



ASO GROUP  
Steel part of progress.

**INSPECTION CERTIFICATE /**  
Werkszeugnis Acc. To EN 10204 - ISO 9001

**MADE IN ITALY mod.**  
Q.P9.02.b - rev.6

**CERT. TYPE 3.1**

ASO Forge srl, Via Verginello 29/31 Castegnato BS(ITALY) - Tel. 030/6841011 Fax. 030/6841012

Certificate Nr./Zeugnis Nr. 2175/2019

Rev. 0

**CUSTOMER**  
Cliente / Kunde

Client Order Nr.  
Ordine Nr. / Bestell Nr. P05745

**ASO ORDER**  
Ordine Aso / Auftrags Nr. 8190523

**REFERENCE STANDARDS**  
Standard di Riferimento / Referenzstandards

ASTM A276, A479, A182/SA 182, ASTM A262 Practice E, A484, ASME SA479, SA193/A193 B8M CL1, SAE AMS-QQ-S-763B, AMS 5653, AMS 5648, NACE MR0175-ISO 15156, NACE MR0103, ASTM A320/A320M, ASME SA320/SA320M

Client Item / Artikel Nr.

Heat N° / Schmelze 111826

**STEEL GRADE / Stahl** F316 / F316L - UNS S31600 - UNS S31603

**CONDITION Trattamento / Wärmebehandlung** Solution Annealing

Melting process / Schmelzprozess

Steel produced by electric furnace and refine in AOD / Elektrolichtbogenofen und Ausbau in der AOD-Konverter

**Chemical Analysis / Chemische Analyse**

C %	Mn %	Si %	P %	S %	Cu %	Cr %	Ni %
0,015	1,79	0,44	0,032	0,027	0,43	16,80	10,11

Mo %	Sn %	Al %	V %	Nb %	Ti %	B %	As %
2,14	0,008	0,006	0,070	0,063	0,005	0,0038	0,006

Sb %	Co %	Ca %	Pb %	W %	Zr %	Bi %	Ta %
0,0034	0,126	0,0008					

H2 ppm	O2 ppm	N2 ppm	Ceq %
		730	

Grain size: ASTM E-112=3				
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**Remarks / Notes / Anmerkungen:**

No welding repair has been performed . Material free of radioactive contaminations . Radioactivity Co.60<0,1 Bq/g. Mercury free.

Statement confirming that all the operation have been performed in accordance with the ASO QAS Rev. 16 (ASO QM System) / Erklärung, die bestätigt, dass alle Operationen in Übereinstimmung mit dem ASO QAS Rev. 16 durchgeführt wurden (ASO-Qualitäts-Handbuch)

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	111826	F316 / F316L - UNS S31600 - UNS S31603	Solution Annealing

**VDH: Visual, Dimensional and Surface Hardness / Visibilitätät, Dimension Oberflaechen Haerte**

Bar Nr	Nominal section ["]	Real section ["]	Length[mm]	Weight [Kg]	Forging Reduction	Hardness test (HB)
	-0/+3mm					140 - 241
1A	20"	20,24"	3410	5630	4,18:1	188 - 190
1B	20"	20,24"	3413	5640	4,18:1	190 - 188

Material must be of European origin. According to ISO 9001:2008 - ISO 9002 - 1987 EN 29002 1987 Approval.  
**STAINLESS STEEL FORGED ROUND BARS**

No Welding Performed, Mercury Free, Radioactivity Co.60 < 0,1 Bq/g. VISUAL INSPECTION: Satisfactory. Free from cracks, 100% anti-mix-test, free from toxic contamination. According to NACE MR0103. "Emesso in accordo con TUV di Monaco (Giugno 2011)"

Ingot type / Blockart	Country of origin / Ursprungsland
Polygonal 16000	ITALY
Material description / Materialbeschreibung	Forged steel bars

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**Heat Treatment / Waermebehandlung**

Lot - Nr. / Fertigungsauftr Nr. TT005115	Heating Temperature 1050 °C, Holding time 10h. Cooling in Water
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Furnace temperature monitoring by thermocouple: method A (atmosphere). Furnace calibration according to API 6A Annex M

**Mechanical Properties / Mechanische Eigenschaften**

Mechanical testing on a prolongation from the forged bar after quality heat treatment

Test One - bar size		20"					
Tensile test / Zugversuch		Lot nr. / Fertigungsauftr Nr.				Direction	T - D/4 B.S.
	Temperature	Rm [Mpa]	Rp 0,2% [Mpa]	A5 [%]	Z [%]		
Required	20°C	> 515	> 205	> 30	> 50		
Obtained		516	213	56	71		

Impact test / Schlagbiegeversuch		Lot nr. / Fertigungsauftr Nr.				Direction and position	T - D/4 B.S.
	Temperature	Kv [joule]	Kv Av. [joule]			Hard. / HB	
Required	20°C	inf.	inf.				
Obtained		162 - 151 - 142	151,67			154 - 152 - 154	

**Remarks / Notes / Anmerkungen:**

According to ASTM A182

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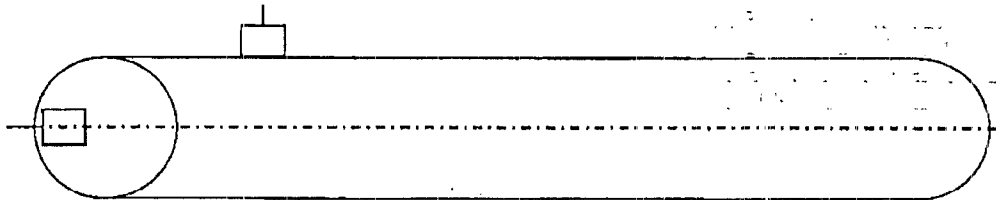
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**Ultrasonic Inspection / Ultraschallprüfung**

Reference Standard / Referenzstandards	ASTM A388 (6,4mm F.B.H. max)		
Test method / Ausführungsverfahren	DGS / AVG	Instrument / Ausrüstung	USN60
Test technique / Prüftechnik	pulse - echo - method	Reference block / Testkörper	V1
Transducers / Prüfkopftyp	B1S	Test frequency / Prüffrequenz	1 Mhz
Surface condition / Oberflächlicher zustab	Machined	Testing scope / Prüfumfang	100% of the surface
Sensitivity / Empfindlichkeit	5mm F.B.H.	Coupling / Kupplung	Couplant 333
Qualification operator / Prufer Controleur	UT 2 level - EN ISO 9712	Test result / Beachtung	Conform to : ASTM A388
Indications detect / Hinweise gefunden	Bars Nr. 1A+1B, No indications detect		

Bar Sketch - Stabform



**The content is correct and accurate, all test results are in compliance with the material specification.**

**"Vedi Allegato Certificato di Analisi chimica e metallografica Nr 2175/2019" / "See annex Certificate of chemical analysis and metallographic Nr 2175/2019".**

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