

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10075345 - 20	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	A06	Purchase order No. : 800816 Purchaser's reference : 800816 Project Id. : 4003661	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 [%]
569255	max 0.030 0,021	max 1.000 0,360	max 2.000 1,630	max 0.040 0,030	max 0.015 0,007

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]
569255	17.000-18.000 17,340	12.500-14.000 13,170	2.500-3.000 2,630	max 0.100 0,042

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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
569255	2118339-11	0,022	0,370	1,680	0,030	0,007

Heat	Lot	Cr [%]	Ni [%]	Mo [%]	N [%]
		17.000-18.000	12.500-14.000	2.500-3.000	max 0.100
569255	2118339-11	17,460	13,030	2,590	0,049

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
569255	2118317-11	ALLEIMA SE	1	505	3 030.000	830.220
569255	2118318-11	ALLEIMA SE	1	494	2 964.000	812.136
569255	2118319-11	ALLEIMA SE	1	496	2 976.000	815.424
569255	2118320-11	ALLEIMA SE	1	489	2 934.000	803.916
569255	2118334-11	ALLEIMA SE	1	509	3 054.000	836.796
569255	2118335-11	ALLEIMA SE	1	511	3 066.000	840.084
569255	2118336-11	ALLEIMA SE	1	491	2 946.000	807.204
569255	2118337-11	ALLEIMA SE	1	521	3 126.000	856.524
569255	2118338-11	ALLEIMA SE	1	440	2 640.000	723.360
569255	2118339-11	ALLEIMA SE	1	469	2 814.000	771.036
569255	2118343-11	ALLEIMA SE	1	191	1 146.000	314.004

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 : 11.1.2024

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result
			[pass/fail]
			pass
569255	2118317-11		pass
569255	2118317-11		pass
569255	2118318-11		pass
569255	2118318-11		pass
569255	2118319-11		pass
569255	2118319-11		pass
569255	2118320-11		pass
569255	2118320-11		pass
569255	2118334-11		pass
569255	2118334-11		pass
569255	2118335-11		pass
569255	2118335-11		pass
569255	2118336-11		pass
569255	2118336-11		pass
569255	2118337-11		pass
569255	2118337-11		pass
569255	2118338-11		pass
569255	2118338-11		pass
569255	2118339-11		pass
569255	2118339-11		pass
569255	2118343-11		pass
569255	2118343-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result
			[pass/fail]
			pass
569255	2118317-11		pass
569255	2118318-11		pass
569255	2118319-11		pass
569255	2118320-11		pass
569255	2118334-11		pass
569255	2118335-11		pass
569255	2118336-11		pass
569255	2118337-11		pass
569255	2118338-11		pass
569255	2118339-11		pass
569255	2118343-11		pass

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Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result
			[pass/fail]
			pass
569255	2118317-11		pass
569255	2118317-11		pass
569255	2118318-11		pass
569255	2118318-11		pass
569255	2118319-11		pass
569255	2118319-11		pass
569255	2118320-11		pass
569255	2118320-11		pass
569255	2118334-11		pass
569255	2118334-11		pass
569255	2118335-11		pass
569255	2118335-11		pass
569255	2118336-11		pass
569255	2118336-11		pass
569255	2118337-11		pass
569255	2118337-11		pass
569255	2118338-11		pass
569255	2118338-11		pass
569255	2118339-11		pass
569255	2118339-11		pass
569255	2118343-11		pass
569255	2118343-11		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
569255	2118317-11		74,000	yes
569255	2118317-11		77,000	yes
569255	2118318-11		79,000	yes
569255	2118318-11		73,000	yes
569255	2118319-11		73,000	yes
569255	2118319-11		72,000	yes
569255	2118320-11		72,000	yes
569255	2118320-11		73,000	yes
569255	2118334-11		72,000	yes
569255	2118334-11		75,000	yes
569255	2118335-11		74,000	yes
569255	2118335-11		74,000	yes
569255	2118336-11		73,000	yes
569255	2118336-11		75,000	yes
569255	2118337-11		72,000	yes
569255	2118337-11		73,000	yes
569255	2118338-11		73,000	yes
569255	2118338-11		73,000	yes
569255	2118339-11		75,000	yes
569255	2118339-11		74,000	yes
569255	2118343-11		75,000	yes
569255	2118343-11		73,000	yes

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Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result [pass/fail]
			pass
569255	2118317-11		pass
569255	2118318-11		pass
569255	2118319-11		pass
569255	2118320-11		pass
569255	2118334-11		pass
569255	2118335-11		pass
569255	2118336-11		pass
569255	2118337-11		pass
569255	2118338-11		pass
569255	2118339-11		pass
569255	2118343-11		pass

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

Heat	Lot	ST	Test result [pass/fail]
			pass
569255	2118317-11		pass
569255	2118318-11		pass
569255	2118319-11		pass
569255	2118320-11		pass
569255	2118334-11		pass
569255	2118335-11		pass
569255	2118336-11		pass
569255	2118337-11		pass
569255	2118338-11		pass
569255	2118339-11		pass
569255	2118343-11		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
569255	2118317-11		310,100	581,000	59,000	64,000	340,700
569255	2118318-11		334,600	604,200	54,800	58,000	365,800
569255	2118319-11		292,900	572,300	58,200	64,900	323,100
569255	2118320-11		301,600	579,000	57,800	62,900	333,500
569255	2118334-11		307,300	587,100	54,800	59,400	339,200
569255	2118335-11		308,300	590,600	56,400	61,700	340,100
569255	2118336-11		301,600	571,500	57,600	60,900	331,600
569255	2118337-11		300,500	582,900	55,600	59,100	333,300
569255	2118338-11		303,800	583,400	55,400	59,100	334,700
569255	2118339-11		312,700	581,800	54,000	40,900	343,400
569255	2118343-11		302,700	576,300	56,800	62,900	332,900

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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
569255	2118317-11		No	6,000
569255	2118318-11		No	6,000
569255	2118319-11		No	6,000
569255	2118320-11		No	6,000
569255	2118334-11		No	7,000
569255	2118335-11		No	7,000
569255	2118336-11		No	6,000
569255	2118337-11		No	6,000
569255	2118338-11		No	7,000
569255	2118339-11		No	6,000
569255	2118343-11		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.

Statement

The raw material is free from radioactive contamination.

Statement

Material free from mercury and asbestos contamination.

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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.