

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10071657 - 30	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	A06	Purchase order No. : 800799 Purchaser's reference : 800799 Project Id. : 4003583	A07
Product : Seamless cold finished tube Dimension (OD x WT) : 12,70 x 1,24AW 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 [%]
568899	max 0.030 0,020	max 1.000 0,400	max 2.000 1,570	max 0.040 0,030	max 0.015 0,009

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]
568899	17.000-18.000 17,480	12.500-14.000 13,150	2.500-3.000 2,620	max 0.100 0,035

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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
568899	2110348-11	0,021	0,400	1,600	0,030	0,010

Heat	Lot	Cr [%]	Ni [%]	Mo [%]	N [%]
		17.000-18.000	12.500-14.000	2.500-3.000	max 0.100
568899	2110348-11	17,410	13,010	2,570	0,053

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
568899	2110348-11	ALLEIMA SE	1	461	2 766.000	979.164
568899	2110359-11	ALLEIMA SE	1	466	2 796.000	989.784
568899	2110360-11	ALLEIMA SE	1	481	2 886.000	1 021.644
568899	2110361-11	ALLEIMA SE	1	459	2 754.000	974.916
568899	2110362-11	ALLEIMA SE	1	458	2 748.000	972.792
568899	2110363-11	ALLEIMA SE	1	467	2 802.000	991.908

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 : 20.10.2023

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568899	2110348-11		pass
568899	2110348-11		pass
568899	2110359-11		pass
568899	2110359-11		pass
568899	2110360-11		pass
568899	2110360-11		pass
568899	2110361-11		pass
568899	2110361-11		pass
568899	2110362-11		pass
568899	2110362-11		pass
568899	2110363-11		pass
568899	2110363-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result [pass/fail]
			pass
568899	2110348-11		pass
568899	2110359-11		pass
568899	2110360-11		pass
568899	2110361-11		pass
568899	2110362-11		pass
568899	2110363-11		pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568899	2110348-11		pass
568899	2110348-11		pass
568899	2110359-11		pass
568899	2110359-11		pass
568899	2110360-11		pass
568899	2110360-11		pass
568899	2110361-11		pass
568899	2110361-11		pass
568899	2110362-11		pass
568899	2110362-11		pass
568899	2110363-11		pass
568899	2110363-11		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
568899	2110348-11		79,000	yes
568899	2110348-11		77,000	yes
568899	2110359-11		76,000	yes
568899	2110359-11		76,000	yes
568899	2110360-11		77,000	yes
568899	2110360-11		77,000	yes
568899	2110361-11		78,000	yes
568899	2110361-11		78,000	yes
568899	2110362-11		76,000	yes
568899	2110362-11		75,000	yes
568899	2110363-11		75,000	yes
568899	2110363-11		75,000	yes

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result
			[pass/fail]
			pass
568899	2110348-11		pass
568899	2110359-11		pass
568899	2110360-11		pass
568899	2110361-11		pass
568899	2110362-11		pass
568899	2110363-11		pass

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

Heat	Lot	ST	Test result
			[pass/fail]
			pass
568899	2110348-11		pass
568899	2110359-11		pass
568899	2110360-11		pass
568899	2110361-11		pass
568899	2110362-11		pass
568899	2110363-11		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
568899	2110348-11		295,800	582,300	56,200	59,200	324,700
568899	2110359-11		288,900	580,200	58,200	61,200	317,200
568899	2110360-11		292,100	581,600	55,000	59,200	320,500
568899	2110361-11		297,200	589,200	52,600	55,500	327,300
568899	2110362-11		278,800	573,100	55,600	59,200	306,600
568899	2110363-11		289,100	582,800	56,000	59,000	317,100

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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
568899	2110348-11		No	6,000
568899	2110359-11		No	6,000
568899	2110360-11		No	7,000
568899	2110361-11		No	6,000
568899	2110362-11		No	6,000
568899	2110363-11		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.

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.