

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10059511 - 30	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	A06	Purchase order No. : 800762 Purchaser's reference : 800762 Project Id. : 4003389	A07
Product : Seamless cold finished tube Dimension (OD x WT) : 12,70 x 1,65AW mm	B01/B04 B09/B10	Steel designation : 3R60 / 3R60 Melting process : AOD	B02 C70
Technical requirements : ASME SA213/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 [%]
567917	max 0.030 0,020	max 1.000 0,390	max 2.000 1,620	max 0.040 0,029	max 0.015 0,006

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]
567917	17.000-18.000 17,200	12.500-14.000 13,120	2.500-3.000 2,620	max 0.100 0,038

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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
567917	2097875-11	0,021	0,390	1,670	0,031	0,006

Heat	Lot	Cr [%]	Ni [%]	Mo [%]	N [%]
		17.000-18.000	12.500-14.000	2.500-3.000	max 0.100
567917	2097875-11	17,270	12,790	2,610	0,042

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
567917	2097875-11	ALLEIMA SE	1	412	2 472.000	1 124.760
567917	2097880-11	ALLEIMA SE	1	398	2 388.000	1 086.540
567917	2097881-11	ALLEIMA SE	1	424	2 544.000	1 157.520
567917	2097882-11	ALLEIMA SE	1	402	2 412.000	1 097.460
567917	2097883-11	ALLEIMA SE	1	412	2 472.000	1 124.760
567917	2097884-11	ALLEIMA SE	1	426	2 556.000	1 162.980
567917	2097885-11	ALLEIMA SE	1	392	2 352.000	1 070.160

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 : 5.6.2023

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
567917	2097875-11		pass
567917	2097875-11		pass
567917	2097880-11		pass
567917	2097880-11		pass
567917	2097881-11		pass
567917	2097881-11		pass
567917	2097882-11		pass
567917	2097882-11		pass
567917	2097883-11		pass
567917	2097883-11		pass
567917	2097884-11		pass
567917	2097884-11		pass
567917	2097885-11		pass
567917	2097885-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result [pass/fail]
			pass
567917	2097875-11		pass
567917	2097880-11		pass
567917	2097881-11		pass
567917	2097882-11		pass
567917	2097883-11		pass
567917	2097884-11		pass
567917	2097885-11		pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
567917	2097875-11		pass
567917	2097875-11		pass
567917	2097880-11		pass
567917	2097880-11		pass
567917	2097881-11		pass
567917	2097881-11		pass
567917	2097882-11		pass
567917	2097882-11		pass
567917	2097883-11		pass
567917	2097883-11		pass
567917	2097884-11		pass
567917	2097884-11		pass
567917	2097885-11		pass
567917	2097885-11		pass

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

Heat	Lot	ST	Hardness	Hardness ≤22HRC
			[HRB]	[yes/no]
			max 80,000	yes
567917	2097875-11		77,000	yes
567917	2097875-11		76,000	yes
567917	2097880-11		76,000	yes
567917	2097880-11		77,000	yes
567917	2097881-11		77,000	yes
567917	2097881-11		77,000	yes
567917	2097882-11		78,000	yes
567917	2097882-11		78,000	yes
567917	2097883-11		78,000	yes
567917	2097883-11		78,000	yes
567917	2097884-11		78,000	yes
567917	2097884-11		78,000	yes
567917	2097885-11		78,000	yes
567917	2097885-11		77,000	yes

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result
			[pass/fail]
			pass
567917	2097875-11		pass
567917	2097880-11		pass
567917	2097881-11		pass
567917	2097882-11		pass
567917	2097883-11		pass
567917	2097884-11		pass
567917	2097885-11		pass

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

Heat	Lot	ST	Test result
			[pass/fail]
			pass
567917	2097875-11		pass
567917	2097880-11		pass
567917	2097881-11		pass
567917	2097882-11		pass
567917	2097883-11		pass
567917	2097884-11		pass
567917	2097885-11		pass

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

Heat	Lot	ST	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
567917	2097875-11		292,600	579,900	57,200	24,000	58,700
567917	2097880-11		287,400	578,300	60,000	24,000	60,400
567917	2097881-11		288,800	574,800	63,200	24,000	64,000
567917	2097882-11		291,300	584,100	56,600	24,000	59,300
567917	2097883-11		279,300	562,200	59,200	24,000	61,300
567917	2097884-11		286,100	575,900	55,400	24,000	57,300
567917	2097885-11		292,900	576,400	55,600	24,000	57,800
Heat	Lot	ST	Rp1,0 [MPa]				
			min 250,000				
567917	2097875-11		319,800				
567917	2097880-11		317,600				
567917	2097881-11		317,000				
567917	2097882-11		320,500				
567917	2097883-11		307,800				
567917	2097884-11		313,400				
567917	2097885-11		320,400				

Microstructure evaluation and Grain size WI-3815/ASTM E112

The structure is free from grain boundary chromium carbide precipitations.

Heat	Lot	ST	G.B.Cr.Carbides [No/Yes]	Grain size [(G)]
			No	5,000-14,000
567917	2097875-11		No	7,000
567917	2097880-11		No	6,000
567917	2097881-11		No	6,000
567917	2097882-11		No	6,000
567917	2097883-11		No	6,000
567917	2097884-11		No	6,000
567917	2097885-11		No	6,000

Dimensional check

Test results comply with specified criteria.

HT - Final heat treatment of straight tubes

Bright annealing at 1150°C with min. 0,25 minute holding time.

Quenched by forced cooled inert 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.