

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 50012629 - 10	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT Venlo THE NETHERLANDS	A06	Purchase order No. : Purchaser's reference : Project Id. : 3000494	A07
Product : Seamless cold finished tube Dimension (OD x WT) : 12,00 x 1,50AW mm	B01/B04	Steel designation : 3R60 / 3R60 Melting process : AOD	B02
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 [%]
572159	max 0.030 0,022	max 1.000 0,390	max 2.000 1,600	max 0.040 0,030	max 0.015 0,009
Heat	Cr [%]	Ni [%]	Mo [%]	N [%]	Co [%]
572159	17.000-18.000 17,160	12.500-14.000 13,110	2.500-3.000 2,620	max 0.100 0,036	info 0,150

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Heat	Ti [%] info
572159	<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
572159	2159814-11	0,020	0,400	1,620	0,031	0,008

Heat	Lot	Cr [%] 17.000-18.000	Ni [%] 12.500-14.000	Mo [%] 2.500-3.000	N [%] max 0.100
572159	2159814-11	17,110	13,080	2,580	0,043

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
572159	2159813-11	ALLEIMA SE	1	583	3 498.000	1 374.714
572159	2159814-11	ALLEIMA SE	1	588	3 528.000	1 386.504
572159	2159815-11	ALLEIMA SE	1	595	3 570.000	1 403.010
572159	2159816-11	ALLEIMA SE	1	602	3 612.000	1 419.516
572159	2159817-11	ALLEIMA SE	1	551	3 306.000	1 299.258
572159	2159818-11	ALLEIMA SE	1	535	3 210.000	1 261.530
572159	2159820-11	ALLEIMA SE	1	546	3 276.000	1 287.468
572159	2159822-11	ALLEIMA SE	1	560	3 360.000	1 320.480
572159	2159823-11	ALLEIMA SE	1	575	3 450.000	1 355.850

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 : 21.11.2024

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
572159	2159813-11		pass
572159	2159813-11		pass
572159	2159814-11		pass
572159	2159814-11		pass
572159	2159815-11		pass
572159	2159815-11		pass
572159	2159816-11		pass
572159	2159816-11		pass
572159	2159817-11		pass
572159	2159817-11		pass
572159	2159818-11		pass
572159	2159818-11		pass
572159	2159820-11		pass
572159	2159820-11		pass
572159	2159822-11		pass
572159	2159822-11		pass
572159	2159823-11		pass
572159	2159823-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result [pass/fail]
			pass
572159	2159813-11		pass
572159	2159814-11		pass
572159	2159815-11		pass
572159	2159816-11		pass
572159	2159817-11		pass
572159	2159818-11		pass
572159	2159820-11		pass
572159	2159822-11		pass
572159	2159823-11		pass

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Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result
			[pass/fail]
			pass
572159	2159813-11		pass
572159	2159813-11		pass
572159	2159814-11		pass
572159	2159814-11		pass
572159	2159815-11		pass
572159	2159815-11		pass
572159	2159816-11		pass
572159	2159816-11		pass
572159	2159817-11		pass
572159	2159817-11		pass
572159	2159818-11		pass
572159	2159818-11		pass
572159	2159820-11		pass
572159	2159820-11		pass
572159	2159822-11		pass
572159	2159822-11		pass
572159	2159823-11		pass
572159	2159823-11		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
572159	2159813-11		76,000	yes
572159	2159813-11		78,000	yes
572159	2159814-11		77,000	yes
572159	2159814-11		78,000	yes
572159	2159815-11		78,000	yes
572159	2159815-11		77,000	yes
572159	2159816-11		75,000	yes
572159	2159816-11		76,000	yes
572159	2159817-11		77,000	yes
572159	2159817-11		77,000	yes
572159	2159818-11		78,000	yes
572159	2159818-11		78,000	yes
572159	2159820-11		76,000	yes
572159	2159820-11		77,000	yes
572159	2159822-11		77,000	yes
572159	2159822-11		77,000	yes
572159	2159823-11		78,000	yes
572159	2159823-11		78,000	yes

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Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result [pass/fail]
			pass
572159	2159813-11		pass
572159	2159814-11		pass
572159	2159815-11		pass
572159	2159816-11		pass
572159	2159817-11		pass
572159	2159818-11		pass
572159	2159820-11		pass
572159	2159822-11		pass
572159	2159823-11		pass

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

Heat	Lot	ST	Test result [pass/fail]
			pass
572159	2159813-11		pass
572159	2159814-11		pass
572159	2159815-11		pass
572159	2159816-11		pass
572159	2159817-11		pass
572159	2159818-11		pass
572159	2159820-11		pass
572159	2159822-11		pass
572159	2159823-11		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
572159	2159813-11		290,900	576,600	61,700	58,800	316,900
572159	2159814-11		280,500	573,700	60,200	60,300	308,500
572159	2159815-11		292,200	579,600	61,900	62,100	319,500
572159	2159816-11		289,200	571,200	62,000	57,500	315,700
572159	2159817-11		332,200	640,000	61,000	62,500	361,600
572159	2159818-11		294,100	575,400	62,400	61,000	321,100
572159	2159820-11		294,000	577,700	61,800	60,500	321,000
572159	2159822-11		294,800	572,100	63,800	64,000	321,700
572159	2159823-11		292,900	580,600	59,700	58,600	319,800

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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
572159	2159813-11		No	6,000
572159	2159814-11		No	6,000
572159	2159815-11		No	6,000
572159	2159816-11		No	6,000
572159	2159817-11		No	6,000
572159	2159818-11		No	6,000
572159	2159820-11		No	6,000
572159	2159822-11		No	5,000
572159	2159823-11		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. 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.