URANUS® 65

310 L modified grade - C < 0.020, Si < 0.3 for nitric acid services

Uranus 65 is a 25 Cr 20 Ni austenitic stainless steel with sharp control of the residual elements in order to provide high corrosion resistance properties in boiling 50-65% Nitric acid solutions. The silicon content is kept under 0.3% while the carbon content is lower than 0.015%. Molybdenum additions are also well known to reduce the behaviour of the steel in nitric acid solutions. This explains why the molybdenum content is guaranteed lower than 0.3% .

The sharp control of Carbon, Silicon and phosphorus contents makes it possible to produce a more stable austenite microstructure, free of intermetallic or carbide precipitations.

The alloy is designed for nitric acid applications. The grade is not recommended for concentrated nitric acid purposes or highly oxydizing nitric acid solutions (with Gr VI species...)

STANDARDS

EURONORM ..... X1 Cr Ni 25.21 - 1.4335
AFNOR ..... Z1 CN 25.20
WERKSTOFF ..... Nr 1.4335
ASTM..... 310 L NAG

CHEMICAL ANALYSIS

Typical values (%)

C	Cr	Ni	Mo	Si	Others
0.015	25	20.5	≤ 0.3	< 0.3	Nb ≤ 0.25 - Mn ≤ 2.0

MECHANICAL PROPERTIES

Tensile properties - Minimum guaranteed values

°C	Rp 0.2 MPa	Rp 1.0 MPa	Rm MPa	°F	YS 0.2% KSI	YS 1.0% KSI	UTS KSI	Elongation %
20	215	245	490	*68*	31	35	71	40
50	195	220	460	*122*	28	31.5	66	
100	175	200	430	*212*	25	28.5	61	35
200	140	160	390	*392*	20	23	56	
300	115	135	360	*572*	16.5	19	51	30

Impact values High impact strength even at cryogenic temperatures
Average hardness = 155 HB

PHYSICAL PROPERTIES

Density : 7900 kg/m^3

Interval Temper °C	Thermal expansion ax10^{-6}K^{-1}	°C	°F	Resistivity (µΩ m)	Thermal conductivity (W.m^{-1}.K^{-1})	Young modulus E (GPa)	Shear modulus G (GPa)
0-100	15.8	20	*68*	0.85	450	195	75
0-300	16.5	200	*392*	-	-	182	70
0-500	17.3	400	*752*	-	-	166	66

CORROSION RESISTANCE

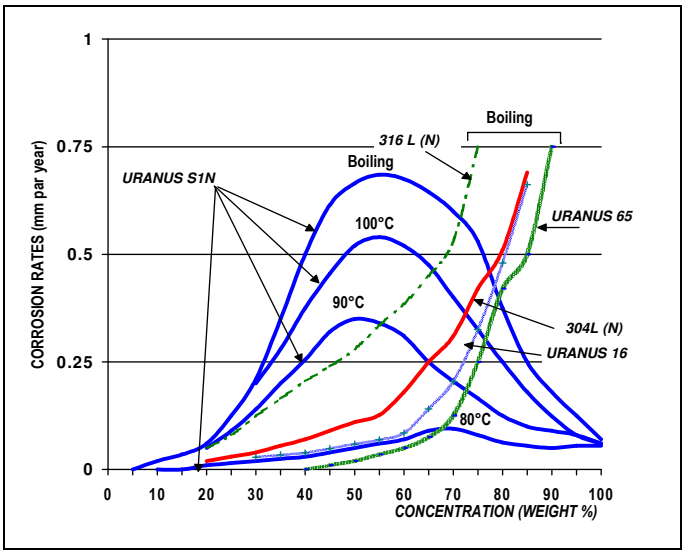
Because of its high chromium content, URANUS® 65 has an excellent resistance in boiling nitric acid solutions of less than about 70% concentration.

In these conditions, the alloy behaves much better than 304 L grade.

Moreover, thanks to the close control of impurities such as carbon, silicon, phosphorus which are known to be deleterious to the resistance of stainless steels in nitric acid solutions in the sensitized condition, UR 65 grade performs very well in HNO_3 solution up to 70%.

Nitric acid solutions containing Cr^{VI} species are much more oxydant than usual HNO_3 solutions. In those cases, UR 65 is normaly not to be used. Please, contact us for more information.

URANUS® 65 melts are optimised to improve corrosion resistance in nitric acid solutions, even after welding



Corrosion rates of solution annealed stainless steels in nitric acid solutions.

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Huey tests

A 262 practice C, 5x48 hours :

Corrosion rate (mm/year)		
Without sensitization	After 1 hour at 675°C	After 0.5 hour at 700°C
< 0.15 (6 mpy)	< 0.20 (8 mpy)	< 0.25 (10 mpy) + Slow cooling (50°C/h)

Pitting

URANUS® 65 has approximately the same pitting corrosion resistance as 316L.

FABRICATION

Heat treatment

1100/1150°C (*2010/2100°F*) followed by rapid cooling.

Forming

Cold forming is easy as for all austenitic steels.
Cold forming does not impair the corrosion resistance and no heat treatment is required after cold forming.

Welding

The welding of fully austenitic material requires precautions against hot cracking.

- manganese addition in the filler wire,
- low heat input (< 15 KJ/cm)
- controlled welding conditions
- prevention of deformations during welding.

From the corrosion resistance point of view, GTAW/TIG welding is the prefered method and welds in contact with the corrosive solution should preferably be welded using this method.

Welding materials :	TIG - MIG	FP SOUDAGE URANUS 65 SPRINT METAL SOUDINOX 65
	ELECTRODE	SOUDOMETAL SOUDINOX S65 UTP 6825.Lc Kb

Our welding research centre provides technical assistance for the welding of URANUS® 65.

Cutting

The prefered methods of cutting are shearing or plasma cutting.

Machining

Similar to austenitic steels

			CONDITIONS		
Operation	**Tool**	**Lubrication**	**Depth of cut (mm) (*inch*)**	**Feed (mm) (*inch*)**	**Speed (m/min) *Speed (feet/min)***
Parting off	High speed steel	Cutting oil	**Blade width mm - *inch***	**Feed mm - *inch***	
			1.5 *0.06*	0.03 *0.0012*	10-13 *32.8-42.7*
			3 *0.11*	0.04 *0.0016*	11-14 *36.1-45.9*
			6 *0.23*	0.05 *0.0020*	12-15 *39.4-49.2*
Drilling	High speed steel	Cutting oil	**Drill Ø mm - *inch***	**Feed mm - *inch***	**Speed (m/min) *Speed (feet/min)***
			1.5 *0.06*	0.025 *0.0010*	6-10 *19.7-32.8*
			3 *0.11*	0.06 *0.0024*	7-11 *23.-26.1*
			6 *0.23*	0.08 *0.0031*	7-11 *23.-26.1*
			12 *0.48*	0.10 *0.0039*	7-11 *23.-26.1*
Milling profiling	High speed steel	Dry or Cutting oil		.05/0.10 *.002/.0039*	10-20 *32.8-65.6*

APPLICATIONS

URANUS® 65 is used in all processes involving hot nitric acid up to 70 % concentration (14 N). (solutions free of Cr^{VI} species or other very oxydizing species)

- Production of nitric acid,
- Ammonium nitrate production,
- Nuclear fuel reprocessing
- Hydrofluoric pickling.

SIZE RANGE

	Hot rolled plates	Cold rolled plates	Clad plates
Thickness	5 to 150 mm 3/16" to 6"	2 to 14 mm 5/64" to 5/8"	6 to 150 mm 1/4" to 6"
Width	Up to 3300 mm Up to 130"	Up to 2300 mm Up to 90.5"	Up to 3300 mm Up to 130"
Length	Up to 12000 mm Up to 472"	Up to 8250 mm Up to 325"	Up to 14000 mm Up to 551"

Other sizes are available on request, including 4100mm (161,4") width plates

NOTE

This technical data and information represents our best knowledge at the time of printing. However, it may be subject to some slight variations due to our ongoing research programme on corrosion resistant grades.

We therefore suggest that information be verified at time of enquiry or order.
Furthermore, in service, real conditions are specific for each application. The data presented here is only for the purpose of description, and may only be considered as guarantees when our company has given written formal approval.

Further information may be obtained from the following address.

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