

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10064554 - 40	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	A06	Purchase order No. : 800778 Purchaser's reference : 800778 Project Id. : 4003460	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 - 2021 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 / TP316L / 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 lenght 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 [%]
568283	17.000-18.000 17,400	12.500-14.000 13,130	2.500-3.000 2,620	max 0.100 0,044

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Product check analysis

Heat	Lot	C [%]	Si [%]	Mn [%]	P [%]	S [%]
		max 0.030	max 1.000	max 2.000	max 0.040	max 0.015
568283	2104417-11	0,017	0,370	1,730	0,029	0,009

Heat	Lot	Cr [%]	Ni [%]	Mo [%]	N [%]
		17.000-18.000	12.500-14.000	2.500-3.000	max 0.100
568283	2104417-11	17,280	12,980	2,570	0,053

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
568283	2104416-11	ALLEIMA SE	1	422	2 532.000	1 767.336
568283	2104417-11	ALLEIMA SE	1	312	1 872.000	1 306.656

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 : 25.8.2023

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568283	2104416-11	EnF	pass
568283	2104416-11	WnF	pass
568283	2104417-11	EnF	pass
568283	2104417-11	WnF	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	2104416-11	pass
568283	2104417-11	pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568283	2104416-11	E	pass
568283	2104416-11	W	pass
568283	2104417-11	E	pass
568283	2104417-11	W	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 ≤ 22 HRC [yes/no]
		max 80,000	yes
568283	2104416-11	78,000	yes
568283	2104416-11	77,000	yes
568283	2104417-11	77,000	yes
568283	2104417-11	76,000	yes

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	Test result [pass/fail]
		pass
568283	2104416-11	pass
568283	2104417-11	pass

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

Heat	Lot	Test result [pass/fail]
		pass
568283	2104416-11	pass
568283	2104417-11	pass

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

Heat	Lot	Rp0,2 [MPa]	Rm [MPa]	A2" [%]	Amb.temper. [°C]	A5 [%]
		min 220.000	515.000-690.000	min 35.000	10.000-35.000	min 40.000
568283	2104416-11	294,400	581,300	55,800	24,000	54,400
568283	2104416-11	298,100	580,700	53,800	24,000	52,500
568283	2104417-11	288,800	581,600	55,800	24,000	53,100
568283	2104417-11	284,000	578,200	55,000	24,000	52,700
Heat	Lot	Rp1,0 [MPa]				
		min 250.000				
568283	2104416-11	327,600				
568283	2104416-11	329,500				
568283	2104417-11	320,600				
568283	2104417-11	315,000				

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	2104416-11	No	6,000
568283	2104417-11	No	6,000

Dimensional check

Test results comply with specified criteria.

HT - Final heat treatment of straight tubes

All tubes have been be 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.

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NDT - Visual inspection

Test results comply with specified criteria.

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.