Pressurfect® CNG
Tube and pipe, seamless
Datasheet

Pressurfect® CNG is a dual grade certified (ASTM 316/316L) austenitic chromium-nickel steel with minimum 2.5% molybdenum and a low carbon content used for compressed natural gas (CNG) fuel systems.

The grade is characterized by:

- Excellent corrosion resistance in CNG environments
- Excellent toughness
- Excellent bendability
- Excellent impact strength

Standards

- ASTM: TP316L, TP316
- UNS: S31603, S31600
- EN Number: 1.4435, 1.4436
- EN Name: X 2 CrNiMo 18-14-3, X 3 CrNiMo 17-13-3
- JIS: SU316LTP, 316TP, SU316LTB, 316TB

Product standards

- ASTM A213, A269 and A312
- JIS G3459
- JIS G3463
- EN 10216-5

Product Approval
JIS Approval No. SE9402 for Stainless Steel Tubes

Chemical composition (nominal)

Chemical composition (nominal) %

C	Si	Mn	P	S	Cr	Ni	Mo
≤0.030	0.4	1.7	≤0.040	≤0.015	17.5	13	2.6

Applications

Pressurfect® CNG has been developed specifically for high-pressure fuel lines for compressed natural gas (CNG) systems in internal combustion engines.

Forms of supply

Pressurfect® CNG seamless stainless steel tubes are supplied in the bright annealed condition.

Dimensions

Outside diameter, mm (in.)	Wall thickness, mm (in.)
6.35 - 25.4 (1/4 - 1)	0.89 - 3.0 (0.035 - 0.12)

Other dimensions can be supplied on request.

Tolerances

Outside diameter	Wall thickness
Wall-thickness tolerance : +/- 10%	OD tolerance : +/- 0.75% with a minimum of +/-0.08 mm (0.0031 in.)

For special tolerance requirements, please contact Alleima.

Surface roughness

- OD ≥ 6 mm Ra (outside) ≤ 1.0 µm (by polishing)
- OD ≥ 6 mm Ra (inside) ≤ 4.5 µm - depending on the wall thickness/outside diameter ratio

For special roughness requirements, please contact Alleima.

Mechanical properties

At 20°C

Metric units

Proof strength		Tensile strength	Elong.		Hardness
$R_{p0.2}$[a]	$R_{p1.0}$[a]	R_m	A[b]	$A_{2"}$	
MPa	MPa	MPa	%	%	HRB
≥220	≥250	515-690	≥40	≥35	≤90[c]

At 68°F

Imperial units

Proof strength		Tensile strength	Elong.		Hardness
$R_{p0.2}$[a]	$R_{p1.0}$[a]	R_m	A[b]	$A_{2"}$	
ksi	ksi	ksi	%	%	HRB

≥32	≥36	75-100	≥40	≥35	≤90[c]

1 MPa = 1 N/mm^2
[a] $R_{p0.2}$ and $R_{p1.0}$ correspond to 0.2% offset and 1.0% offset yield strength, respectively.
[b] Based on $L_0 = 5.65 \sqrt{S_0}$ where L_0 is the original gauge length and S_0 the original cross-section area.

[c] ASTM requirement is HRB ≤90, but HRB ≤80 is guaranteed, based on test results

Impact strength

Due to its austenitic microstructure, Pressurfect® CNG has excellent impact strength at room temperature and at very low temperatures.

Tests have demonstrated that the steel fulfils the requirements according to the European standards EN 13445-2 (UFPV-2) ((min. 60 J (44 ft-lb) at -270°C (-455°F) and EN 10216-5 (min. 60 J (44 ft-lb) at -196°C (-320°F).

At high temperatures

Metric units

Temperature	Proof strength	
	$R_{p0.2}$	$R_{p1.0}$
°C	MPa	MPa
	min.	min.
50	200	230
100	180	215
150	165	195
200	150	180

Imperial units

Temperature	Proof strength	
	$R_{p0.2}$	$R_{p1.0}$
°F	ksi	ksi
	min.	min.
200	26	31
400	21	26

Creep strength is not relevant for the working temperatures for this application.

750	1380	37	5.4	18	2.6

Corrosion resistance

Pressurfect® CNG has good resistance in:

- Organic acids at high concentrations and moderate temperatures
- Inorganic acids, e.g. phosphoric and sulfuric acids, at moderate concentrations and temperatures. The steel can also be used in sulfuric acid of concentrations above 90% at low temperature.
- Salt solutions, e.g. sulfates, sulfides and sulfites
- Caustic environments

Stress corrosion cracking

Austenitic steels are susceptible to stress corrosion cracking. This may occur at temperatures above about 60°C (140°F) if the steel is subjected to tensile stresses and at the same time comes into contact with certain solutions, particularly those containing chlorides. Such service conditions should therefore be avoided. Conditions when plants are shut down must also be considered, as the condensates which are then formed can develop conditions that lead to both stress corrosion cracking and pitting.

In applications demanding high resistance to stress corrosion cracking, Pressurfect® XP is recommended.

Intergranular corrosion

Pressurfect® CNG has a low carbon content and therefore better resistance to intergranular corrosion than steels of type ASTM 316. The TTC-diagram, Figure 1, shows the result of corrosion testing for 24 hours in boiling Strauss solution (12% sulfuric acid, 6% copper sulfate). The resistance to grain boundary attack is much better for ASTM 316L than for ASTM 316. This is an advantage in complicated welding operations.

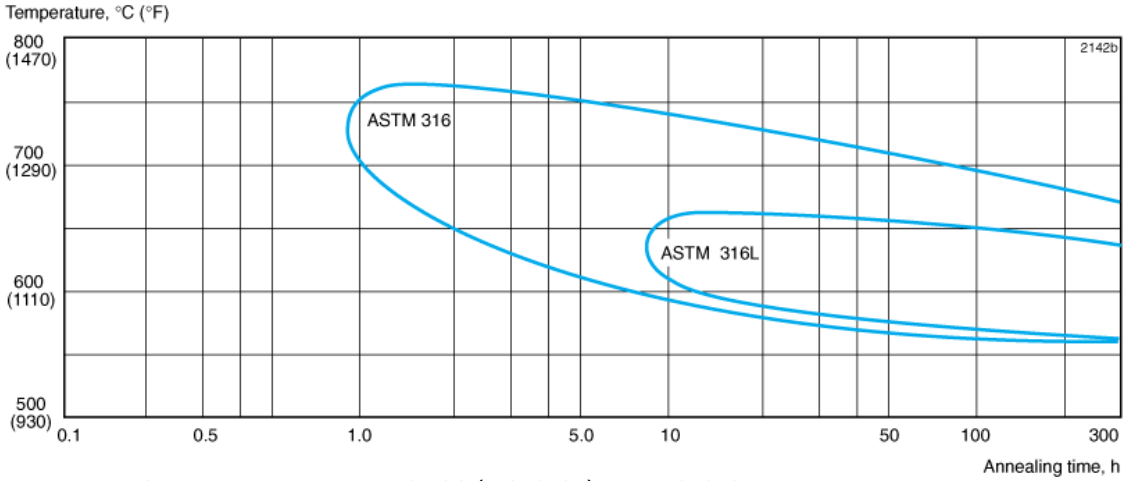

Figure 1. TTC-diagram for Alleima 3R60 (AISI 316L) and AISI 316.

Pitting and crevice corrosion

Resistance to these types of corrosion improves with increasing molybdenum content. Pressurfect® CNG, containing minimum 2.5% Mo, has substantially higher resistance than steels of type ASTM 304 and also better resistance than ordinary ASTM 316/316L steels with minimum 2.0% Mo.

One parameter for comparing the pitting resistance of different steels is the PRE-number (Pitting Resistance Equivalent).
The PRE is defined as, in weight-%: PRE = % Cr + 3.3 %x Mo + 16 x % N

Grade	PRE
Pressurfect CNG	≥25
ASTM 316L	≥23

Gas corrosion

Pressurfect® CNG can be used in:

- Air up to 850°C (1560°F)
- Steam up to 750°C (1380°F)

Creep behavior should also be taken into account when using the steel in the creep range.

In flue gases containing sulfur, the corrosion resistance is reduced. In such environments the steel can be used at temperatures up to 600-750°C (1100-1380°F) depending on service conditions. Factors to consider are whether the atmosphere is oxidizing or reducing, i.e. the oxygen content, and whether impurities such as sodium and vanadium are present.

Physical properties

Density: 8.0 g/cm^3, 0.29 lb/in^3

Thermal conductivity

Temperature, °C	W/m °C	Temperature, °F	Btu/ft h°F
20	14	68	8
100	15	200	8.5
200	17	400	

Specific heat capacity

Temperature, °C	J/kg °C	Temperature, °F	Btu/lb °F
20	485	68	0.11
100	500	200	0.12
200	515	400	0.12

Thermal expansion [1)]

Temperature, °C	Per °C	Temperature, °F	Per °F
30-100	16.5	86-200	9.5
30-200	17	86-400	9.5

1) Mean values in temperature ranges (x10^{-6})

Modulus of elasticity [1)]

Temperature, °C	MPa	Temperature, °F	ksi
20	200	68	29.0
100	194	200	28.2

200	186	400	26.9

1) ($x10^3$)

Bending

Annealing after cold bending is not necessary.

Tight radius bends of up to 180 degrees without the walls collapsing are possible.

Datasheet last updated 6/20/2025 3:19:59 PM (supersedes all previous editions)