DATA SHEET CRONIDUR® 30

Mat. No.: 1.4108 – SAE No. AMS 5898

X 30 CrMoN 15 1

Energietechnik Essen
GmbH · since 1811

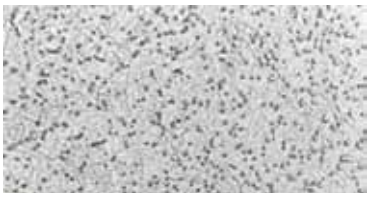
CRONIDUR® 30

Cronidur® 30 is a pressure-nitrided, martensitic cold working steel. If offers outstanding durability as well as hardness levels up to 60 HRc. Use of the PESR (Pressure Electro Slag Remelting) process in combination with sophisticated forging and rolling technology imparts extremely good cleanliness and a fine, homogeneous structure. This results in excellent machinability, outstanding polishability, and high dimensional stability after heat treatment. The use of nitrogen as a partial substitute for carbon leads to far better resistance to corrosion and wear than the conventional method of producing cold working steels. Furthermore, Cronidur® 30 possesses a tempering resistance as high as 500 °C. Through this outstanding mix of properties it has established itself as a material for spindle and ball bearings in the aerospace and mechanical engineering industries.

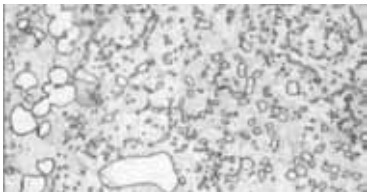
NEW APPLICATIONS BESIDES THE CLASSICAL FIELDS OF USE INCLUDE:

- Cutter knives, portioning and filling units (food industry)
- Pump vanes, spindles, conveying and dosing units (chemicals and pharmaceuticals industries)
- Preforming and compression tools
- Mirror-finish polished moulds (plastics industry)
- Shredder knives und granulating rotors (recycling industry)
- Medical instruments

STRUCTURE COMPARISON (MAGNIFICATION 1000X, ETCHED)



Cronidur® 30

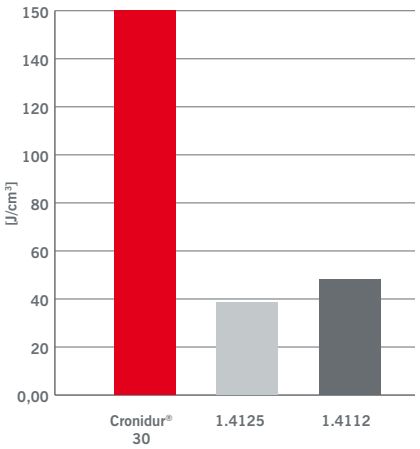


1.4112

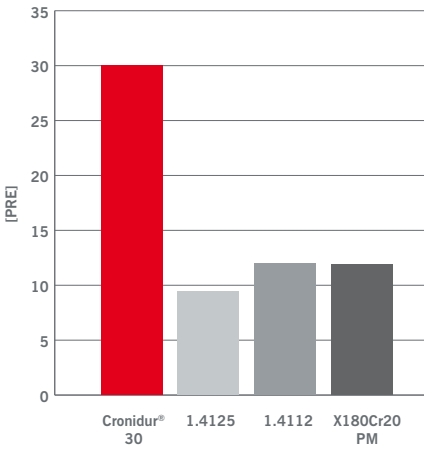
CHEMICAL ANALYSIS

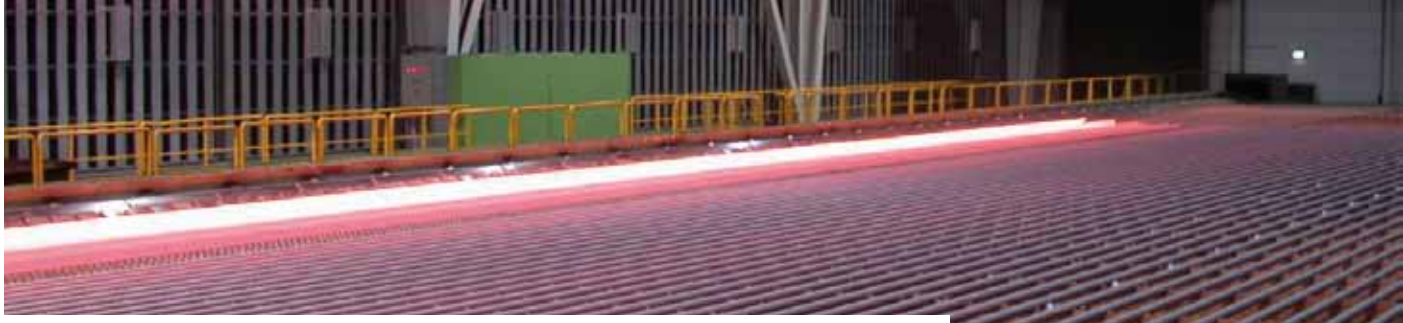
	Min.	Max.
Carbon	0.25	0.35
Silicon	-	1.00
Manganese	-	1.00
Chromium	14.00	16.00
Nickel	-	0.50
Molybdenum	0.85	1.10
Nitrogen	0.30	0.50

TOUGHNESS COMPARISON (SPEC. IMPACT ENERGY) FOR A HARDNESS OF 56-57 HRC



CORROSION COMPARISON





HEAT TREATMENT

SOFT-ANNEALING: Cronidur® 30 should be heated uniformly to a temperature of 780 to 820 °C. The holding time after complete soaking is around 8 h. After this heat treatment the level of hardness will be 200 to 240 HB.

STRESS RELIEF ANNEALING: Rough machining should be followed by stress relief annealing at around 600 to 650 °C. After thorough heating, the work piece should be held at temperature for about 2 hours and subsequently cooled down in the furnace to approximately 350 °C. This should be followed by cooling in still air.

HARDENING: The selected austenitising temperature can be between 1000 and 1030 °C, depending on the product requirements (see table). If the work piece is of a complex nature, temperature equalisation should be performed at 750 to 780 °C. When carrying out hardening in a vacuum furnace, it must be ensured that the nitrogen partial pressure is adjusted to between 100 and 200 mbar so as to avoid any increase or decrease in the surface nitrogen content. Should this not be possible for technical or equipment-related reasons, a machining allowance of around 0.2 mm on all sides must be included so as to eliminate possible surface influences.

COOLING: Cooling can be done by quenching in oil. If the heat treatment is performed in a vacuum furnace, it is necessary to have a quenching overpressure of at least 5 bars.

ANNEALING: Where hardening temperatures have been > 1000 °C it is necessary, directly after quenching to room temperature (approx. 20 °C), to carry out deep-freezing because the nitrogen contained in Cronidur® 30 stabilises retained austenite to a major degree. A minimum temperature of – 80 °C should be achieved in this regard and maintained over a period of at least 60 minutes after complete cooling. This should be followed by 2 x 2 h of tempering at an adjusted temperature (see chart) to achieve the required properties.

HEAT TREATMENT TO ACHIEVE DIFFERENT PROPERTIES

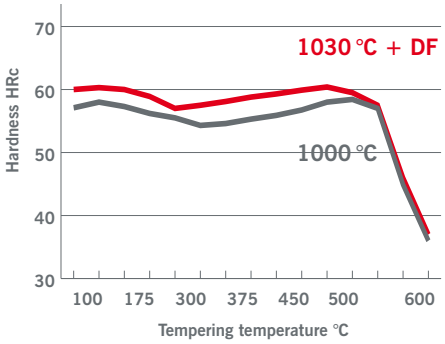
Hardness HRc	Hardening temperature °C	Tempering °C	Corrosion-resistance	Toughness
> 58	1030*	160 – 180	++	0
55 – 58	1030*	220 – 300	++	++
> 58	1030*	460 – 475	+	+
30 – 40	1000	550 – 620	+	+++

* deep freezing (DF), -80 °C, 60 min., air

MECHANICAL PROPERTIES

Hardness [HRc]	> 58
Yield strength [MPa]	1850
Tensile strength [MPa]	2150
Fracture elongation [%]	3
Fracture toughness [MPa√m]	> 20

TEMPERING CHART



In addition to Cronidur® 30, the following High Nitrogen Steels are available from Energietechnik Essen GmbH:

Material grades

Name	Mat. No.	
P 900 N	1.3815	X 8CrMnN19-19
P 900 N Mo	1.4456	X 8CrMnMoN18-18-2
P 2000	1.4452	X 13CrMnMoN18-14-3

Typical applications:

- Engine manufacture
- Medical engineering
- Power machine engineering

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