

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10073820 - 30	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	A06	Purchase order No. : 800809 Purchaser's reference : 800809 Project Id. : 4003633	A07
Product : Seamless cold finished tube Dimension (OD x WT) : 12,00 x 1,50AW mm	B01/B04 B09/B10	Steel designation : 3R60 / 3R60 Melting process : AOD	B02 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 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 [%]
569754	max 0.030 0,020	max 1.000 0,380	max 2.000 1,730	max 0.040 0,029	max 0.015 0,008

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]	Co [%]
569754	17.000-18.000 17,420	12.500-14.000 13,130	2.500-3.000 2,660	max 0.100 0,046	info 0,120

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Heat	Ti [%] info
569754	<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
569754	2122739-11	0,019	0,380	1,770	0,027	0,004

Heat	Lot	Cr [%] 17.000-18.000	Ni [%] 12.500-14.000	Mo [%] 2.500-3.000	N [%] max 0.100
569754	2122739-11	17,490	13,040	2,630	0,042

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
569754	2122731-11	ALLEIMA SE	1	486	2 916.000	1 145.988
569754	2122732-11	ALLEIMA SE	1	489	2 934.000	1 153.062
569754	2122733-11	ALLEIMA SE	1	484	2 904.000	1 141.272
569754	2122734-11	ALLEIMA SE	1	458	2 748.000	1 079.964
569754	2122735-11	ALLEIMA SE	1	480	2 880.000	1 131.840
569754	2122737-11	ALLEIMA SE	1	491	2 946.000	1 157.778
569754	2122739-11	ALLEIMA SE	1	418	2 508.000	985.644
569754	2122740-11	ALLEIMA SE	1	427	2 562.000	1 006.866

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 : 15.2.2024

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
569754	2122731-11		pass
569754	2122731-11		pass
569754	2122732-11		pass
569754	2122732-11		pass
569754	2122733-11		pass
569754	2122733-11		pass
569754	2122734-11		pass
569754	2122734-11		pass
569754	2122735-11		pass
569754	2122735-11		pass
569754	2122737-11		pass
569754	2122737-11		pass
569754	2122739-11		pass
569754	2122739-11		pass
569754	2122740-11		pass
569754	2122740-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result [pass/fail]
			pass
569754	2122731-11		pass
569754	2122732-11		pass
569754	2122733-11		pass
569754	2122734-11		pass
569754	2122735-11		pass
569754	2122737-11		pass
569754	2122739-11		pass
569754	2122740-11		pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
569754	2122731-11		pass
569754	2122731-11		pass
569754	2122732-11		pass
569754	2122732-11		pass
569754	2122733-11		pass
569754	2122733-11		pass
569754	2122734-11		pass
569754	2122734-11		pass
569754	2122735-11		pass
569754	2122735-11		pass
569754	2122737-11		pass
569754	2122737-11		pass
569754	2122739-11		pass
569754	2122739-11		pass
569754	2122740-11		pass
569754	2122740-11		pass

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

Heat	Lot	SC	ST	Hardness	Hardness ≤22HRC
				[HRB]	[yes/no]
				max 80,000	yes
569754	2122731-11			79,000	yes
569754	2122731-11			79,000	yes
569754	2122732-11			79,000	yes
569754	2122732-11			79,000	yes
569754	2122733-11			78,000	yes
569754	2122733-11			78,000	yes
569754	2122734-11	1)		81,000	yes
569754	2122734-11			79,000	yes
569754	2122734-11	2)		80,000	yes
569754	2122734-11	3)		80,000	yes
569754	2122734-11	4)		80,000	yes
569754	2122734-11	5)		80,000	yes
569754	2122735-11			77,000	yes
569754	2122735-11			77,000	yes
569754	2122737-11			79,000	yes
569754	2122737-11			78,000	yes
569754	2122739-11			76,000	yes
569754	2122739-11			75,000	yes
569754	2122740-11			78,000	yes
569754	2122740-11			78,000	yes

SC (sample comment): 1)Tube No. 21 failed; 2)Retest OK; 3)Retest OK; 4)Retest OK; 5)Retest OK;

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result
			[pass/fail]
			pass
569754	2122731-11		pass
569754	2122732-11		pass
569754	2122733-11		pass
569754	2122734-11		pass
569754	2122735-11		pass
569754	2122737-11		pass
569754	2122739-11		pass
569754	2122740-11		pass

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

Heat	Lot	ST	Test result
			[pass/fail]
			pass
569754	2122731-11		pass
569754	2122732-11		pass
569754	2122733-11		pass
569754	2122734-11		pass
569754	2122735-11		pass
569754	2122737-11		pass
569754	2122739-11		pass
569754	2122740-11		pass

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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
569754	2122731-11		301,200	567,300	58,800	61,200	325,700
569754	2122732-11		311,300	571,200	59,400	63,500	332,400
569754	2122733-11		307,100	573,500	58,200	60,200	330,600
569754	2122734-11		326,800	587,900	58,000	61,200	352,400
569754	2122735-11		291,700	573,700	58,600	63,200	314,000
569754	2122737-11		300,500	566,800	57,800	61,500	323,200
569754	2122739-11		289,200	565,200	60,400	63,800	310,300
569754	2122740-11		304,200	571,900	58,400	62,500	327,900

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
569754	2122731-11		No	6,000
569754	2122732-11		No	5,000
569754	2122733-11		No	5,000
569754	2122734-11		No	5,000
569754	2122735-11		No	5,000
569754	2122737-11		No	5,000
569754	2122739-11		No	5,000
569754	2122740-11		No	5,000

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.

NDT - Visual inspection

Test results comply with specified criteria.

PMI - 100% positive material identification

Test results comply with specified criteria.

Manufacturer's works

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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.