Energietechnik Essen
GMH GRUPPE

CRONIDUR® 30
A Driver of Innovation

Mat.-no.: 1.4108 – X30CrMoN15-1

Cronidur® 30 is a high-nitrogen, highly corrosion-resistant, martensitic cold-work steel offering outstanding toughness at a hardness above 58 HRC. The material provides a unique combination of properties that often makes innovative and highly demanding applications possible in the first place.
By means of high-pressure Electro-Slag Remelting (PESR), nitrogen is alloyed beyond the usual solubility limit. The resulting homogeneous microstructure with finely dispersed carbonitrides, combined with an exceptional degree of cleanliness, delivers outstanding dimensional stability, polishability and wear resistance.
The influence of nitrogen not only enhances corrosion resistance but also has a positive effect on the mechanical properties, resulting in high strength combined with high fracture toughness and tempering resistance up to 475 °C.

Available according to:

- SAE AMS 5898
- ASTM F 899
- UNS S42027

Key Advantages:

- Special steel with hardness > 58 HRC in the hardened condition, offering excellent wear resistance and good edge retention
- Very high corrosion resistance in the hardened condition

MAIN APPLICATION AREAS

Aerospace, motorsports, mechanical engineering, cutlery and blade industry (industrial knives for the food industry), tools for medical and pharmaceutical applications, high-precision ball bearings, ball and roller bearings, ball screw drives, extruder screws, pumps and valves, high-gloss-polishable molds for plastic mold making

Properties: (1 = low – 10 = excellent)

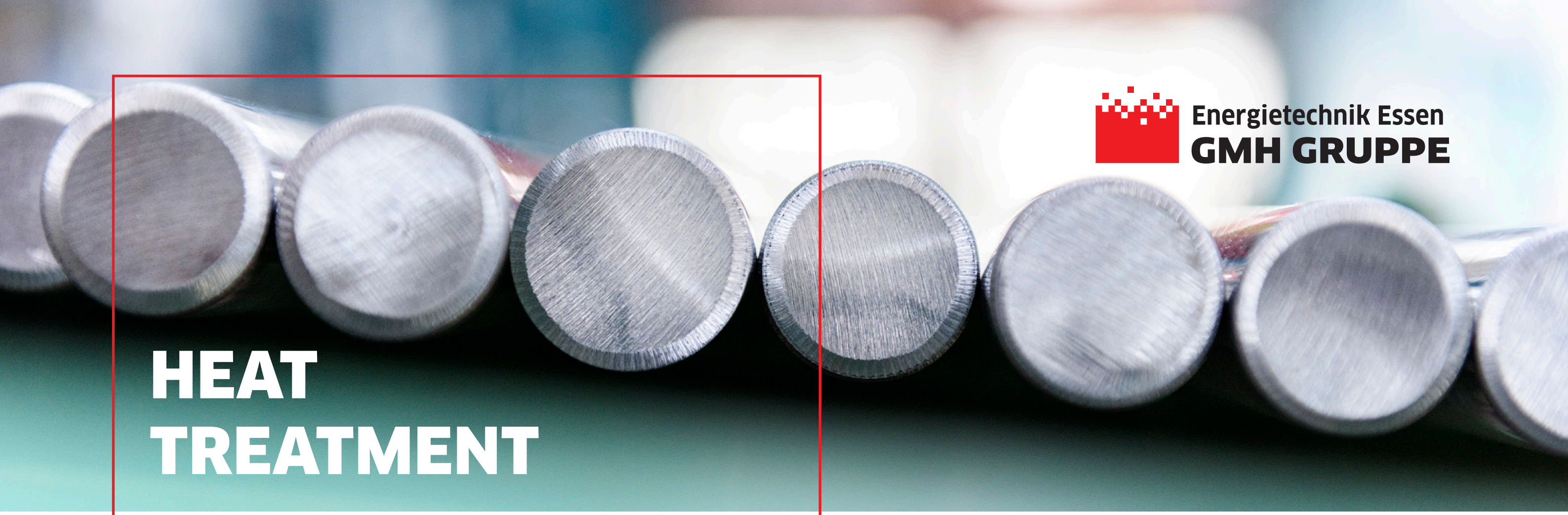
- Weldability: 1
- Machinability: 9
- Wear resistance: 8
- Polishability: 10
- Corrosion rating: 9

Chemical Analysis (in wt.%)**:**

1.4108 X30CrMoN15-1	C	Si	Mn	Cr	Mo	Ni	N
min.	0,25	-	-	14,0	0,85	-	0,3
max.	0,35	1,00	1,00	16,0	1,10	0,5	0,5

Product Portfolio:

1.4108 X30CrMoN15-1	Bars Ø	Sheets	Blank Thickness	Wire Rod Ø
min.	5 mm	3 mm	20 mm	5 mm
max.	350 mm	20 mm	340 mm	21 mm
min. - Production Quantity	0,600 - 1.200 kg	700 kg	250 - 1.000 kg	600 kg



HEAT TREATMENT

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Soft annealing

Cronidur 30 must be heated uniformly to a temperature of 780–820 °C. The holding time after complete soaking is between 4 and 8 hours. After this heat treatment, a hardness of <300 HBW (4 h holding time) or <250 HBW (8 h holding time) is obtained.

Stress relief annealing

After rough machining, stress relief annealing can be carried out by heating to approximately 600–650 °C. After complete through-heating, the workpiece should be held at temperature for about 2 hours and cooled in the furnace to approximately 350 °C. Cooling is then continued in still air down to room temperature.

Hardening

Proper heating to the required austenitizing temperature with the usual holding steps is assumed. For complex components, equalizing is typically carried out at approximately 750–780 °C. The holding time after full through-heating is 20–40 minutes. The austenitizing temperature can be selected between 990 and 1030 °C depending on product requirements. When hardening in vacuum, an adapted nitrogen partial pressure of 100–200 mbar must be maintained to avoid nitrogen depletion or nitrogen enrichment in the surface layer. If this is not possible due to equipment limitations, an all-round grinding allowance of approximately 0.2 mm must be considered to remove potential surface effects.

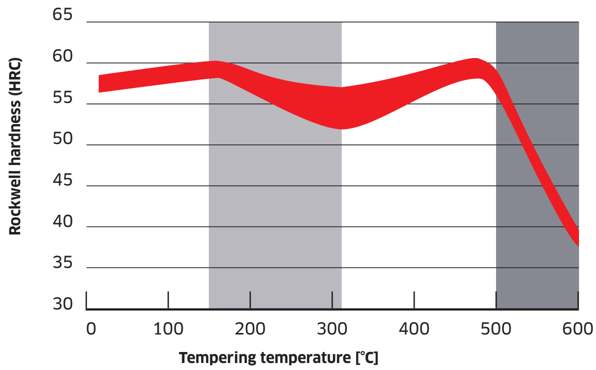
Cooling

Cooling may be performed by oil quenching. For vacuum heat treatment, a quenching overpressure of at least 5 bar is required.

Tempering

Immediately after quenching to room temperature (approximately 20 °C), cryogenic treatment is required at hardening temperatures above 1000 °C, since the nitrogen content of Cronidur 30 strongly stabilizes retained austenite. At least –80 °C must be reached, and after complete cooling, the material should be held for at least 60 minutes. Subsequently, tempering is carried out for 2 × 2 hours at the appropriate temperature (according to the tempering diagram) to achieve the desired final properties.

Tempering diagram:



Tempering diagram according to:

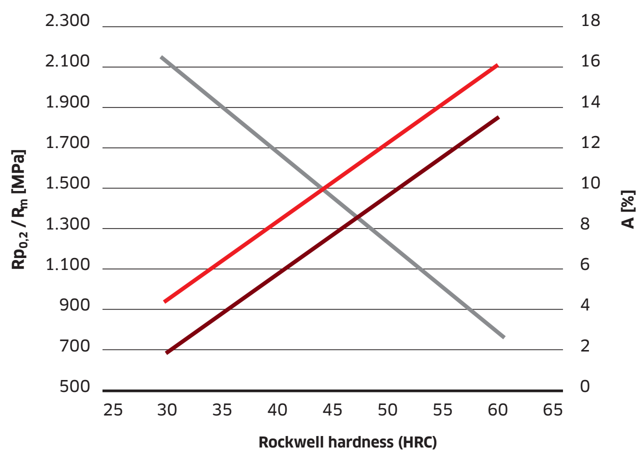
a. austenitizing at 1030 °C followed by
b. quenching in oil or gas and
c. cryogenic treatment at –80 °C

very good corrosion resistance
high toughness

Heat treatment recommendations:

1. 1030 °C/–80 °C/2 × 180 °C – very good corrosion resistance; at 58–60 HRC
2. 1030 °C/–80 °C/2 × 280 °C – very good corrosion resistance with increased ductility; at 52–57 HRC
3. 1030 °C/–80 °C/2 × 475 °C – for higher service temperatures; at 58–60 HRC

Mechanical properties:



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