HASTELLOY® C-276 alloy I NiMo16Cr15W I 2.4819 I High Performance Alloys Data Sheet

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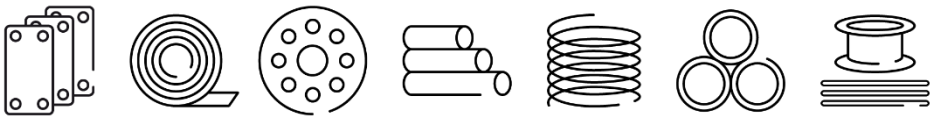

HASTELLOY® C-276 alloy
belongs to the group of highly corrosion-resistant nickel-chromium-molybdenum-tungsten alloys. The alloy is characterized by high resistance to crevice corrosion, pitting and stress-crack corrosion in oxidizing and reducing media.

The material exhibits good resistance to numerous corrosive media, including strong oxidizing agents such as iron(III) chloride and copper(II) chloride and hot media, e.g. sulfuric acid, nitric acid, phosphoric acid, chlorine (dry), formic acid and acetic acid.

It also exhibits good resistance in wet chlorine gas, sodium hypochlorite and chlorine dioxide solutions.

Applications

- Environmental engineering, e.g. construction components in waste incineration plants and flue gas desulfurization plants, e.g. raw gas inlet nozzles, carrier systems, absorbers, nozzle pipes, claddings and chimney linings
- Oil and natural gas production, e.g. pumping systems in contact with sour gas, e.g. suction pipes, fittings and probes
- Chemical engineering, e.g. heat exchangers, fittings, mixers, pipe linings in wet and dry zones
- Pulp industry, e.g. chlorine injection nozzles, bleach washers and piping

Further information under:
https://www.zapp.com/en-us/materials/high-performance-alloys-ni-co-ti

Specifications

DIN Designation	NiMo16Cr15W
DIN Material Number	2.4819
VdTÜV Datasheet	400
UNS	N10276
DIN	17744, 17750, 17751, 17752
ASTM	B 574, B 575, B 619, B 622, B 626
ASME	SB 574, SB 575, SB 619, SB 622, SB 626

Delivery Forms

Sheet	hot or cold rolled, bright/ solution annealed, pickled or de-scaled
Strip	cold rolled, bright/solution annealed, pickled or de-scaled
Pipe	longitudinally welded or seamless, solution annealed, pickled or de-scaled
Bar	hot rolled or forged, solution annealed, pickled or de-scaled
Wire	rolled or drawn, solution annealed, pickled or de-scaled
Forging	solution annealed, machined on request
Welding filler metal	welding bar, wire electrode, coated bar electrode

Do you require other delivery forms or finishes? We will be glad to discuss your needs with you over the phone.

Processing Instructions

HASTELLOY® C-276 alloy is cold and hot formable. The hot forming temperature is between 1,230 and 950 °C. All standard forming techniques can be used.

The material tends to work harden. Solution annealing should be repeated after hot forming in general and after cold forming with degrees of deformation greater than > 15%.

Heat Treatment

Solution annealing: 1,080 – 1,135 °C*, duration depending on thickness of semi-finished product
Cooling: water, compressed air or inert gas
* other temperatures possible depending on manufacturing process or specification

Welding

The welding of HASTELLOY® C-276 alloy is preferably carried out on like materials or with HASTELLOY® C-22 alloy using GWAT and GMAW gas metal arc welding processes as well as the fusion arc welding process.

The semi-finished products should also be in a stress-free, metallic bright condition and be free of dirt.

In order to achieve optimal corrosion resistance, care must be taken to apply a minimum of heat during welding.

Preheating or secondary heat treatment is generally unnecessary.

Chemical Composition*

	C	Si	Mn	P	S	Co
Max.	0.01	0.08	1.00	0.025	0.010	2.50
	Cr	**Fe**	**Mo**	**V**	**W**	**Ni**
Min.	14.50	4.00	15.00	-	3.00	Bal.
Max.	16.50	7.00	17.00	0.35	4.50	Bal.

* weight %

Physical Properties

Melting temperature range	1,323–1371 [°C]
Density*	8,890 [kg · m^{-3}]
Modulus of elasticity* (approximately)	205 [GPa]
Specific heat*	427 [J · kg^{-1} · K^{-1}]
Thermal conductivity*	9.2 [W · m^{-1} · K^{-1}]
Coefficient of thermal expansion 20-100°C	11.2 x 10^{-6} [K^{-1}]
Specific electrical resistivity*	1.3 [Ω · mm^2 · m^{-1}]

* at room temperature

Mechanical Properties at Room Temperature

Semi-finished product form	Sheet ≤ 5 mm thickness	Forging/bar ≤ 90 mm ⌀ thickness, sheet > 5 to ≤ 20mm thickness
$R_{p\ 0.2}$ min [MPa]	310	280
R_m [MPa]	750 – 1,000	700 – 950
A min [%]	30	25

Mechanical Properties at Elevated Temperatures*

Semi-finished product form	Strength parameter	Temperature °C 100	200	300	400
Sheet ≤ 5 mm thickness	$R_{p\ 0.2}$ [MPa]	280	240	220	195
Forging/ bar > 90 mm thickness, sheet > 5 to ≤ 20 mm thickness	$R_{p\ 0.2}$ [MPa]	255	225	200	170

* minimum values

Welding Filler Metal

	DIN Material No.	DIN Designation	VdTÜV Data Sheet No.	DIN EN ISO	AWS/ASME
Bar (GTAW)				18274	A5.14
C-276	2.4886	SG-NiMo16Cr16W	0320	Ni6276	ER NiCrMo-4
C-22	2.4635	SG-NiCr22Mo14W	04536	Ni6022	ER NiCrMo-10
Wire (GMAW)				18274	A5.14
C-276	2.4886	SG-NiMo16Cr16W	-	Ni6276	ER NiCrMo-4
C-22	2.4635	SG-NiCr22Mo14W	04535	Ni6022	ER NiCrMo-10
Coated Rod Electrode (MMA)				14172	A5.11
C-276	2.4887	EL-NiMo15Cr15W	0319	Ni6276	E NiCrMo-4
C-22	2.4638	EL-NiCr20Mo14W	04534	Ni6022	E NiCrMo-10

We will be glad to provide you with information and instructions on machining and processing and on the selection of suitable welding filler metal. Please do not hesitate to call us.

® HASTELLOY is a registered trade mark of our contracted manufacturer HAYNES International, Inc., Kokomo, Indiana, USA.

Depending on the manufacturer the trade designations of products may vary from this given here.

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For further information about our products and locations, please refer to our image brochure or consult our website at www.zapp.com.

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