

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10070335 - 40	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	A06	Purchase order No. : 800790 Purchaser's reference : 800790 Project Id. : 4003539	A07
Product : Seamless cold finished tube	B01/B04	Steel designation : 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 lenght 6000 mm (-0/+5mm)			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	2110018-11	0,021	0,400	1,640	0,031	0,009

Heat	Lot	Cr [%]	Ni [%]	Mo [%]	N [%]
		17.000-18.000	12.500-14.000	2.500-3.000	max 0.100
568899	2110018-11	17,430	13,070	2,560	0,032

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
568899	2110018-11	ALLEIMA SE	1	512	3 072.000	841.728
568899	2110019-11	ALLEIMA SE	1	505	3 030.000	830.220
568899	2110020-11	ALLEIMA SE	1	500	3 000.000	822.000
568899	2110022-11	ALLEIMA SE	1	468	2 808.000	769.392
568899	2110023-11	ALLEIMA SE	1	501	3 006.000	823.644
568899	2110024-11	ALLEIMA SE	1	488	2 928.000	802.272
568899	2110025-11	ALLEIMA SE	1	509	3 054.000	836.796
568899	2110039-11	ALLEIMA SE	1	530	3 180.000	871.320
568899	2110040-11	ALLEIMA SE	1	360	2 160.000	591.840

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 : 16.10.2023

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568899	2110018-11		pass
568899	2110018-11		pass
568899	2110019-11		pass
568899	2110019-11		pass
568899	2110020-11		pass
568899	2110020-11		pass
568899	2110022-11		pass
568899	2110022-11		pass
568899	2110023-11		pass
568899	2110023-11		pass
568899	2110024-11		pass
568899	2110024-11		pass
568899	2110025-11		pass
568899	2110025-11		pass
568899	2110039-11		pass
568899	2110039-11		pass
568899	2110040-11		pass
568899	2110040-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result [pass/fail]
			pass
568899	2110018-11		pass
568899	2110019-11		pass
568899	2110020-11		pass
568899	2110022-11		pass
568899	2110023-11		pass
568899	2110024-11		pass
568899	2110025-11		pass
568899	2110039-11		pass
568899	2110040-11		pass

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Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568899	2110018-11		pass
568899	2110018-11		pass
568899	2110019-11		pass
568899	2110019-11		pass
568899	2110020-11		pass
568899	2110020-11		pass
568899	2110022-11		pass
568899	2110022-11		pass
568899	2110023-11		pass
568899	2110023-11		pass
568899	2110024-11		pass
568899	2110024-11		pass
568899	2110025-11		pass
568899	2110025-11		pass
568899	2110039-11		pass
568899	2110039-11		pass
568899	2110040-11		pass
568899	2110040-11		pass

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

Heat	Lot	ST	Hardness [HRB]	Hardness ≤22HRC [yes/no]
			max 80,000	yes
568899	2110018-11		71,000	yes
568899	2110018-11		72,000	yes
568899	2110019-11		72,000	yes
568899	2110019-11		71,000	yes
568899	2110020-11		73,000	yes
568899	2110020-11		73,000	yes
568899	2110022-11		73,000	yes
568899	2110022-11		71,000	yes
568899	2110023-11		71,000	yes
568899	2110023-11		71,000	yes
568899	2110024-11		72,000	yes
568899	2110024-11		71,000	yes
568899	2110025-11		72,000	yes
568899	2110025-11		71,000	yes
568899	2110039-11		75,000	yes
568899	2110039-11		75,000	yes
568899	2110040-11		75,000	yes
568899	2110040-11		73,000	yes

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Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result [pass/fail]
			pass
568899	2110018-11		pass
568899	2110019-11		pass
568899	2110020-11		pass
568899	2110022-11		pass
568899	2110023-11		pass
568899	2110024-11		pass
568899	2110025-11		pass
568899	2110039-11		pass
568899	2110040-11		pass

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

Heat	Lot	ST	Test result [pass/fail]
			pass
568899	2110018-11		pass
568899	2110019-11		pass
568899	2110020-11		pass
568899	2110022-11		pass
568899	2110023-11		pass
568899	2110024-11		pass
568899	2110025-11		pass
568899	2110039-11		pass
568899	2110040-11		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
568899	2110018-11		286,600	573,400	55,200	62,300	317,600
568899	2110019-11		296,600	585,600	56,400	61,700	328,500
568899	2110020-11		296,200	572,500	57,400	64,600	327,400
568899	2110022-11		290,800	574,000	56,600	61,700	319,300
568899	2110023-11		292,200	570,600	58,400	66,600	323,000
568899	2110024-11		291,000	584,100	58,200	63,100	322,400
568899	2110025-11		306,200	599,500	56,800	61,700	339,100
568899	2110039-11		307,200	577,500	57,800	66,300	338,800
568899	2110040-11		306,400	567,800	58,400	69,400	337,700

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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	2110018-11		No	7,000
568899	2110019-11		No	7,000
568899	2110020-11		No	6,000
568899	2110022-11		No	7,000
568899	2110023-11		No	7,000
568899	2110024-11		No	6,000
568899	2110025-11		No	7,000
568899	2110039-11		No	6,000
568899	2110040-11		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.

Manufacturer's works

A01

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Straightness check

Test results comply with specified criteria.