

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 50012232 - 10	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT Venlo THE NETHERLANDS	A06	Purchase order No. : Purchaser's reference : Project Id. : 3000472	A07
Product : Seamless cold finished tube	B01/B04	Steel designation : 3R60 / 3R60	B02
Dimension (OD x WT) : 12,00 x 1,50AW mm	B09/B10	Melting process : AOD	C70
Technical requirements : ASME SA213/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 [%]
571981	max 0.030 0,019	max 1.000 0,400	max 2.000 1,650	max 0.040 0,029	max 0.015 0,008
Heat	Cr [%]	Ni [%]	Mo [%]	N [%]	Co [%]
571981	17.000-18.000 17,280	12.500-14.000 13,220	2.500-3.000 2,630	max 0.100 0,036	info 0,110

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Heat	Ti [%] info
571981	<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
571981	2159093-11	0,018	0,400	1,680	0,026	0,007

Heat	Lot	Cr [%] 17.000-18.000	Ni [%] 12.500-14.000	Mo [%] 2.500-3.000	N [%] max 0.100
571981	2159093-11	17,310	13,030	2,590	0,054

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
571981	2159093-11	ALLEIMA SE	1	553	3 318.000	1 303.974
571981	2159095-11	ALLEIMA SE	1	575	3 450.000	1 355.850
571981	2159098-11	ALLEIMA SE	1	583	3 498.000	1 374.714
571981	2159101-11	ALLEIMA SE	1	587	3 522.000	1 384.146
571981	2159105-11	ALLEIMA SE	1	565	3 390.000	1 332.270
571981	2159106-11	ALLEIMA SE	1	145	870.000	341.910

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 : 18.11.2024

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
571981	2159093-11		pass
571981	2159093-11		pass
571981	2159095-11		pass
571981	2159095-11		pass
571981	2159098-11		pass
571981	2159098-11		pass
571981	2159101-11		pass
571981	2159101-11		pass
571981	2159105-11		pass
571981	2159105-11		pass
571981	2159106-11		pass
571981	2159106-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result [pass/fail]
			pass
571981	2159093-11		pass
571981	2159095-11		pass
571981	2159098-11		pass
571981	2159101-11		pass
571981	2159105-11		pass
571981	2159106-11		pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
571981	2159093-11		pass
571981	2159093-11		pass
571981	2159095-11		pass
571981	2159095-11		pass
571981	2159098-11		pass
571981	2159098-11		pass
571981	2159101-11		pass
571981	2159101-11		pass
571981	2159105-11		pass
571981	2159105-11		pass
571981	2159106-11		pass
571981	2159106-11		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
571981	2159093-11		76,000	yes
571981	2159093-11		78,000	yes
571981	2159095-11		76,000	yes
571981	2159095-11		76,000	yes
571981	2159098-11		77,000	yes
571981	2159098-11		77,000	yes
571981	2159101-11		77,000	yes
571981	2159101-11		77,000	yes
571981	2159105-11		77,000	yes
571981	2159105-11		78,000	yes
571981	2159106-11		76,000	yes
571981	2159106-11		77,000	yes

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result
			[pass/fail]
			pass
571981	2159093-11		pass
571981	2159095-11		pass
571981	2159098-11		pass
571981	2159101-11		pass
571981	2159105-11		pass
571981	2159106-11		pass

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

Heat	Lot	ST	Test result
			[pass/fail]
			pass
571981	2159093-11		pass
571981	2159095-11		pass
571981	2159098-11		pass
571981	2159101-11		pass
571981	2159105-11		pass
571981	2159106-11		pass

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

Heat	Lot	ST	Rp0,2	Rm	A2"	A5	Rp1,0
			[MPa]	[MPa]	[%]	[%]	[MPa]
			min 220,000	515,000-690,000	min 35,000	min 40,000	min 250,000
571981	2159093-11		279,800	572,100	59,800	63,500	309,100
571981	2159095-11		282,900	568,100	56,800	59,200	310,200
571981	2159098-11		288,800	578,300	54,200	58,800	315,600
571981	2159101-11		285,000	578,800	56,400	60,200	312,000
571981	2159105-11		298,900	599,300	54,800	58,800	328,600
571981	2159106-11		294,100	576,800	56,400	58,500	321,900

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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	Grain size
			[No/Yes]	[(G)]
			No	5.000-14.000
571981	2159093-11		No	6,000
571981	2159095-11		No	6,000
571981	2159098-11		No	6,000
571981	2159101-11		No	6,000
571981	2159105-11		No	6,000
571981	2159106-11		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. E426/EN ISO 10893-1

Test results comply with specified criteria.

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.

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Straightness check

Test results comply with specified criteria.