

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10075345 - 70	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 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 [%]
569055	max 0.030 0,020	max 1.000 0,380	max 2.000 1,530	max 0.040 0,030	max 0.015 0,011

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]
569055	17.000-18.000 17,310	12.500-14.000 13,130	2.500-3.000 2,630	max 0.100 0,038

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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
569055	2114916-11	0,020	0,400	1,600	0,030	0,009

Heat	Lot	Cr [%]	Ni [%]	Mo [%]	N [%]
		17.000-18.000	12.500-14.000	2.500-3.000	max 0.100
569055	2114916-11	17,530	13,020	2,520	0,052

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
569055	2114911-11	ALLEIMA SE	1	444	2 664.000	1 046.952
569055	2114912-11	ALLEIMA SE	1	468	2 808.000	1 103.544
569055	2114913-11	ALLEIMA SE	1	453	2 718.000	1 068.174
569055	2114914-11	ALLEIMA SE	1	427	2 562.000	1 006.866
569055	2114915-11	ALLEIMA SE	1	469	2 814.000	1 105.902
569055	2114916-11	ALLEIMA SE	1	464	2 784.000	1 094.112
569055	2115026-11	ALLEIMA SE	1	432	2 592.000	1 018.656
569055	2115032-11	ALLEIMA SE	1	434	2 604.000	1 023.372
569055	2115033-11	ALLEIMA SE	1	425	2 550.000	1 002.150
569055	2115034-11	ALLEIMA SE	1	428	2 568.000	1 009.224

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 : 30.11.2023

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
569055	2114911-11		pass
569055	2114911-11		pass
569055	2114912-11		pass
569055	2114912-11		pass
569055	2114913-11		pass
569055	2114913-11		pass
569055	2114914-11		pass
569055	2114914-11		pass
569055	2114915-11		pass
569055	2114915-11		pass
569055	2114916-11		pass
569055	2114916-11		pass
569055	2115026-11		pass
569055	2115026-11		pass
569055	2115032-11		pass
569055	2115032-11		pass
569055	2115033-11		pass
569055	2115033-11		pass
569055	2115034-11		pass
569055	2115034-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result [pass/fail]
			pass
569055	2114911-11		pass
569055	2114912-11		pass
569055	2114913-11		pass
569055	2114914-11		pass
569055	2114915-11		pass
569055	2114916-11		pass
569055	2115026-11		pass
569055	2115032-11		pass
569055	2115033-11		pass
569055	2115034-11		pass

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Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
569055	2114911-11		pass
569055	2114911-11		pass
569055	2114912-11		pass
569055	2114912-11		pass
569055	2114913-11		pass
569055	2114913-11		pass
569055	2114914-11		pass
569055	2114914-11		pass
569055	2114915-11		pass
569055	2114915-11		pass
569055	2114916-11		pass
569055	2114916-11		pass
569055	2115026-11		pass
569055	2115026-11		pass
569055	2115032-11		pass
569055	2115032-11		pass
569055	2115033-11		pass
569055	2115033-11		pass
569055	2115034-11		pass
569055	2115034-11		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
569055	2114911-11		77,000	yes
569055	2114911-11		76,000	yes
569055	2114912-11		78,000	yes
569055	2114912-11		77,000	yes
569055	2114913-11		76,000	yes
569055	2114913-11		77,000	yes
569055	2114914-11		78,000	yes
569055	2114914-11		78,000	yes
569055	2114915-11		76,000	yes
569055	2114915-11		76,000	yes
569055	2114916-11		78,000	yes
569055	2114916-11		78,000	yes
569055	2115026-11		78,000	yes
569055	2115026-11		78,000	yes
569055	2115032-11		76,000	yes
569055	2115032-11		76,000	yes
569055	2115033-11		77,000	yes
569055	2115033-11		75,000	yes
569055	2115034-11		78,000	yes
569055	2115034-11		76,000	yes

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Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result [pass/fail]
			pass
569055	2114911-11		pass
569055	2114912-11		pass
569055	2114913-11		pass
569055	2114914-11		pass
569055	2114915-11		pass
569055	2114916-11		pass
569055	2115026-11		pass
569055	2115032-11		pass
569055	2115033-11		pass
569055	2115034-11		pass

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

Heat	Lot	ST	Test result [pass/fail]
			pass
569055	2114911-11		pass
569055	2114912-11		pass
569055	2114913-11		pass
569055	2114914-11		pass
569055	2114915-11		pass
569055	2114916-11		pass
569055	2115026-11		pass
569055	2115032-11		pass
569055	2115033-11		pass
569055	2115034-11		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
569055	2114911-11		293,300	573,400	57,600	61,000	320,200
569055	2114912-11		284,900	571,500	61,000	65,000	313,100
569055	2114913-11		288,900	570,800	60,000	63,000	316,600
569055	2114914-11		299,200	576,500	57,200	60,800	325,000
569055	2114915-11		281,700	562,100	57,000	59,500	307,100
569055	2114916-11		295,700	580,000	59,800	62,000	322,800
569055	2115026-11		292,400	570,400	57,600	60,500	320,000
569055	2115032-11		293,500	571,500	59,800	62,800	320,100
569055	2115033-11		284,200	567,100	60,400	64,800	312,000
569055	2115034-11		287,600	563,500	57,200	59,500	314,800

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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
569055	2114911-11		No	6,000
569055	2114912-11		No	5,000
569055	2114913-11		No	5,000
569055	2114914-11		No	7,000
569055	2114915-11		No	6,000
569055	2114916-11		No	6,000
569055	2115026-11		No	7,000
569055	2115032-11		No	6,000
569055	2115033-11		No	6,000
569055	2115034-11		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.

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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.