

Sandvik SAF 2707 HD for wirelines

(Wire)

Sandvik SAF 2707 HD is a hyper-duplex (austenitic-ferritic) stainless steel particularly suitable for slickline service in highly corrosive oil and gas wells. The grade is characterized by:

- Excellent resistance to stress corrosion cracking (SCC) in chloride containing environments (recommended H₂S partial pressure of max. 3 psi)
- Excellent resistance to pitting and general corrosion in chloride and acidizing environments owing to its high PRE* value of min. 48
- Excellent resistance to erosion corrosion
- Excellent corrosion fatigue properties
- Exceptionally high mechanical strength and correspondingly high breaking loads

Service temperature: -50 to 280°C (-60 to 540°F)

* PRE, Pitting Resistance Equivalent = %Cr + 3.3 x %Mo + 16 x %N

STANDARDS

- UNS S32707

CHEMICAL COMPOSITION (NOMINAL) %

C	Si	Mn	P	S	Cr	Ni	Mo	Others
max	max	max	max	max				
0.030	0.5	1.5	0.035	0.010	27	6.5	4.8	N=0.4 Co=1.0

CORROSION RESISTANCE

Pitting

The pitting corrosion resistance of stainless steel is primarily determined by the content of chromium, molybdenum and nitrogen. An index for comparing the resistance to pitting corrosion in chloride environments is the PRE number (Pitting Resistance Equivalent). The PRE is defined as, in weight % : PRE=%Cr + 3.3x%Mo + 16x%N.

The minimum PRE value for SAF 2707 HD is 48.

CPT, °C (°F), 600mV SCE

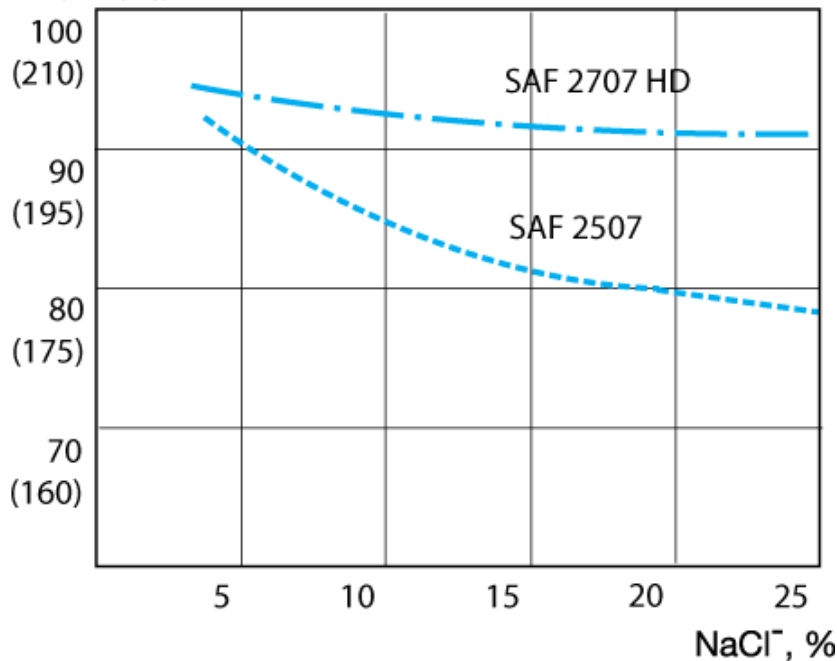


Figure 1. Critical pitting temperatures (CPT) at varying concentrations of sodium chloride, from 3 to 25% (potentiostatic determination at +600mV SCE

with surface ground with 220 grit paper).

Stress corrosion cracking

The stress corrosion cracking (SCC) resistance of Sandvik SAF 2707 HD in chloride containing environments is excellent.

SCC resistance of Sandvik SAF 2707 HD in chloride solutions at high temperatures is illustrated in Figure 2. In these tests, there were no signs of SCC up to 1000 ppm Cl⁻/280°C and 10000 ppm Cl⁻/250°C.

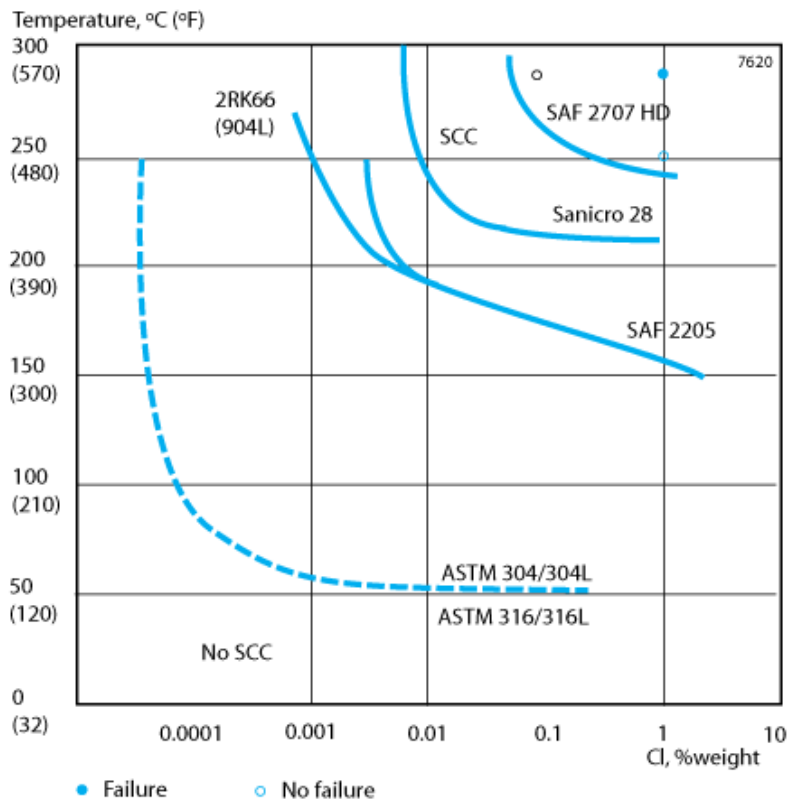


Figure 2. SCC resistance in oxygen-bearing (abt. 8 ppm) neutral chloride solutions. Testing time 1000 hours. Applied stress equal to proof strength at testing temperature.

Corrosion resistance in H₂S

Sandvik SAF 2707 HD is recommended for use with a maximum H₂S partial pressure of 3 psi.

FORMS OF SUPPLY

Sandvik SAF 2707 HD in corrosive oil and gas environments is supplied in the form of cold-drawn and degreased wire in continuous lengths, without welds, on metallic spools.

PRODUCT PROGRAM

Dimension	Breaking load	Weight			
		N	lb	kg/1 000 m	lb/1 000 ft
2.743	0.108	10935	2457	46.2	31.0
3.175	0.125	14649	3292	61.9	41.5

MECHANICAL PROPERTIES

Sandvik SAF 2707 HD for corrosive oil and gas environments

Sandvik SAF 2707 HD is tested and certified in accordance with a minimum nominal tensile strength. Proof strength is in the range of 90 % of the tensile strength. Therefore, Sandvik SAF 2707 HD resists high loads without permanent set of the wire.

SANDVIK SAF 2707 HD AT 20°C (68°F)

Proof strength		Tensile strength		Dimension		Elongation
R _{p0.2}		R _m				A ₂ "
MPa	ksi	MPa	ksi	mm	in.	%
min.	min.	min.	min.			
1665	241	1850	268	2.743	0.108	4
1665	241	1850	268	3.175	0.125	4

SANDVIK SAF 2205 AT 20°C (68°F) - FOR COMPARISON

Proof strength		Tensile strength		Dimension	
R _{p0.2}		R _m			
MPa	ksi	MPa	ksi	mm	in.
min.	min.	min.	min.		
1530	222	1700	247	2.743	0.108
1530	222	1700	247	3.175	0.125

PHYSICAL PROPERTIES

Density: 7.8 g/cm³, 0.28lb/in³

SPECIFIC HEAT CAPACITY

Metric units		Imperial units	
Temperature, °C	J/(Kg °C)	Temperature, °F	Btu/(lb °F)
20	470	68	0.11
100	495	200	0.12
200	530	400	0.13
300	560	600	0.13
400	590	800	0.14

Thermal conductivity**METRIC UNITS ¹⁾**

Temperature, °C	20	100	200	300	400
SAF 2707 HD	12	14	16	18	19
AISI 316L	14	15	17	18	20

1) W/(m °C)

IMPERIAL UNITS ¹⁾

Temperature, °F	68	200	400	600	800
SAF 2707 HD	7	8	9	10	11
AISI 316L	8	9	10	10	12

1) Btu/(ft h °F)

Thermal expansion

Sandvik SAF 2707 HD has a coefficient of thermal expansion at the same level as carbon steel. The values given are average values in the temperature ranges.

METRIC UNITS ¹⁾

Temperature, °C	30-100	30-200	30-300	30-400
SAF 2707 HD	12.5	13	13.5	14
AISI 316L	16.5	17	17.5	18

1) x10⁻⁶/°C**IMPERIAL UNITS ¹⁾**

Temperature, °F	86-200	86-400	86-600	86-800
SAF 2707 HD	7	7.5	7.5	7.5
AISI 316L	9.5	9.5	10	10

x10⁻⁶/°F**RESISTIVITY**

Temperature, °C	μΩm	Temperature, °F	μΩin.
22	0.75	72	29.5

MODULUS OF ELASTICITY ¹⁾

Metric units		Imperial units	
Temperature, °C	MPa	Temperature, °F	ksi
20	197	68	28.5
100	189	200	27.5
200	178	400	25.7
300	168	600	24.2

1) x10³**DISCLAIMER:**

Recommendations are for guidance only, and the suitability of a material for a specific application can be confirmed only when we know the actual service conditions. Continuous development may necessitate changes in technical data without notice. This datasheet is only valid for Sandvik materials.