

# DATASHEET

## DMV 617 mod

### 1 – Application

Designed for application as superheater and reheater boiler tube grade, DMV 617 mod is suitable for the most advanced coal fired power stations using steam temperatures of approximately 700°C (1300°F) in ultra supercritical and advanced ultra supercritical vessel designs.

### 2 – Main Features

- Nickel Base material
- Excellent high temperature strength and creep strength up to 1100°C (2000°F)
- Very good high temperature oxidation resistance
- Very good resistance against carburisation up to 1100°C (2000°F)
- Good weldability

### 3 – Description

#### 3.1 Specifications

- 2.4663, NiCr23Co12Mo
- ASTM B167-08, UNS N06617
- ASME SB-167
- VdTÜV Material Datasheet 485, 09.2001, Federal Republic of Germany
- ISO NiCr22Co12Mo9

#### 3.2 Available Sizes

DMV 617 mod is produced as seamless Ni Base tube, suitable for all recently used austenitic reheater and superheater boiler tube sizes. Following VdTÜV Material Datasheet 485, 09.2001, the max. outer diameter is 150 mm and the max. wall thickness is 17 mm. Other sizes are available on request.

#### 3.3 Chemical Composition

DMV 617 mod typical values:

	Weight %
<b>Cr</b>	22.0
<b>Co</b>	12.0
<b>Mo</b>	9.0
<b>Ti</b>	0.4
<b>Al</b>	1.0
<b>C</b>	0.07
<b>Fe</b>	< 1.5
<b>Mn</b>	< 0.3
<b>Si</b>	< 0.3
<b>P</b>	< 0.012
<b>S</b>	< 0.008
<b>N</b>	< 0.05
<b>B</b>	< 0.010
<b>Ni</b>	Rest

#### 3.4 Mechanical Properties

##### 3.4.1 At Solution Annealed Condition

According to ASME SB-167

	MPa	ksi
<b>Y.S. min.</b>	240	35
<b>U.T.S. min.</b>	665	95
<b>E in 2", min., %</b>	35	

According VdTÜV Datasheet 485, 09.2001

	MPa	ksi
<b>Y.S. min.</b>	300	(43)
<b>U.T.S. min.</b>	700	(101)
<b>A [%]</b>	35	

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

##### 3.4.2 Impact Resistance

According to VdTÜV Material Datasheet 485, 09.2001, the Impact resistance KV in longitudinal direction is min 120 J. (Average value from 3 specimens. The average value may fall short only with one specimen, and only by max. 30%)

# DATA SHEET

## DMV 617 mod

### 3.4.3 At Elevated Temperature

According VdTÜV Datasheet 485, 09.2001

Temp. °C (°F)	0.2% Y.S. min. MPa (ksi)	1.0% Y.S. min. MPa (ksi)
100 (212)	270 (39.1)	300 (43.5)
200 (392)	230 (33.3)	260 (37.7)
300 (572)	220 (31.9)	250 (36.2)
350 (662)	215 (31.2)	245 (35.5)
400 (752)	210 (30.4)	240 (34.8)
450 (842)	205 (29.7)	230 (33.3)
500 (932)	200 (29.0)	225 (32.6)
550 (1022)	195 (28.3)	220 (31.9)
600 (1112)	190 (27.5)	210 (30.4)
650 (1202)	187 (27.1)	207 (30.0)
700 (1292)	185 (26.8)	205 (29.7)
750 (1382)	180 (26.1)	200 (29.0)

( ) = calculated values

### 3.4.4 Creep Strength Values

Creep Strength Values for 10,000 h and 100,000 h acc. to Material Datasheet VdTÜV 485, 09.2001

Temp. °C (°F)	10,000h MPa (ksi)	100,000h MPa (ksi)
600 (1112)	260 (37.1)	190 (27.5)
610 (1130)	240 (34.8)	170 (24.6)
620 (1148)	220 (31.9)	155 (22.5)
630 (1166)	200 (29.0)	143 (20.7)
640 (1184)	185 (26.8)	133 (19.3)
650 (1202)	170 (24.6)	125 (18.1)
660 (1220)	160 (23.2)	119 (17.2)
670 (1238)	150 (21.7)	113 (16.4)
680 (1256)	141 (20.4)	107 (15.5)
690 (1274)	132 (19.1)	101 (14.6)
700 (1292)	123 (17.8)	95 (13.8)
710 (1310)	116 (16.8)	89 (12.9)

Temp. °C (°F)	10,000h MPa (ksi)	100,000h MPa (ksi)
720 (1328)	109 (15.8)	83 (12.0)
730 (1346)	102 (14.8)	77 (11.2)
740 (1364)	96 (13.9)	71 (10.3)
750 (1382)	90 (13.0)	65 (9.4)
800 (1472)	65 (9.4)	43 (6.2)
850 (1562)	45 (6.5)	27 (3.9)

( ) = calculated values

### 3.4.5 Creep Strength Values

According Survey of MFI-WM, 11.12.03, accepted for applications acc. to PED 97/23/EC

Temp. °C (°F)	10,000h MPa (ksi)	100,000h MPa (ksi)
600 (1112)	331 (48.0)	265 (38.4)
610 (1130)	317 (45.9)	249 (36.1)
620 (1148)	303 (43.9)	233 (33.8)
630 (1166)	289 (41.9)	218 (31.6)
640 (1184)	274 (39.7)	202 (29.3)
650 (1202)	259 (37.5)	187 (27.1)
660 (1220)	244 (35.4)	172 (24.9)
670 (1238)	229 (33.2)	158 (22.9)
680 (1256)	214 (31.0)	145 (21.0)
690 (1274)	199 (28.8)	132 (19.1)
700 (1292)	185 (26.8)	119 (17.2)
710 (1310)	171 (24.8)	108 (15.7)
720 (1328)	158 (22.9)	97 (14.1)
730 (1346)	145 (21.0)	87 (12.6)
740 (1364)	132 (19.1)	77 (11.2)
750 (1382)	121 (17.5)	69 (10.0)

( ) = calculated values

### 3.5 Physical Properties

Coefficient of Thermal Expansion following VdTÜV Material Datasheet 485, 09.2001

Coefficient of Thermal Expansion between 20°C and ...		
...Temperature °C (°F)	10 <sup>-6</sup> /K	10 <sup>-6</sup> /°F
100 (212)	12.4	(6.9)
300 (572)	13.3	(7.4)
500 (932)	14.0	(7.8)
600 (1112)	14.4	(8.0)
700 (1292)	15.1	(8.4)
800 (1472)	15.7	(8.7)
900 (1652)	16.3	(9.0)
1000 (1832)	16.9	(9.3)

( ) = calculated values, 1/°F = 1,8/K

Thermal Conductivity following VdTÜV Material Datasheet 485, 09.2001

Thermal Conductivity		
Temperature °C (°F)	W / (m°C)	Btu / (ft.h °F)
20 (68)	10	(5.8)
100 (212)	12	(6.9)
300 (572)	15	(8.7)
500 (932)	19	(11.0)
600 (1112)	21	(12.1)
700 (1292)	23	(13.3)
800 (1472)	25	(14.4)
900 (1652)	27	(15.6)
1000 (1832)	29	(16.8)

( ) = calculated values, 1W/(m°C) = 0,5779 Btu/(ft h °F)

# DATA SHEET

## DMV 617 mod

Modulus of Elasticity following VdTÜV  
Material Datasheet 485, 09.2001

Modulus of Elasticity		
Temperature °C (°F)	10 <sup>3</sup> MPa	10 <sup>3</sup> ksi
20 (68)	215	(31.1)
100 (212)	211	(30.6)
300 (572)	198	(28.7)
500 (932)	185	(26.8)
600 (1112)	177	(25.7)
700 (1292)	169	(24.5)
800 (1472)	160	(23.2)
900 (1652)	152	(22.0)
1000 (1832)	143	(20.7)

( ) = calculated values

## 4 – Application Properties

### 4.1 Heat Treatment

The solution annealing of the cold finished DMV 617 mod meets the requirement of VdTÜV Material Datasheet 485, where an annealing temperature between 1140°C (2084°F) and 1200°C (2192°F) is required. Additionally, the requirements of ASME SB 167 are met where solution-treated at 2100 – 2250°F (1150 – 1232°C) is specified.

Work pieces must be free of any kind of contamination before or during any heat treatment.

DMV 617 mod is susceptible to relaxation cracking if new solution annealed and welded pipes and tubes are exposed to service temperatures

within the temperature range of 550 – 780°C (1020 – 1436°F) without prior postweld stabilizing heat treatment (PWHT) at 980°C (1800°F) for 3 hrs. The heating and cooling rates for such stabilizing heat treatments are not critical. The subsequent service temperature range within relaxation cracking may occur, extends further to 500 – 780°C (932 – 1436°F), if products are reused which have already been in service and which have been repair welded with matching alloy 617 consumables without a following stabilizing heat treatment at 980°C (1800°F) for 3 hrs.

### 4.2 Corrosion Properties

The DMV 617 mod is designed for the application in furnace atmospheres at high temperature in the range up to 1100°C (2000°F) and has a good oxidation and carburization resistance.

### 4.3 Tube Bending

DMV 617 mod is generally suitable for further cold or hot forming. Hot and cold working requires high power machines due to the high mechanical properties of the material.

#### 4.3.1 Hot working

Hot working should be done in a temperature range of 1200 to 950°C (2190 – 1740°C), followed by water quench or rapid air cooling. Heat treatment after hot working is recommended to obtain optimum properties.

#### 4.3.2 Cold working

After cold reduction of more than 10%, or more than 5% for applications at temperatures above 900°C (1650°F) solution annealing is required before use.

### 4.4 Welding

Pre-heating and a heat treatment after welding are normally not necessary. To avoid hot cracks in the weld, the 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 considered.

## 5 – Specifications and References

DMV 617 mod may be delivered in accordance with European and ASTM Norms.

Salzgitter Mannesmann Stainless Tubes GmbH is an approved supplier for this grade 2.4663 under VdTÜV Material Datasheet 485, 09.2001, Federal Republic of Germany.

Frequently the DMV 617 mod is delivered according to project specific customer specifications.

Further information on projects is available upon request.

# DATA SHEET

## DMV 617 mod

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QUALITY IN ROUND TERMS.

## Contact

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