

# DATA SHEET

## DMV 800 / DMV 800 L

### 1 – Applications

DMV 800 / DMV 800 L is the material of choice for a wide range of different applications like:

- Nitric acid coolers because of resistance to nitric acid conditions
- Superheater tubing because of excellent corrosion resistance to steam
- Heating element sheathing because of good mechanical strength
- As acetic anhydride cracking tubes because of good resistance in process conditions

### 2 – Main Features

DMV 800 / DMV 800 L has an entirely austenitic structure. The low carbon content and the Ti/C ratio promote a stable face centered structure and improve the resistance to intergranular corrosion in certain aggressive media.

### 3 – Description

#### 3.1 Specifications

- UNS N08800\* acc. to ASTM B 163 and ASME SB 163
- UNS N08800\* acc. to ASTM B 407 and ASME SB 407
- 1.4558 acc. to SEW 400
- 1.4558 acc. to EN 10216-5 and EN 10297-2

\* Please check the corresponding chemical analysis modification with our technical department.

#### 3.2 Chemical Composition

DMV 800 / DMV 800 L contains:

	% min.	% max.
<b>C</b>		0.030
<b>Si</b>		0.70
<b>Mn</b>		1.50
<b>P</b>		0.025
<b>S</b>		0.015
<b>Cr</b>	20.00	23.00
<b>Ni</b>	32.00	35.00
<b>Al</b>	0.15	0.45
<b>Ti</b>	8x (C+N)	0.60
<b>Cu</b>		0.50
<b>Fe</b>	39.5	

#### 3.3 Mechanical Properties

##### 3.3.1 Tensile Properties at 20°C (68°F), annealed Condition

UNS N08800\* acc. to ASTM B 407:  
Cold worked annealed

	MPa	ksi
<b>0.2% Y.S. min.</b>	205	30
<b>U.T.S. min</b>	520	75
<b>E in 2" min.</b>		30%

UNS N08800\* acc. to ASTM B 407:  
Hot-finished annealed:

	MPa	ksi
<b>0.2% Y.S. min.</b>	170	25
<b>U.T.S. min.</b>	450	65
<b>E in 2" min.</b>		30%

Grade 1.4558 acc. to EN 10216-5 and EN 10297-2:

	MPa	ksi
<b>0.2% Y.S. min.</b>	180	(26.1)
<b>1.0% Y.S. min.</b>	210	(30.4)
<b>U.T.S. min.</b>	450	(65.2)
<b>A</b>		30%

1MPa=1 N/mm<sup>2</sup>; 1 ksi=6.9 MPa  
( ) = calculated values

##### 3.3.2 Tensile Properties at Elevated Temperature

Grade 1.4558 acc. to EN 10216-5:

Temp. °C (°F)	0.2% Y.S. min. MPa (ksi)	1.0% Y.S. min. MPa (ksi)
<b>100 (212)</b>	155 (22.5)	185 (26.8)
<b>150 (302)</b>	145 (21.0)	175 (25.4)
<b>200 (392)</b>	140 (20.2)	170 (24.6)
<b>250 (482)</b>	135 (19.6)	165 (23.9)
<b>300 (572)</b>	130 (18.8)	160 (23.2)
<b>350 (662)</b>	125 (18.1)	155 (22.5)
<b>400 (752)</b>	120 (17.4)	150 (21.7)
<b>450 (842)</b>	110 (15.9)	140 (20.3)
<b>500 (932)</b>	100 (14.5)	130 (18.8)
<b>550 (1022)</b>	90 (13.0)	120 (17.4)

( ) = calculated values

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### 3.3.3 Impact Resistance

Acc. to EN 10216-5 the notch impact energy at 20°C must be minimal 120 J in longitudinal and 90 J in transversal direction (average value of three samples with min. 84 J in longitudinal and min. 63 J in transversal individual value).

### 3.3.4 Creep Rupture Strength

For applications at temperatures above 800°C (1450°F), where high creep strength values are required, please choose the high carbon version DMV 800 H. For the referring accepted values, please consider the according datasheet.

### 3.4 Physical Properties

Coefficient of Thermal Expansion between 20°C (68°F) and ...			
Temperature °C	(°F)	10 <sup>-6</sup> / K	10 <sup>-6</sup> / °F
100	(212)	14.4	(8.1)
200	(392)	15.2	(8.4)
300	(572)	15.8	(8.7)
400	(752)	16.2	(9.0)
500	(932)	16.6	(9.2)
600	(1112)	17.0	(9.5)

( ) = calculated values

Thermal Conductivity			
Temperature °C	(°F)	W / (m K)	Btu in / (ft h °F)
20	(68)	11.6	(6.71)
100	(212)	13.0	(7.51)
200	(392)	15.0	(8.67)
300	(572)	16.2	(9.36)
400	(752)	17.8	(10.3)
500	(932)	19.2	(11.1)
600	(1112)	21.0	(12.1)

( ) = calculated values

Modulus of Elasticity			
Temperature °C	(°F)	10 <sup>3</sup> MPa	10 <sup>3</sup> ksi
20	(68)	198	(28.7)
100	(212)	193	(28.0)
200	(392)	187	(27.1)
300	(572)	180	(26.1)
400	(752)	173	(25.1)
500	(932)	166	(24.1)
600	(1112)	158	(22.9)

( ) = calculated values

### 3.5 Corrosion Properties

Within a temperature range of 550°C – 900°C (1022°F – 1652°F), DMV 800 / DMV 800L can be sensitive to inter-granular attack, even following only short exposure. Therefore it is often necessary to take precautions when pickling the alloy or using it in aggressive media.

In this case, additional annealing should be performed.

DMV 800 / DMV 800 L shows very good resistance to nitric and organic acids, but has only limited resistance to sulphuric and hydrochloric acids.

This alloy can be used in halogen free neutral salts, either oxidizing or reducing, as well as in alkaline environments.

Due to the high nickel content, DMV 800 / DMV 800 L offers a very good resistance to stress corrosion cracking in chloride environments. These alloy tubes also resist well to cracking in alkaline environments like caustic soda. No rupture in boiling 50%-caustic was detected in laboratory tests.

Compared to austenitic stainless steels, the elevated chromium content gives better resistance to pitting and crevice corrosion.

The high chromium and nickel contents of DMV 800 / DMV 800 L make it eminently suitable for use in non sulphurous, oxidizing atmospheres up to 500°C (932°F) even under non-isothermal conditions.

Although DMV 800 / DMV 800 L contains iron, it has a high resistance to internal oxidation, which affects other nickel-chromium iron alloys. Finally, DMV 800 / DMV 800 L has the advantage over other stainless steels, that it is practically insensitive to sigma phase formation.

The position of DMV 800 / DMV 800 L on the galvanic scale is similar to that of stainless steels, with which it can be connected and be used without any problems.

## 4 – Supply

### 4.1 Dimensional Range

DMV 800 / DMV 800 L is produced in form of seamless tubes and pipes in the range of:

Outside diameter:

6 mm – 219.1 mm (0.24" – 8.6")

Wall thickness:

1 mm – 30 mm (0.04" – 1.18")

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### 4.2 Delivery Condition

Tubes and pipes are delivered in cold or hot finished condition depending on size and specification. Normally they will be supplied in annealed condition.

### 4.3 U-bent

Our tubes are also available in U-bent version in lengths of up to 30 m (straight); the high deformability of the material allows cold bending down to a very small bending radius.

## 5 – Fabrication

### 5.1 Heat Treatment

For service up to about 500°C (932°F), the alloy is supplied in the (soft) annealed condition. (Soft) annealing temperature in the range of 950°C (1742°F) provides a fine grain structure.

Heat treatment is recommended after welding, cold work and after being maintained in the temperature range of 550°C – 900°C (1022°F – 1652°F), to ensure complete recrystallisation and a homogeneous chromium distribution when used in humid atmospheres.

As for all austenitic stainless steels, the cleanliness requirements (especially contamination for greases) must be strictly observed.

The furnace atmosphere must have very low sulphur content.

When subsequently used in moist environment, oxidation must be avoided by use of a highly reducing atmosphere (cracked ammonia, hydrogen...) or removed by pickling after heat treatment.

### 5.2 Bending

DMV 800 / DMV 800 L is generally suitable for further cold or hot forming.

Cold bending of tubes can be carried out under similar conditions to those required for stainless steels. Cold formed tubes and pipes have to be newly solution annealed if the forming degree is > 20% or the R/D ratio < or equal 2.5.

For corrosion reasons, it is sometimes recommended to perform a new solution annealing even following smaller forming degrees.

### 5.3 Welding

Preheating and heat treatment after welding are not necessary.

To avoid hot cracks in the weld metal, processes recommended by the filler producers have to be observed. Only approved filler materials should be considered, that have been tested for the foreseen application temperature. The calculation values for the filler materials should be respected.

To eliminate the risk of relaxation cracking, material exposed to service temperature above 550°C (1022°F) should obey strictly the mentioned instructions in chapter “5.1 Heat Treatment” of this datasheet.

In all cases, the usual cleanliness precaution for welding stainless steels should be taken into account.

Where the subsequent application might be in moist environment, all oxidation must be avoided or eliminated.

## 6 – Standards and References

DMV 800 / DMV 800 L may be delivered in accordance with the commonly used European, American and other national standards.

In other cases, our specialists are at your service for any guidance on drawing up your tube specifications.

Salzgitter Mannesmann Stainless Tubes has delivered DMV 800 / DMV 800 L tubes and pipes to a wide range of world-wide customers in the chemical and petrochemical industry.

For any specific queries, please contact our sales offices.

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## DMV 800 / DMV 800 L

QUALITY IN ROUND TERMS.

### Contact

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