



## UR™ 625

### UR™ 625

UR™ 625 is an austenitic nickel - base superalloy possessing excellent resistance to oxidation and corrosion over a broad range of corrosive conditions. The alloy has high strength and toughness at temperatures ranging from cryogenic temperature to 1100°C. UR™ 625 also has exceptional fatigue resistance. Its fatigue strength is exceptional. This non - magnetic alloy derives its strength from the strengthening effect of Mo and Nb on its Ni - Cr matrix. In addition to good oxidation resistance, the alloy also resists to corrosive attack by many other media; it is virtually immune to chloride - ion stress corrosion cracking. The alloy is not magnetic.

## PROPERTIES

### STANDARDS

- > EURONORM: EN 2.4856 Ni Cr22 Mo9 Nb
- > ASTM: UNS N06625  
B443
- > ASME: SB - 443

### CHEMICAL ANALYSIS - WEIGHT %

#### Typical values

	Ni	Cr	Fe	C	Mn	Si	Mo	Co	Al	Ti	Nb+Ta	P	S
MIN	bal	20.0					8.0				3.15		
MAX		23.0	5.0	0.05	0.50	0.50	10.0	1.0	0.40	0.40	4.15	0.015	0.015

### PHYSICAL PROPERTIES

#### Typical values

Density: 8.44 kg/dm<sup>3</sup> - 0.305 lb/in<sup>3</sup>

Mean coefficient of thermal expansion,  
m/m/°C X 10<sup>-6</sup>

20 - 100 °C	20 - 300 °C	20 - 500 °C	20 - 700 °C	20 - 800 °C	20 - 900 °C	20 - 1000 °C
12.9	13.3	13.9	14.9	15.5	16.1	16.8

Coefficient of thermal conductivity, W.m / m<sup>2</sup> / °C/s

20 °C	95 °C	540 °C	760 °C	980 °C
9.8	10.8	17.5	20.8	25.2

Coefficient of electrical resistivity at 20 °C, microhm x cm <sup>2</sup> /cm	129
Modulus of elasticity, MPa tension	206 - 700
Modulus of elasticity, MPa torsion	75 - 790
Poisson's ratio	0.31
Melting range, °C	1290 - 1350
Coefficient of specific heat, at 21 °C, J/g/°C	0.41
Curie temperature, °C	lower than - 196
Permeability at 21 °C and H = 200 oersted (annealed)	1.0006

## PROPERTIES

### MECHANICAL PROPERTIES

#### Room temperature properties

	R <sub>p</sub> 0.2 MPa	R <sub>m</sub> MPa	Elongation (50 mm)%
As rolled or annealed (950°C - 1050°C)	415 - 760	830 - 1110	30
Solution heat treated (1100°C)	290	725 - 950	40

°C	R <sub>p0.2</sub> MPa	R <sub>m</sub> MPa	°F	R <sub>p</sub> 0.2 ksi	R <sub>m</sub> ksi
100	350	740	212	51.1	108.3
200	320	700	392	46.1	101.8
300	300	685	572	42.8	98.9
400	280	670	752	37.7	96.3
450	270	660			

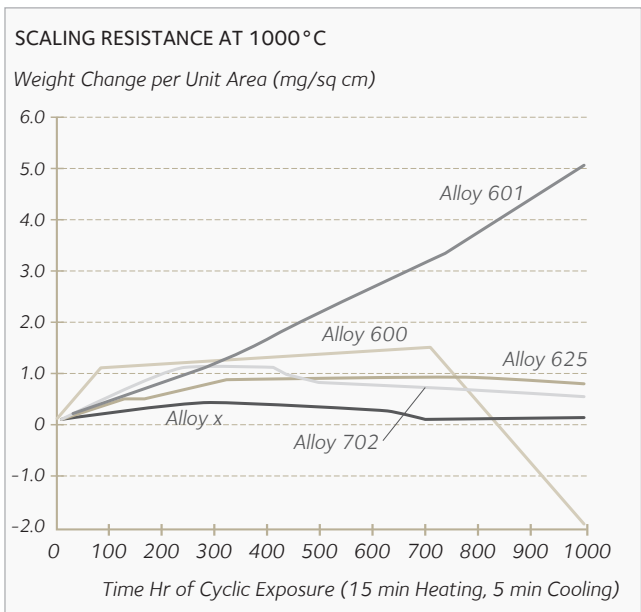
Minimum short - time mechanical properties in the soft - annealed condition (grade 1) at elevated temperatures according to VdTÜV material data sheet 499. ISO V - notch impact toughness, in accordance to DIN EN 10045 Part 1. Average values at RT  $ak \geq 125 \text{ J/cm}^3$   $KV \geq 100 \text{ J}$ . The alloy is subject to loss of impact strength at room temperature after exposure in the range of 1000°C (538°C) to 1100°F (593°C).

## IN SERVICE CONDITIONS

### PROPERTIES IN SERVICE

#### High temperature oxidation

UR™ 625 has good resistance to oxidation and scaling at high temperature. 1000°C is a temperature at which scaling resistance become a significant factor in service.



### CORROSION RESISTANCE PROPERTIES

UR™ 625 presents better pitting corrosion resistance than UR™ 904L and conventional 6%Mo grades. Below Typical Critical Pitting Temperatures measured according to ASTM G48 method E (6%FeCl<sub>3</sub> + 1%HCl).

Grade	CPT range (°C)	CPT range (°F)
UR™ 316L	0 - 7.5	32 - 45.5
UR™ 904L	30 - 40	86 - 104
UR™ 254	45 - 55	113 - 131
UR™ 625	65 - 85	149 - 185

## IN SERVICE CONDITIONS

UR™ 625 grade exhibits excellent corrosion resistance in a wide range of industrial media:

### Acids

UR™ 625 is highly resistant in mineral acids (sulfuric acid, nitric acid, phosphoric acid) and also in organic acids (oxalic acid, formic acid, acetic acid). Please ask for our recommendations according to the temperature and the acid concentration.

### Seawater and brackish water

Tests show that UR™ 625 has a good resistance to pitting corrosion in seawater and brackish water under both flowing and stagnant conditions and under fouling. This grade can be subjected to crevice corrosion under severe conditions.

### Air pollution control

Tests conducted in simulated wet flue gas desulfurization systems show that UR™ 625 is more resistant to pitting corrosion than standard 6%Mo grades especially when bromide ions are added. The following data are illustrative.



Simulated wet FGD environment			
Grade	0 ppm Br -	1.000 ppm Br -	5000 ppm Br -
N08904	Pitting	Pitting	Pitting
S31254	No pit	No pit	Pitting
S34565	No pit	No pit	Pitting
N06625	No pit	No pit	No pit
S31266	No pit	No pit	No pit

### Oil & Gas

According to the NACE MR0175/ISO15156 standard, UR™ 625 can be used with any combination of temperature, H<sub>2</sub>S partial pressure, chloride concentration and in situ pH in production environments.

### High temperature applications

UR™ 625 has excellent oxidation resistance up to 1000°C (1832°F). UR™ 625 is also resistant in atmosphere containing halogen gases.

## DELIVERY CONDITIONS

### SIZE RANGE

	Hot rolled plates*	Cold rolled plates	Clad plates
Thickness	6 to 80 mm	2 to 10 mm	10 to 100 mm
Max Width	2300 mm for t ≤ 10 mm 2500 mm for t > 10 mm	2300 mm	Please consult
Max Length	8000 mm	8000 mm	Please consult

\* Max. weight: 3.2 t

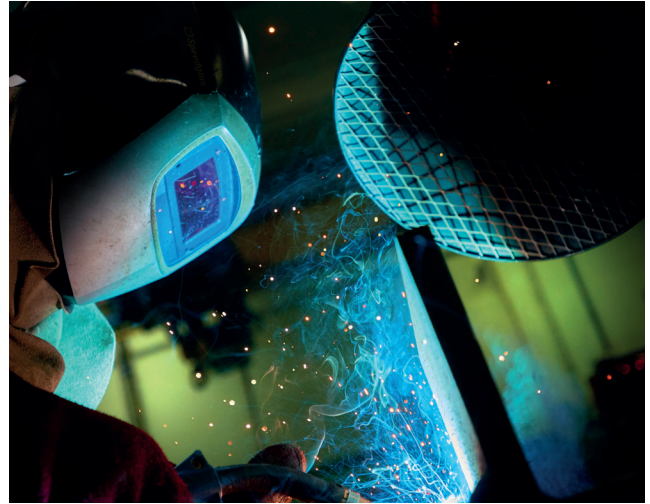
## PLATE PROCESSING

### FABRICATION

UR™ 625 is readily fabricated by common industrial processes and has excellent weldability qualities and requires no postweld thermal treatment for maintenance of its corrosion resistance. Heating, pickling, hot and cold forming, machining and welding: information on request.

### WELDING

UR™ 625 can be readily welded by conventional processes used for austenitic stainless steels. The material should be in the mill annealed condition and thoroughly descaled and cleaned before welding. Preheating is not required and postweld treatment is not needed to maintain or restore corrosion resistance.



## APPLICATIONS

Typical uses include industries such as:

- > Aerospace, chemical processing, marine, off-shore, nuclear, transportation and storage
- > Chemical reactor vessels, distillation columns, evaporators, heat exchangers, transfer piping and valves
- > Flue stacks (FGD), waste storage and incinerators, scrubbers, fasteners
- > Propeller blades, exhaust ducts
- > Undersea and offshore pipes
- > Nuclear reactor core and control rod components in water reactors and advanced reactors.

## YOUR CONTACTS

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*Technical data and information are to the best of our knowledge at the time of printing. However, they may be subject to some slight variations due to our ongoing research programme on steels. Therefore, we 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 are only for the purpose of description, and considered as guarantees when written formal approval has been delivered by our company. Further information may be obtained from the address opposite.*