

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 50005681 - 10	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT Venlo THE NETHERLANDS	A06	Purchase order No. : Purchaser's reference : Project Id. : 3000061	A07
Product : Seamless cold finished tube	B01/B04	Steel designation : 3R60 / 3R60	B02
Dimension (OD x WT) : 12,00 x 1,00AW 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 [%]
570343	max 0.030 0,015	max 1.000 0,370	max 2.000 1,660	max 0.040 0,030	max 0.015 0,005
Heat	Cr [%]	Ni [%]	Mo [%]	N [%]	Co [%]
570343	17.000-18.000 17,260	12.500-14.000 13,090	2.500-3.000 2,640	max 0.100 0,047	info 0,110

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Heat	Ti [%] info
570343	<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
570343	2132961-11	0,019	0,360	1,580	0,032	0,006

Heat	Lot	Cr [%] 17.000-18.000	Ni [%] 12.500-14.000	Mo [%] 2.500-3.000	N [%] max 0.100
570343	2132961-11	17,200	13,130	2,620	0,040

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
570343	2132955-11	ALLEIMA SE	1	571	3 426.000	938.724
570343	2132956-11	ALLEIMA SE	1	618	3 708.000	1 015.992
570343	2132957-11	ALLEIMA SE	1	611	3 666.000	1 004.484
570343	2132958-11	ALLEIMA SE	1	553	3 318.000	909.132
570343	2132959-11	ALLEIMA SE	1	562	3 372.000	923.928
570343	2132960-11	ALLEIMA SE	1	580	3 480.000	953.520
570343	2132961-11	ALLEIMA SE	1	594	3 564.000	976.536
570343	2132962-11	ALLEIMA SE	1	375	2 250.000	616.500
570343	2132963-11	ALLEIMA SE	1	252	1 512.000	414.288

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 : 9.5.2024

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result
			[pass/fail]
			pass
570343	2132955-11		pass
570343	2132955-11		pass
570343	2132956-11		pass
570343	2132956-11		pass
570343	2132957-11		pass
570343	2132957-11		pass
570343	2132958-11		pass
570343	2132958-11		pass
570343	2132959-11		pass
570343	2132959-11		pass
570343	2132960-11		pass
570343	2132960-11		pass
570343	2132961-11		pass
570343	2132961-11		pass
570343	2132962-11		pass
570343	2132962-11		pass
570343	2132963-11		pass
570343	2132963-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result
			[pass/fail]
			pass
570343	2132955-11		pass
570343	2132956-11		pass
570343	2132957-11		pass
570343	2132958-11		pass
570343	2132959-11		pass
570343	2132960-11		pass
570343	2132961-11		pass
570343	2132962-11		pass
570343	2132963-11		pass

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Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result
			[pass/fail]
			pass
570343	2132955-11		pass
570343	2132955-11		pass
570343	2132956-11		pass
570343	2132956-11		pass
570343	2132957-11		pass
570343	2132957-11		pass
570343	2132958-11		pass
570343	2132958-11		pass
570343	2132959-11		pass
570343	2132959-11		pass
570343	2132960-11		pass
570343	2132960-11		pass
570343	2132961-11		pass
570343	2132961-11		pass
570343	2132962-11		pass
570343	2132962-11		pass
570343	2132963-11		pass
570343	2132963-11		pass

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

Heat	Lot	ST	Hardness	Hardness ≤22HRC
			[HRB]	[yes/no]
			max 80,000	yes
570343	2132955-11		71,000	yes
570343	2132955-11		72,000	yes
570343	2132956-11		72,000	yes
570343	2132956-11		70,000	yes
570343	2132957-11		74,000	yes
570343	2132957-11		72,000	yes
570343	2132958-11		74,000	yes
570343	2132958-11		72,000	yes
570343	2132959-11		72,000	yes
570343	2132959-11		73,000	yes
570343	2132960-11		72,000	yes
570343	2132960-11		71,000	yes
570343	2132961-11		75,000	yes
570343	2132961-11		73,000	yes
570343	2132962-11		71,000	yes
570343	2132962-11		72,000	yes
570343	2132963-11		71,000	yes
570343	2132963-11		70,000	yes

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Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result [pass/fail]
			pass
570343	2132955-11		pass
570343	2132956-11		pass
570343	2132957-11		pass
570343	2132958-11		pass
570343	2132959-11		pass
570343	2132960-11		pass
570343	2132961-11		pass
570343	2132962-11		pass
570343	2132963-11		pass

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

Heat	Lot	ST	Test result [pass/fail]
			pass
570343	2132955-11		pass
570343	2132956-11		pass
570343	2132957-11		pass
570343	2132958-11		pass
570343	2132959-11		pass
570343	2132960-11		pass
570343	2132961-11		pass
570343	2132962-11		pass
570343	2132963-11		pass

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

Heat	Lot	ST	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
570343	2132955-11		319,100	589,600	55,400	59,700	348,400
570343	2132956-11		302,500	592,100	57,800	65,100	333,300
570343	2132957-11		294,900	580,000	56,200	58,900	323,600
570343	2132958-11		293,300	572,900	57,600	62,600	321,300
570343	2132959-11		293,600	569,200	59,200	64,300	322,600
570343	2132960-11		300,800	582,000	58,000	68,600	330,000
570343	2132961-11		302,200	586,100	54,000	58,300	335,000
570343	2132962-11		293,900	578,800	57,600	62,600	324,200
570343	2132963-11		298,100	584,000	58,800	64,300	328,400

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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
570343	2132955-11		No	6,000
570343	2132956-11		No	6,000
570343	2132957-11		No	5,000
570343	2132958-11		No	5,000
570343	2132959-11		No	6,000
570343	2132960-11		No	6,000
570343	2132961-11		No	6,000
570343	2132962-11		No	6,000
570343	2132963-11		No	7,000

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.

Manufacturer's works

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Straightness check

Test results comply with specified criteria.