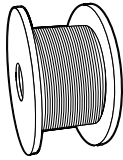


ZAPP PRECISION WIRE

ALLOY 2507 (UNS S32750)

QUALITY SYSTEM CERTIFIED TO ISO 9001:2015

ZAPP



ALLOY 2507 (UNS S32750) WIRE FOR:

- _ Wirelines for down hole service applications
- _ Shaping/shaped wire for down hole well screens

CHARACTERISTICS

Alloy 2507 (UNS S32750) is a super duplex (austenitic/ferritic) stainless steel that provides a good combination of corrosion resistance and tensile strength. It contains about 7% nickel, 25% chromium, and 4% molybdenum. See Table 1 for chemical composition limits. Nickel and molybdenum provide resistance to reducing media while the high chromium content offers resistance to oxidizing media.

The 2507 alloy offers better resistance to chloride ion stress corrosion cracking than lower alloyed materials such as AISI 316 stainless steel. The alloy 2507 produces comparable mechanical properties to AISI 316.

See Table 2 for minimum break loads and table 3 for PREN and CPT values.

TABLE 1 - LIMITING CHEMICAL COMPOSITION OF ALLOY 2507, WEIGHT %

Ni	Cr	Mo	N	C	Si	Mn	P	S
7.00	25.00	4.0	.30	0.030 max.	1.00 max.	1.20 max	0.030 max.	0.015 max.

CHEMISTRY STANDARDS

- _ UNS S32750
- _ W.Nr.1.4410
- _ ASTM A276

TABLE 2 - MINIMUM BREAK LOADS FOR A 0.108" DIAMETER WIRELINE PRODUCT

Alloy	Min. break load	Recommended safe working load (60%)
AISI 316	2000#	1200#
2205	2240#	1344#
XM19	2150#	1290#
2507	2240#	1344#
25-6MO	2130#	1278#
27-7MO	2250#	1350#
MP35N®	2300#	1380#
C276	2210#	1326#

TABLE 3 - PITTING RESISTANCE EQUIVALENCY NUMBERS (PREN)

Alloy	PREN*	CPT(°F)	CPT(°C)
AISI 316	26	72	22
2205	36	108	42
XM19	38	106	41
2507	41	143	61
25-6MO	47	149	65
27-7MO	56	176	80
MP35N®	53	183	84
C276	73	>302	>150

*PREN = Cr + 3.3Mo + 30N

*2507 PREN = Cr + 3.3Mo + 16N

*CPT (°C) = 2.5Cr + 7.6Mo + 31.9N - 41

WEIGHT PER FOOT (LBS.) FOR WIRELINES

Alloy	.082"	.092"	.108"	.125"	.140"	.150"	.160"
316	.018	.023	.031	.042	.053	.060	.069
2205	.018	.022	.031	.041	.052	.059	.068
XM19	.018	.023	.031	.042	.053	.060	.069
2507	.018	0.22	.031	.041	.052	.059	.068
25-6MO	.018	.023	.032	.043	.054	.062	.070
27-7MO	.018	.023	.032	.043	.054	.062	.070
MP35N®	.020	.025	.034	.046	.057	.066	.075
C276	.018	0.22	.031	.041	.052	.059	.068

EXAMPLES OF THEORETICAL ACCEPTABLE WELL ENVIRONMENTS FOR 2507 WIRE*

Chlorides	Temp °F	H ₂ S	CO ₂	Pressure (PSI)	Reg. Minimum Pitting Index (PI)	2507 (PI)	2507 (PREN)
20,000 ppm	325	0 %	6 %	12,000	16.50	39.85	41
100,000 ppm	275	0 %	10 %	10,000	30.00	39.85	41
20,000 ppm	200	0 %	80 %	5,000	13.00	39.85	41
90,000 ppm	326	0 %	30 %	5,000	16.50	39.85	41

** Marginally acceptable
PI = Cr + 3.3Mo + 11N + 1.5 (W+Nb)
PREN = Cr + 3.3Mo + 30N

* The theoretical acceptable well environments are based on the SOCRATES software. SOCRATES is a comprehensive material selection tool for oil and gas applications that selects corrosion resistant alloys (CRA) through material evaluation based on mechanical strength parameters, heat treatment/cold work and hardness limitations. The program also evaluates the characterization of the environment in terms of operating pressure, temperature, pH, H₂S, chlorides, elemental sulfur, aeration, gas to oil ratio and water to gas ratio water cut. Stress corrosion cracking, hydrogen embrittlement cracking, sulfide stress cracking and resistance to pitting corrosion are also evaluated. The examples above are based on the environment listed and do not take into consideration the actual values of elemental sulfur, aeration, gas to oil ratio and water to gas ratio water cut.

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ZAPP TECHNICAL DATA**ALLOY CHEMISTRY**

Alloy	UNS	C	Mn	Cr	Ni	Mo	Cu	N	Co	Ti	Fe
316	S31600	.08	2.0	16.0 - 18.0	10.0 - 14.0	2.0 - 3.0	-	-	-	-	bal.
2205	S31803	.03	2.0	21.0 - 23.0	4.5 - 6.5	2.5 - 3.5	-	.08 - .20	-	-	bal.
XM19	S20910	.06	4.0 - 6.0	20.5 - 23.5	11.5 - 13.5	1.5 - 3.0	-	.20 - .40	-	-	bal.
2507	S32750	.03	1.2	25.0	7.0	4.0	-	.30	-	-	bal.
25-6MO	N08926	.02	2.0	19.0 - 21.0	24.0 - 26.0	6.0 - 7.0	.5 - 1.5	.15 - .25	-	-	bal.
27-7 MO	S31277	.02	3.0	20.5 - 23.0	26.0 - 28.0	6.6 - 8.0	.5 - 1.5	.30 - .40	-	-	bal.
MP35N®	R30035	.02	0.1	19.0 - 21.0	33.0 - 37.0	9.0 - 10.5	-	-	bal.	1.0	1.0
C276	N10276	.01	1.0	14.5 - 16.5	-	15.0 - 17.0	-	-	2.5	-	4.0 - 7.0

(Maximum values unless range specified)

WIRELINE MINIMUM BREAK STRENGTH**

Size	316	2205	XM19	2507	25-6MO	27-7MO	MP35N®	C276
.082"	1150#	1345#	1215#	1345#	1175#	1300#	1300#	1280#
.092"	1500#	1690#	1540#	1690#	1500#	1650#	1690#	1615#
.108"	2000#	2240#	2200#	2240#	2130#	2250#	2300#	2210#
.125"	2700#	2945#	3000#	2975#	2750#	3000#	3100#	2935#
.140"	3300#	3540#	3540#	3694#	3250#	3670#	3725#	3680#
.150"	3750#	3975#	4065#	4150#	3750#	4155#	4240#	4205#
.160"	4225#	4425#	4625#	4665#	4250#	4650#	4825#	4785#

(** The recommended safe working load is 60% of minimum break strength)

DENSITY/CORROSION

Alloy	Density (lb/in³)	Corrosion (PREN)*	CPT (°F)	CPT (°C)**
316	.287	26	72	22
2205	.278	36	108	42
XM19	.285	38	106	41
2507	.281	41	144	62
25-6MO	.290	47	149	65
27-7MO	.289	56	176	80
MP35N®	.309	53	183	84
C276	.321	68	>302	>150

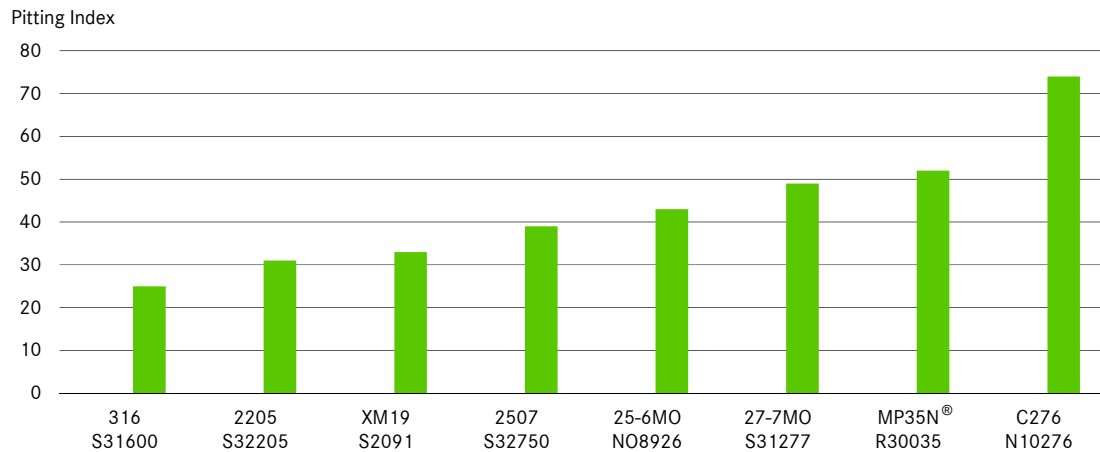
* PREN = Cr + 3.3 Mo + 30N

** CPT (°C) = 2.5 Cr + 7.6 Mo + 31.9 N - 41

NOMINAL CHEMICAL COMPOSITION COMPARISON

Chemical Element	316	2205	XM19	2507	25-6MO	27-7MO	MP35N®	C276
Fe	65.40	67.71	56.40	62.43	46.30	39.65	1.00	5.5
Mn	2.00	2.0	5.00	0.6	2.00	3.00	0.15	0.5
Ni	12.00	5.5	12.50	7.0	25.00	27.00	35.00	55.0 bal.
Co	*	*	*	*	*	*	32.90	2.0
Cr	17.00	22.0	22.00	25.0	20.00	21.75	20.00	15.5
Mo	2.50	2.2	2.25	4.0	6.50	7.25	9.75	16.0
W	*	*	*	*	*	*	*	*
Nb	*	*	0.20	*	*	*	*	*
N	*	0.12	0.30	*	0.20	0.35	*	*
*Trace								
PI	25.25	31.57	33.03	39.85	43.65	49.53	52.18	74.43

MATERIAL SELECTION OVERVIEW



The 2507 alloy wire produces a tensile strength of 210/245,000 psi through cold drawing. At this strength level, the wire is ductile and able to successfully pass the wrap test in the as drawn condition as well as the as drawn plus exposed to temperatures as high as 540°F conditions. This wrap or bend test shows no surface cracking or failure.

Material produced to the UNS S32750 chemistry ranges and manufactured into wirelines by Zapp Precision Wire will provide an excellent quality product. Zapp Precision Wire technology, quality, and superior wire drawing capabilities will make the difference for these critical applications.

The Zapp Precision Wire quality system is registered to ISO 9001:2015. For additional information on this or any other Zapp Precision Wire, Inc. product, please contact the Customer Service Department at 843-851-0700 or fax your inquiry to 843-851-0100, or e-mail the inquiry to sales@zapp.com.

ZAPP PRECISION WIRE STANDARDS

1. All wirelines must pass an eddy current test as part of our NDT quality assurance program.
2. All wirelines and armor wires must pass an aged wrap test as part of our ductility quality assurance program.
3. All wirelines and armor wires have full traceability.

ZAPP PRECISION WIRE QUALITY

The Zapp Precision Wire technology, quality, and superior wire drawing capabilities will make the difference for critical armor wire and wireline applications. The Zapp Precision Wire quality system is registered to ISO 9001:2015.

ZAPP PRECISION WIRE

WIRE | BAR | PROFILE | FLAT WIRE

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