°C:  $200 \times 10^3$
  - at 200°C:  $187 \times 10^3$
  - at 400°C:  $168 \times 10^3$
  - at 600°C:  $147 \times 10^3$

## FORGING

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Please contact us for specific advice.

Contact:

[www.aubertduval.com](http://www.aubertduval.com)

The data provided in this document represent typical or average values rather than maximum or minimum guaranteed values. The applications indicated for the grades described are given as guidance only in order to help the reader in his personal assessment. Please note that these do not constitute a guarantee whether implicit or explicit as to whether the grade selected is suited to specific requirements. Aubert & Duval's liability shall not under any circumstances extend to product selection or to the consequences of that selection.