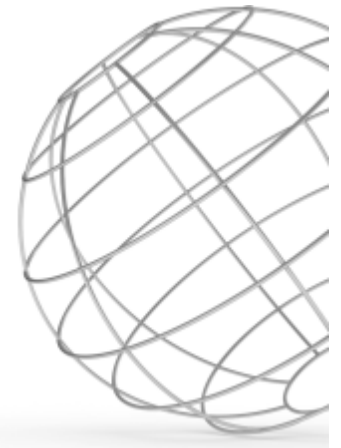




R868.11

EN: 1.4887
Type: 330Cb



R868.11 (330 Cb) is similar to R860.13 (Type 330) with Columbium added as a stabilizing agent to prevent precipitation of carbides and with improved mechanical properties. A higher Silicon content also improves its resistance to oxidation and carburization. This grade is recommended for products extended exposure in the 650-930°C (1200-1700°F) range where the maximum temperature does not exceed 1120°C (2050°F). It has good resistance to carburizing and carbonitriding at temperatures up to 980°C (1800°F). Like R860.13 can suffer from excessive grain growth. Typical applications are wire for heat-treating baskets, furnace fans and shafts, conveyors and for gas turbine parts.

CHEMICAL COMPOSITION (Nominal) %

C	Si	Mn	Cr	Ni	Mo	N	Nb	
<0.030	1.85	0.50	19.5	34.5	<0.30	0.060	0.85	

PRE: 21 (PRE = Cr + 3.1 x Mo + 25 x N)

Comments:

PHYSICAL PROPERTIES

Condition: Annealed

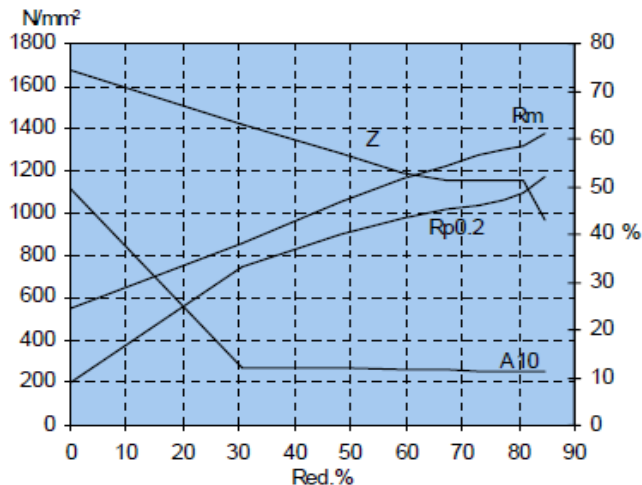
Density	8.0 g / cm ³
Moduls of elasticity, E	196 GPa
Specific heat 0-100°C	460 J / kg°C

TYPICAL MECHANICAL PROPERTIES

Condition: Annealed

Proof strength	Rp0.2	min 180 N / mm ²
Tensile strength	Rm	500-620 N / mm ²
Elongation	A10	min 40 %

DEFORMATION GRAPH



THERMAL TREATMENT

	°C	°F
Annealing temperature	1050-1100	1920-2010

MAX. OPERATING TEMPERATURE

	°C	°F
Oxidizing atm. intermitt. / cont.	1070 / 1150	1958 / 2102
Oxidizing sulphurous atm.	930	1700
Reducing sulphurous atm.	930	1700
Carburizing/carbonitriding atm.	980	1800
Diss. ammonia and hydrogen at.	1095	2000

THERMAL CONDUCTIVITY

20 °C	12.4 W / mK
400 °C	19.0 W / mK
650 °C	23.4 W / mK
750 °C	23.8 W / mK
870 °C	24.6 W / mK
1000 °C	26.2 W / mK

THERMAL EXPANSION

Thermal expansion per °C x 10⁻⁶ from 20°C to:

200 °C	15.5
400 °C	16.0
600 °C	17.0
800 °C	17.7
1000 °C	18.0

RESISTIVITY

20 °C	1200 μΩmm
400 °C	1110 μΩmm
650 °C	1130 μΩmm
750 °C	1200 μΩmm
870 °C	1240 μΩmm
1000 °C	1270 μΩmm