

**Ugitech**  
Stainless steel  
solutions for the oil  
and gas industry



**Ugitech**



# Ugitech and the Oil and Gas industry

## The world's conventional oil reserves are seriously decreasing and this trend is bound to become more acute.

Consequently, oil and gas companies are focusing increasingly on subsea exploration and overcoming the technical issues to exploiting unconventional liquid sources like oil sands, heavy and extra-heavy oils.

As oil and gas companies rise to new challenges, the choice of materials is a critical issue. Ugitech, as a major world specialist in the manufacture of stainless steel long products for over 100 years, provides tailor made solutions to meet the most technical demands of our customers.

At your disposal, a wide range of products, dimensions and finishes

### **Drawn wire**

#### For welding wire:

- Ø 0.8 to 5 mm

#### For wire lines:

- Ø 0.92 - 0.108 - 0.125 - 0.140 - 0.160 inch
- From 15 000 to 30 000 feet long

#### For profiles:

- Cross-section from 2 to 70 mm<sup>2</sup>
- Simple or complex shapes:
  - isosceles triangle, square, oval, drop
  - flat bars with round or flat edges
  - half-round bars...

### For springs and nonmagnetic components:

- Ø 0.18 to 16 mm with a large and customised range of mechanical properties.

### **Bars**

- 1.5 to 450 mm
- ◆ 3 to 55 mm
- 3 to 55 mm

A variety of finishes and metallurgical conditions are available on request: turned, polished, ground, strain, hardened, double age hardened...

### **Wire rods**

- 5 to 32 mm
- ◆ 12.4 to 28 mm

## Approvals and Standards

Our grades are compliant with major oil and gas standards and specifications, including:

- NACE MR0175/ISO 15156-3: Materials for use in H<sub>2</sub>S containing environments in oil and gas production-part 3 : cracking resistant CRAs (corrosion resistant alloys and other alloys).
- NACE MR0103: Materials resistant to sulfide stress cracking in corrosive petroleum refining environment.
- API Specification 6A: Specification for wellhead and Christmas tree equipment
- ASTM A182: Standard specification for forged and rolled alloys for high temperature service
- ASTM A276: Standard specification for stainless steel bars and shapes
- Approval: NORSOK M-650: Qualification of manufacturers of special materials
- Pressure vessels: ASTM/ASME A479 – EN 10272 – PED 97/23/EC – AD 2000 Merkblatt

This list is not exhaustive and we would be pleased to look at your special requirements: please do not hesitate to put your technical specifications to us for so that we can develop our proposal accordingly.

Ugitech has the benefit of a world-class Research Centre and a testing laboratory which is certified to ISO 17025, and also a testing facility in H<sub>2</sub>S medium (required for EFC 17 and NACE TM0177) to help in the development of products for the Oil and Gas Industry.

# Focus on our grades




Conventional grades				Ugitech products		
Usual name	UNS	EN/WNr	Other naming	Bars	Wire rods	Drawn wires
<b>Austenitic</b>						
UGI® 304	S30400	1.4301		•	•	•
UGI® 304L	S30403	1.4307		•	•	•
UGI® 304H	S30409	1.4301		•	•	•
UGI® 321	S32100	1.4541		•	•	•
UGI® 321H	S32109	1.4541/1.4878		•	•	•
UGI® 347	S34700	1.4550		•	•	•
UGI® 316	S31600	1.4401		•	•	•
UGI® 316L	S31603	1.4404		•	•	•
UGI® 316H	S31609	1.4401		•	•	•
UGI® 316Ti	S31635	1.4571		•	•	•
UGI® 317L	S31703	1.4438		•	•	•
UGI® 209	S20910		XM-19	•	•	•
UGI® 904L	N08904	1.4539	B6	•	•	•
UGI® 926	N08926	1.4529	6Mo	•	•	•
<b>Martensitic</b>						
UGI® 410	S41000	1.4006		•	•	•
UGI® 420A	S42000	1.4021		•	•	•
UGI® 420B	S42000	1.4028		•	•	•
UGI® 4418		1.4418 <sup>1</sup>		•	•	•
UGI® 630	S17400	1.4542	17-4PH	•	•	•
<b>Duplex</b>						
UGI® 4062	S32202	1.4062	2202	•	•	•
UGI® 4362	S32304	1.4362	2304 - 35N	•	•	•
UGI® 4462 <sup>2</sup>	S32205/S31803	1.4462	F51/F60 – 2205 – 45N – D47	•	•	•
UGI® 4507 <sup>2</sup>	S32520/32550	1.4507	F59 – F61 – 52N+ – D57	•	•	•
UGI® 4410 <sup>2</sup>	S32750	1.4410	F53 – 2507 – D57	•	•	•
UGIWELD™ 45N		1.4462	EN ISO 14343 : 22 9 3 N L			•
UGIWELD™ 25.9.4			EN ISO 14343 : 25 9 4 N L			•
<b>Nickel based alloys</b>						
UGIALLOY® 625	N06625	2.4831	EN ISO 18274 : Ni 6625			•
UGIALLOY® 825	N08825					•
UGIALLOY® HT718	N07718	2.4668				•
UGIALLOY® HT750	N07750	2.4669				•
UGIALLOY® 276	N10276	2.4886/2.4819	EN ISO 18274 : Ni 6276			•
UGIALLOY® NCW			EN ISO 18274 : Ni 6660			•
UGIALLOY® 16Mo		2.4607	EN ISO 18274 : Ni 6058			•
UGIALLOY® 59	N06059	2.4605	EN ISO 18274 : Ni 6059			•
<b>Cobalt based alloys</b>						
UGIALLOY® KC35N	R300035		MP-35N			•
UGIALLOY® PHYNOX® <sup>3</sup>	R30003					•




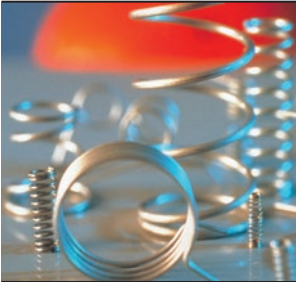
1 On-going study to introduce this grade into the NACE MR 0175.

2 Ugitech is NORSOK M-650 qualified for this grade.

3 PHYNOX® is a registered trademark from Aperam.

# For each oil and gas application, a stainless steel solution!

A few oil and gas applications	Examples of stainless steel part Stainless steel product	Technical and operating challenges Stainless steel properties	Recommended stainless steel and alloy families					
			Austenitics	Super Austenitics	Martensitics	Duplex	Super Duplex	Alloys
<b>Pumps</b>								
	Flanges - Bars / wire rod Seats - Bars Fasteners - Bars/wire rod Mechanical seals - Bars Shafts/rotors - Bav	Corrosive fluid transfer – Corrosion resistance	•	•		•	•	•
		Fluid transfer with high levels of sand cuts and solid particles – Corrosion resistance – Erosion resistance	•	•		•	•	•
		High pressure – High mechanical properties				•	•	
		Stress and strain – Stress corrosion – Cracking resistance					•	•
<b>Valves</b>								
	Shafts/needles/stems - Bars Pins - Bars Seals - Bars Studs - Bars Nuts and bolts - Bars/wire rod Bush/rings - Bars Balls/discs - Bars Gates - Bars Springs - Drawn wires Plugs - Bars Seats - Bars	High pressure – Mechanical properties				•	•	
		Low/cryogenic temperatures – High Impact value – Corrosion resistance	•	•				•
		Corrosive fluid transfer – Corrosion resistance	•	•		•	•	•
		Stress and strain – Mechanical properties				•	•	
<b>Fittings, fasteners and connectors</b>								
	Bars/Wire rod	Stress and strain – Stress corrosion – Cracking resistance					•	•
		Corrosive fluids – Corrosion resistance	•	•				•

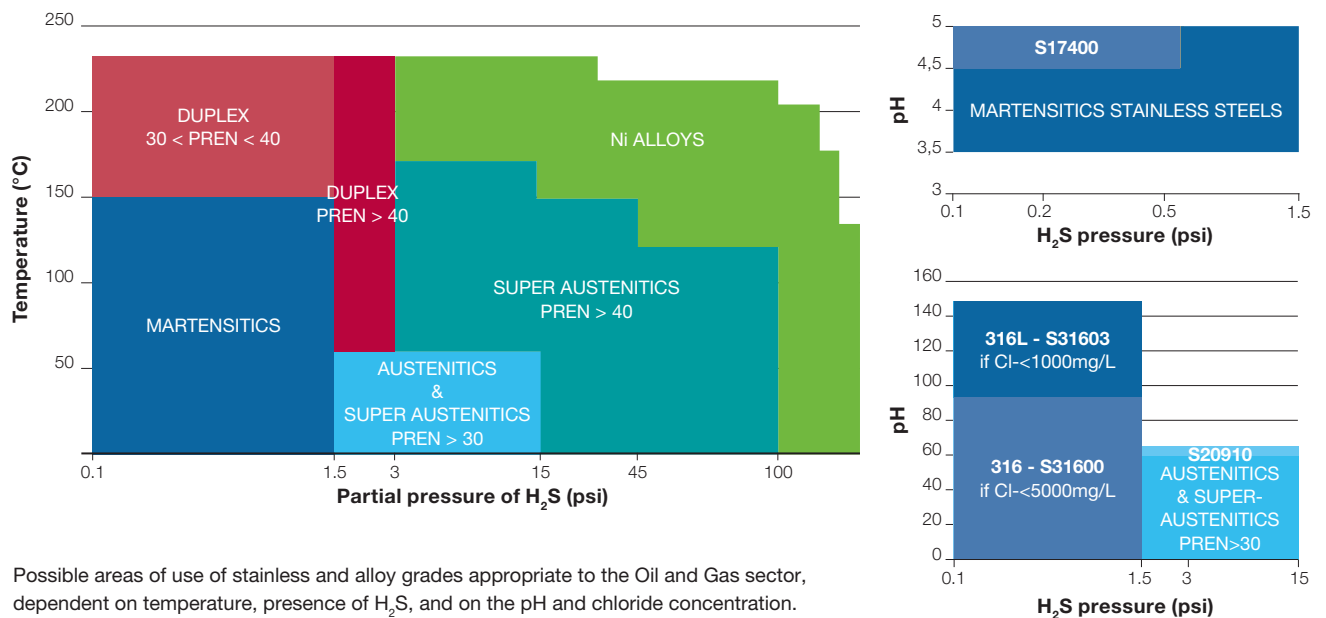
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<b>Wire lines</b>									
	<i>Drawn wires</i>	Stress and strain – <i>Mechanical properties</i>		•		•	•	•	
		Corrosive fluids – <i>Corrosion resistance</i>		•		•	•	•	
<b>Weld overlay</b>									
	<i>Drawn wires</i>	Corrosive fluids – <i>Corrosion resistance</i>				•	•	•	
<b>Liners/screens</b>									
	<i>Drawn shaped wires</i>	Fluid transfer with high levels of sand cuts and solid particles – <i>Erosion resistance</i>				•	•	•	
		Corrosive fluids – <i>Corrosion resistance</i>	•	•				•	
		Stress and strain – <i>Mechanical properties</i>					•		
		High temperature – <i>Corrosion resistance</i>	•	•				•	
<b>Springs</b>									
	<i>Drawn wires</i>	Stress and strain – <i>High fatigue resistance</i>	•	•				•	
		Corrosive fluids – <i>Corrosion resistance</i>						•	
		Service temperature range – <i>Brittleness resistance</i>						•	
		Magnetic interferences – <i>Non-magnetism</i>						•	

# Use limits for different stainless steel families in H<sub>2</sub>S environments

## General use

PREN: the Pitting Resistance Equivalent Number was developed to reflect and predict the pitting resistance of Corrosion Resistant Alloys (CRA) in the presence of dissolved chloride.

It is based on the proportions of the corrosion resistant elements Cr, Mo, W, N in the composition of the alloy (PREN = %Cr + 3,3x%Mo + 16x%N).



Possible areas of use of stainless and alloy grades appropriate to the Oil and Gas sector, dependent on temperature, presence of H<sub>2</sub>S, and on the pH and chloride concentration.

## Some additional information

### Martensitic grades

Limited to pH ≥ 3,5, except for precipitation-hardened martensitics used for wellheads and christmas tree components (S17400: pH ≥ 4,5)

### Austenitic grades

They are limited in temperature (up to 60°C). If the chloride concentration is lower than 50mg/L, they may be used without restriction in H<sub>2</sub>S environments.

### Duplex grades

They should not be used at temperatures higher than 232°C. These grades are divided into two groups: those with a PREN between 30 and 40 are limited in H<sub>2</sub>S pressure up to 1.5 psi, those with a PREN higher than 40 could be used up to 3 psi.

### Superaustenitic grades

The limits are given with a concentration up to 5000mg/L. The use limits depend on the temperature: the higher the temperature, the lower the limit of H<sub>2</sub>S pressure.

### Nickel based alloys

Are suitable for use in applications subject to high pressures in H<sub>2</sub>S and to high temperatures.

# Pitting Resistance Equivalent Number regarding Yield Strength

The mechanical properties indicated are those guaranteed by the relevant Standards, but could be higher, depending on the dimensions of the product and the production methods used.

## Martensitic grades

Grades with high mechanical properties adjustable by heat treatment and with, for some of them (630 or 4418), PREN similar to or higher than those achieved in austenitics.

## Austenitic grades

Grades with a large range of pitting corrosion resistance, however with somewhat lower mechanical properties.

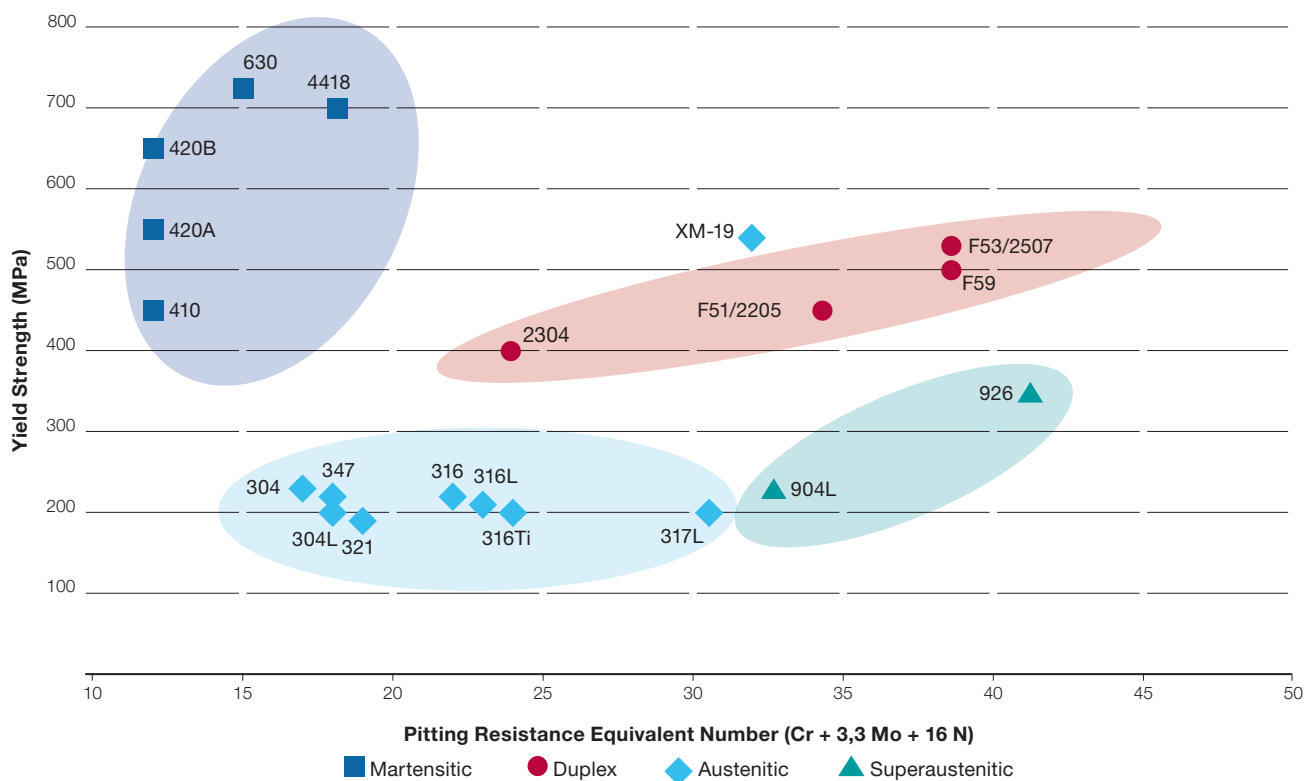
## Duplex grades

Large range of PREN up to super austenitic but with higher mechanical properties.

## Superaustenitic grades

Austenitic grades with much better pitting corrosion resistance, chemical composition close to Ni base Alloys.

Technical data sheets are available for each grade on request.





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