



EXEO-CR20

**HIGH STRENGTH AND CORROSION-RESISTANT
STAINLESS STEEL (MARTENSITIC STAINLESS STEEL)**

CELEBRATE THE POLE POSITION



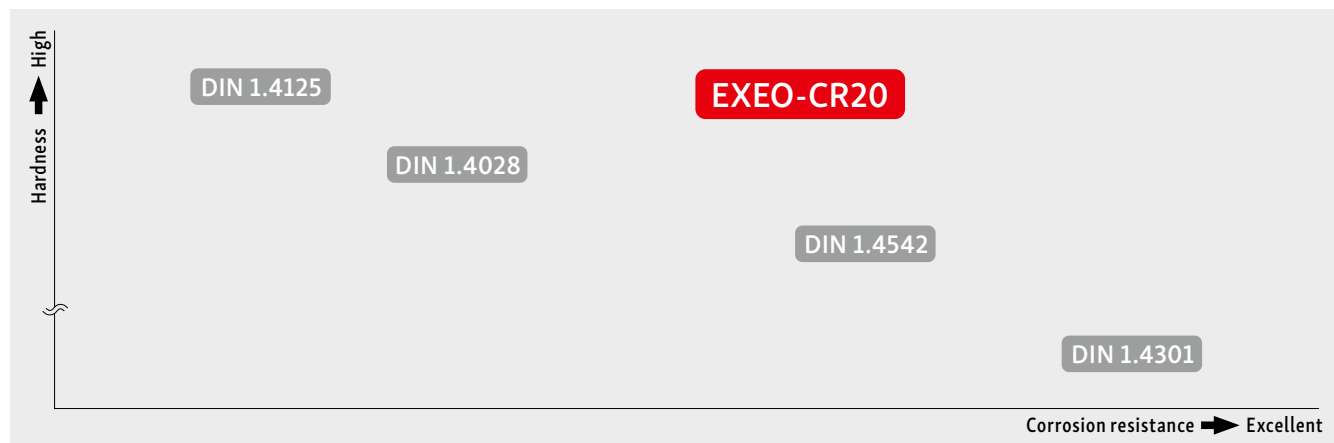
EXEO-CR20 – High strength and corrosion-resistant stainless steel

EXEO-CR20 is a new concept stainless steel developed by original composition design and special melting technology as the material with top class high strength and high corrosion resistance (DIN 1.4123-Äquivalent).

- ▶ EXEO-CR20 has the hardness of maximum 60 HRC and high strength exceeding 2GPa as well as excellent corrosion resistance compared with DIN 1.4028.
- ▶ Since coarse carbide does not exist, EXEO-CR20 has high fatigue strength and toughness.
- ▶ Due to its excellent machinability, the manufacturing cost can be halved compared to DIN 1.4125. (Our estimation)



Relationship between hardness and corrosion resistance (conceptual diagram)



Application Examples: EXEO-CR20 contributes to the improvement of the life of parts used in harsh environments.

MOTORS

Fuel system parts, corrosion resistant bearings, etc.



MEDICAL AND FOOD INSTRUMENTS

Tableting stamp, Knife, scissors, drill, etc.

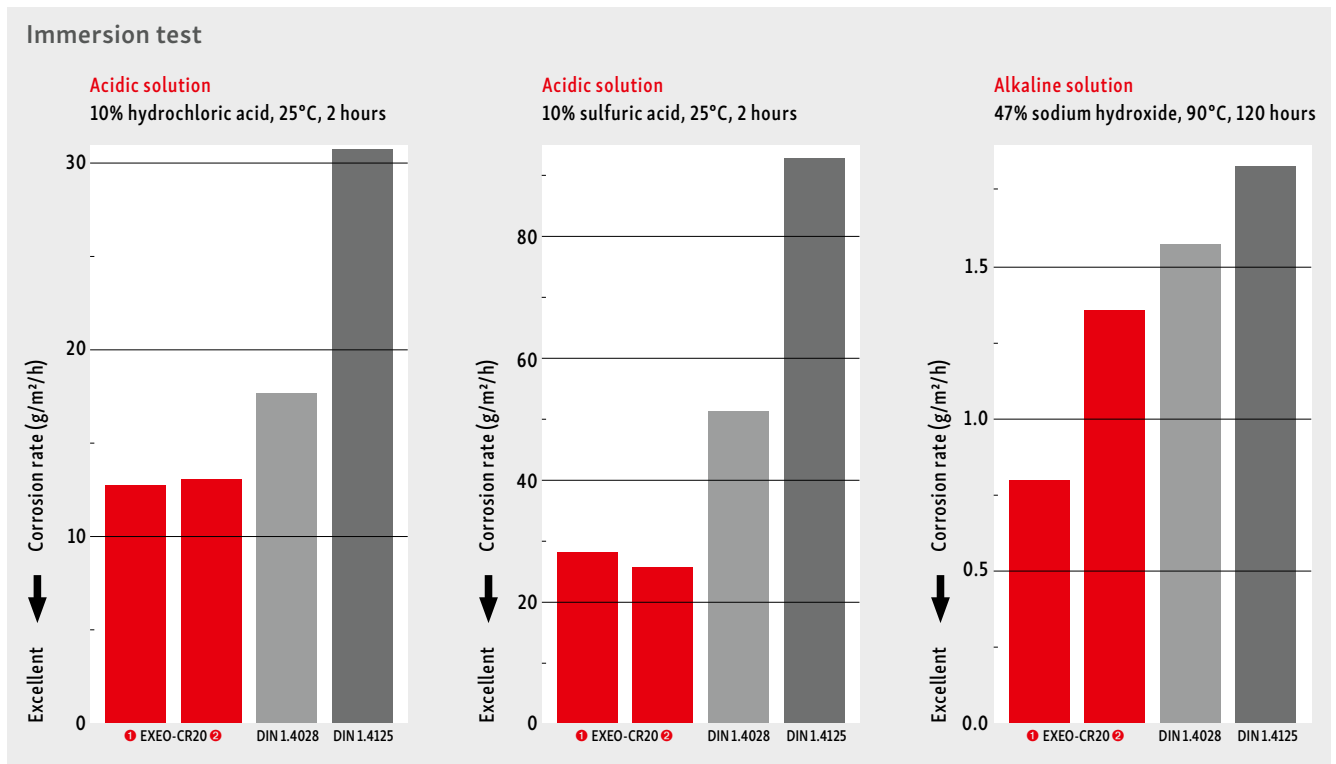
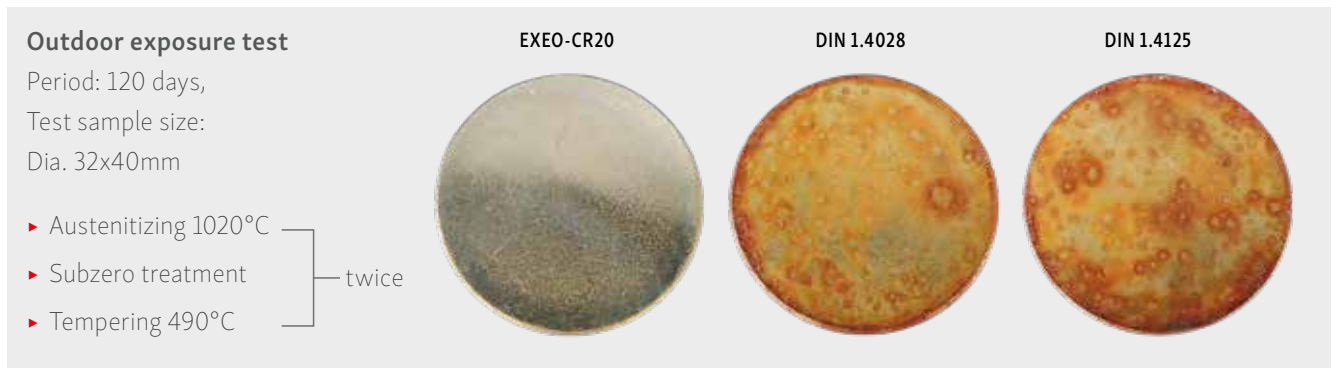


PLASTIC MOLD

Corrosion-resistant mold parts, high-pressure molds (hard to deform)



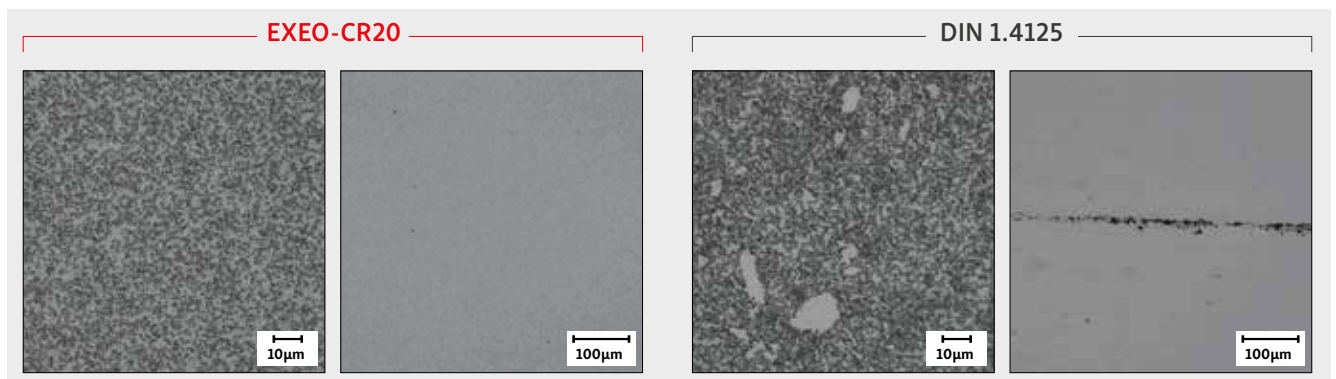
Corrosion resistance:



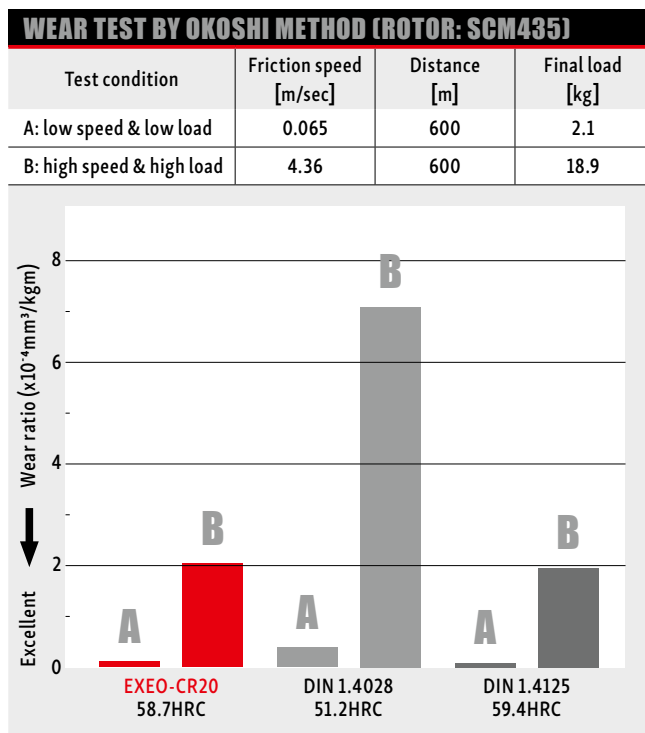
① EXEO-CR20: Austenitizing 1050°C + Subzero treatment + tempering 180°C - once
 ② EXEO-CR20: Austenitizing 1050°C + Subzero treatment + tempering 500°C - twice

DIN 1.4028: Austenitizing 1030°C + tempering 180°C - once
 DIN 1.4125: Austenitizing 1050°C + tempering 180°C - once

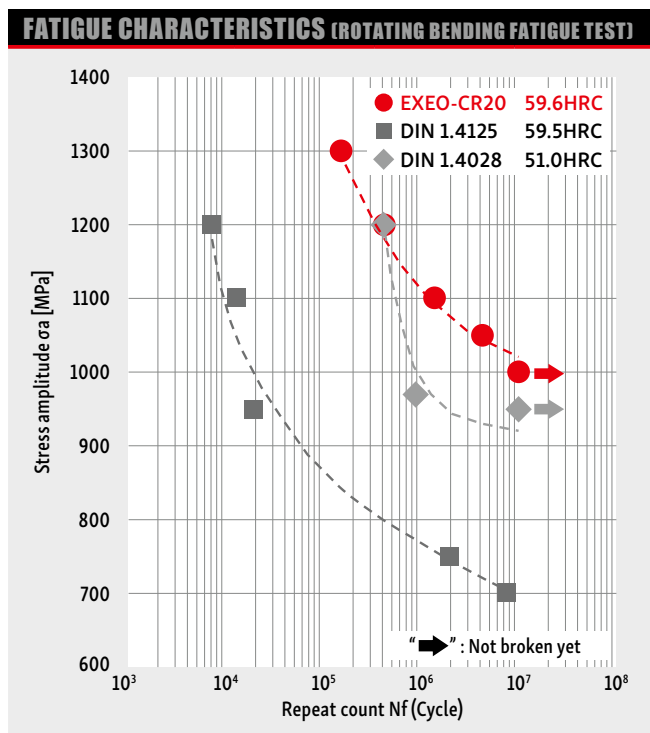
Microstructure: EXEO-CR20 realizes miniaturization of carbide and reduction of nonmetallic inclusions by original component design and special melting technology.



Mechanical properties: EXEO-CR20 has the same wear resistance as DIN 1.4125 and excellent fatigue strength.

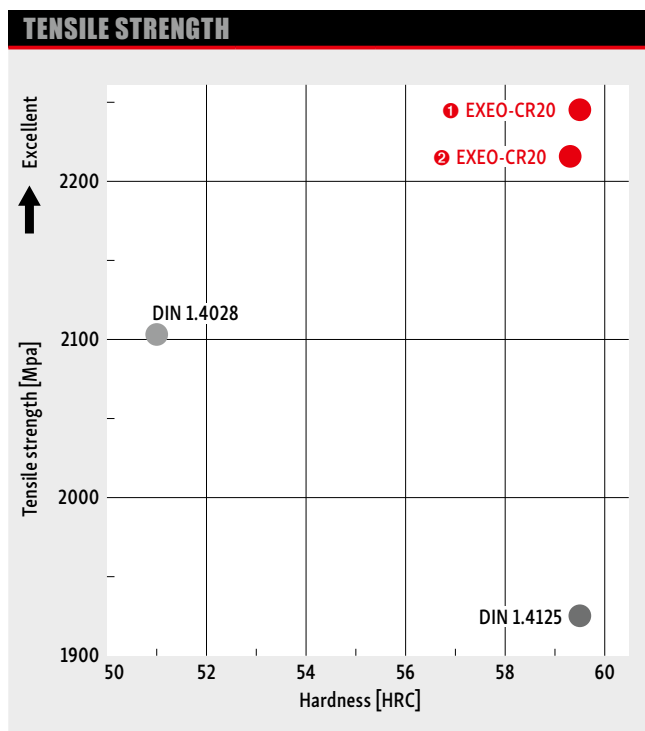


EXEO-CR20: Austenitizing 1050°C + subzero treatment + tempering 180°C - once
 DIN 1.4028: Austenitizing 1030°C + tempering 180°C - once
 DIN 1.4125: Austenitizing 1050°C + tempering 180°C - once

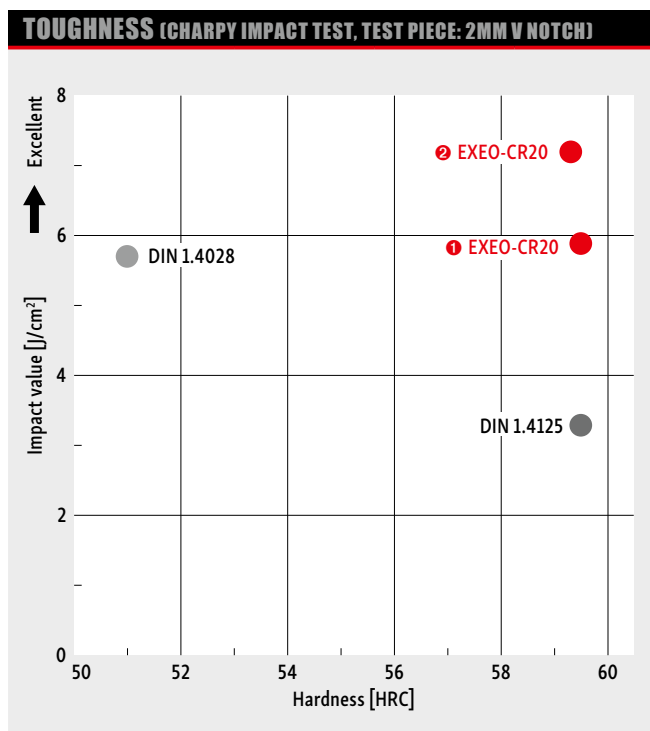


EXEO-CR20: Austenitizing 1075°C + subzero treatment + tempering 180°C - once
 DIN 1.4028: Austenitizing 1030°C + tempering 180°C - once
 DIN 1.4125: Austenitizing 1050°C + tempering 180°C - once

Mechanical properties: EXEO-CR20 has better strength than DIN 1.4028 and DIN 1.4125.



① EXEO-CR20: Austenitizing 1075°C + Subzero treatment + tempering 180°C - once
 ② EXEO-CR20: Austenitizing 1075°C + Subzero treatment + tempering 500°C - twice
 DIN 1.4028: Austenitizing 1030°C + tempering 180°C - once
 DIN 1.4125: Austenitizing 1050°C + tempering 180°C - once



① EXEO-CR20: Austenitizing 1075°C + Subzero treatment + tempering 180°C - once
 ② EXEO-CR20: Austenitizing 1075°C + Subzero treatment + tempering 500°C - twice
 DIN 1.4028: Austenitizing 1030°C + tempering 180°C - once
 DIN 1.4125: Austenitizing 1050°C + tempering 180°C - once

Machinability: EXEO-CR20 has a substantially better machinability compared to DIN 1.4125, and the machining time is reduced.

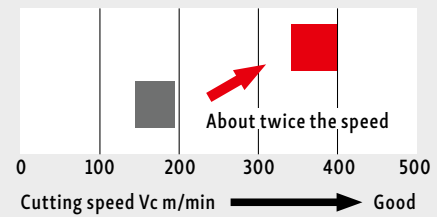
Example of turning process

Rough machining (Annealed material, cutting fluid: Microcut 3680, 20 times aqueous solution, cutting amount: 1.5-4.0mm)

Material	Tools to use	Cutting speed Vc [m/min]	Feed amount f [mm/rev]
EXEO-CR20	CNMG120408 M3	350-385	0.3-0.5
DIN 1.4125	TP2501 SECO	150-175	0.25-0.4

EXEO-CR20

DIN 1.4125



Grindability: Grinding is possible with WA grinding wheels, and grindability is further improved if grinding wheels suitable for 440C are used.

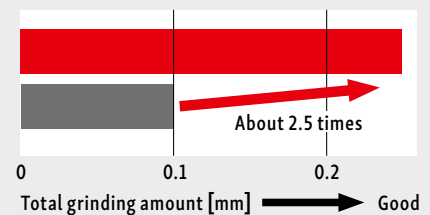
Example of grinding process

Rough machining (Quenched and tempered material, Dia. 100x50mm, 5 pieces aligned, Grinding fluid: Chemicool X-89, 30 times aqueous solution)

Material	Hardness of work	Wheels to use	Total grinding amount	Judgment
EXEO-CR20	58HRC	WA60H7AV	0.25	●
DIN 1.4125	56HRC	Ø355×38×Ø127	0.10	×

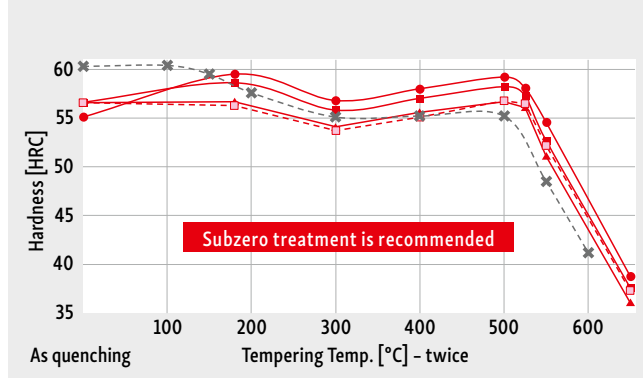
EXEO-CR20

DIN 1.4125



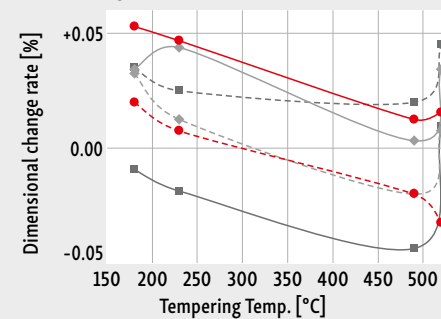
Heat treatment:

Hardness after heat treatment



Size deformation after heat treatment

Dimensions of test piece: Dia. 32x40mm, Austenitizing 1020°C + subzero treatment



Austenitizing temperature

- ▲ 1025°C Subzero treatment
- 1050°C Subzero treatment
- 1075°C Subzero treatment
- 1050°C
- ✱ DIN 1.4125, 1050°C

- EXEO-CR20 Radial direction
- EXEO-CR20 Axial direction
- DIN 1.4125 Radial direction
- DIN 1.4125 Axial direction
- DIN 1.4028 Radial direction
- DIN 1.4028 Axial direction

RECOMMENDED HEAT TREATMENT CONDITION

Hardening		Sub-zero treatment	Tempering		Remarks
Preheating	Austenitizing		Temperature	Hardness	
600-850°C	1020-1075°C Oil quenching or gas pressure quenching	-80°C	180°C - once	56-60HRC	To emphasize corrosion resistance
			490-550°C - twice	55-60HRC	Electric discharge machining, coating compatible

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