

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10074570 - 30	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	A06	Purchase order No. : 800812 Purchaser's reference : 800812 Project Id. : 4003651	A07
Product : Seamless cold finished tube	B01/B04	Steel designation : 3R60 / 3R60	B02
Dimension (OD x WT) : 16,00 x 2,00AW mm	B09/B10	Melting process : AOD	C70
Technical requirements : ASME SA-213/SA213M - 2023 ASTM A213/A213M - 2022 ASTM A269/A269M-2015a(Reap.2019) EN 10216-5 TC1 2021 EN 10305-1 (Only Tolerances-Table 5) AD 2000 W2 Einbaurohre - 2022 AD 2000 W10 - 2019 NACE MR0175-2021/ISO 15156-3:2020, NACE MR0103/ISO 17945-1:2015 Alleima Spec. S-08921 PED 2014/68/EU			B03
Supplementary information : Manufacturing of stainless steel tubes in grade 3R60 / TP316/316L / UNS S31603 / 1.4435 from steel origin: Alleima Tube AB, Sweden. The qualified pre-material supplier is mentioned in the section "Extent of material delivery". Tube length 6000 mm (-0/+5 mm)			B14
The products, covered by this certificate, comply with specification and requirements of the order.			Z01
Originator of the document : QA - AC	A05/Z02	Inspector's stamp:	Z03

Chemical composition (Heat analysis)

Heat	C [%]	Si [%]	Mn [%]	P [%]	S [%]
568283	max 0.030 0,018	max 1.000 0,370	max 2.000 1,700	max 0.040 0,031	max 0.015 0,009
Heat	Cr [%]	Ni [%]	Mo [%]	N [%]	Co [%]
568283	17.000-18.000 17,400	12.500-14.000 13,130	2.500-3.000 2,620	max 0.100 0,044	info 0,130

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Heat	Ti [%] info
568283	<0,003

Product check analysis

Heat	Lot	C [%] max 0.030	Si [%] max 1.000	Mn [%] max 2.000	P [%] max 0.040	S [%] max 0.015
568283	2124815-11	0,018	0,370	1,740	0,033	0,009

Heat	Lot	Cr [%] 17.000-18.000	Ni [%] 12.500-14.000	Mo [%] 2.500-3.000	N [%] max 0.100
568283	2124815-11	17,400	12,970	2,600	0,057

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
568283	2124814-11	ALLEIMA SE	1	429	2 574.000	1 796.652
568283	2124815-11	ALLEIMA SE	1	386	2 316.000	1 616.568
568283	2124816-11	ALLEIMA SE	1	92	552.000	385.296

Note : ¹⁾ Number of heat treatment cycles performed on the tubes.

²⁾ Weight quantity is theoretically calculated, it might differ compared to shipping documents.

Chomutov, date : 5.3.2024

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
pass			
568283	2124814-11	EnF	pass
568283	2124814-11	WnF	pass
568283	2124815-11	EnF	pass
568283	2124815-11	WnF	pass
568283	2124816-11	WnF	pass
568283	2124816-11	EnF	pass

ST (sample type): WnF-West end, tube did not not used for flattening test,Enf-East end, tube did not not used for flattening test;

Flaring test in acc. with EN 10216-5

Heat	Lot	Test result [pass/fail]
pass		
568283	2124814-11	pass
568283	2124815-11	pass
568283	2124816-11	pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
pass			
568283	2124814-11	E	pass
568283	2124814-11	W	pass
568283	2124815-11	E	pass
568283	2124815-11	W	pass
568283	2124816-11	W	pass
568283	2124816-11	E	pass

ST (sample type): E-East end of tube; W-West end of tube;

Hardness test (HRB/HRC) in acc. with E18/S-08921/NACE

Heat	Lot	Hardness [HRB]	Hardness ≤22HRC [yes/no]
		max 80,000	yes
568283	2124814-11	77,000	yes
568283	2124814-11	76,000	yes
568283	2124815-11	77,000	yes
568283	2124815-11	77,000	yes
568283	2124816-11	74,000	yes
568283	2124816-11	75,000	yes

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	Test result [pass/fail]
pass		
568283	2124814-11	pass
568283	2124815-11	pass
568283	2124816-11	pass

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Intergranular corrosion testing in acc. with EN ISO 3651-2/A

Heat	Lot	Test result [pass/fail]
		pass
568283	2124814-11	pass
568283	2124815-11	pass
568283	2124816-11	pass

Longitudinal tensile test in acc. with A370 / EN ISO 6892-1

Heat	Lot	Rp0,2 [MPa]	Rm [MPa]	A2" [%]	A5 [%]	Rp1,0 [MPa]
		min 220.000	515.000-690.000	min 35.000	min 40.000	min 250.000
568283	2124814-11	267,300	576,900	53,800	54,500	300,200
568283	2124814-11	280,400	572,100	48,000	50,400	311,900
568283	2124815-11	266,200	580,000	53,600	52,400	300,700
568283	2124815-11	259,400	574,300	55,200	53,300	295,900
568283	2124816-11	270,700	575,200	56,000	53,500	302,300
568283	2124816-11	295,400	598,300	53,000	51,300	331,200

Microstructure evaluation and Grain size WI-3815/ASTM E112

The structure is free from grain boundary chromium carbide precipitations.

Heat	Lot	G.B.Cr.Carbides [No/Yes]	Grain size [(G)]
		No	5.000-14.000
568283	2124814-11	No	6,000
568283	2124815-11	No	6,000
568283	2124816-11	No	6,000

Dimensional check

Test results comply with specified criteria.

HT - Final heat treatment of straight tubes

All tubes have been solution annealed followed by accelerated cooling.

Solution annealing temperature 1090°C, soaking time min. 2 minutes.

Quench medium - protective gas.

Inside cleanliness check

Test results comply with specified criteria.

NDT - Eddy current flaw detection in acc. ASTM E426

Test results comply with specified criteria.

NDT - Visual inspection

Test results comply with specified criteria.

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PMI - 100% positive material identification

Test results comply with specified criteria.

Statement

The raw material is free from radioactive contamination.

Statement

Material free from mercury and asbestos contamination.

Statement

The material have been manufactured within the scope of certified Quality Management System maintained in accordance with EN ISO 9001:2015.

Straightness check

Test results comply with specified criteria.