

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 50008436 - 10	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT Venlo THE NETHERLANDS	A06	Purchase order No. : Purchaser's reference : Project Id. : 3000217	A07
Product : Seamless cold finished tube	B01/B04	Steel designation : 3R60 / 3R60	B02
Dimension (OD x WT) : 12,00 x 1,50AW 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/+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 [%]
	max 0.030	max 1.000	max 2.000	max 0.040	max 0.015
571120	0,020	0,370	1,480	0,028	0,007
571156	0,018	0,400	1,740	0,031	0,012

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]	Co [%]
	17.000-18.000	12.500-14.000	2.500-3.000	max 0.100	info
571120	17,180	13,160	2,630	0,038	0,120
571156	17,410	13,200	2,640	0,036	0,150

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Heat	Ti [%] info
571120	<0,003
571156	<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
571120	2149211-11	0,020	0,370	1,510	0,026	0,006
571156	2149183-11	0,019	0,390	1,800	0,029	0,010

Heat	Lot	Cr [%] 17.000-18.000	Ni [%] 12.500-14.000	Mo [%] 2.500-3.000	N [%] max 0.100
571120	2149211-11	17,280	12,920	2,600	0,051
571156	2149183-11	17,560	12,960	2,620	0,047

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
571120	2149185-11	ALLEIMA SE	1	600	3 600.000	1 414.800
571120	2149210-11	ALLEIMA SE	1	551	3 306.000	1 299.258
571120	2149211-11	ALLEIMA SE	1	596	3 576.000	1 405.368
571120	2149212-11	ALLEIMA SE	1	595	3 570.000	1 403.010
571156	2149183-11	ALLEIMA SE	1	449	2 694.000	1 058.742
571156	2149184-11	ALLEIMA SE	1	199	1 194.000	469.242

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 : 09.09.2024

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
571120	2149185-11		pass
571120	2149185-11		pass
571120	2149210-11		pass
571120	2149210-11		pass
571120	2149211-11		pass
571120	2149211-11		pass
571120	2149212-11		pass
571120	2149212-11		pass
571156	2149183-11		pass
571156	2149183-11		pass
571156	2149184-11		pass
571156	2149184-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result [pass/fail]
			pass
571120	2149185-11		pass
571120	2149210-11		pass
571120	2149211-11		pass
571120	2149212-11		pass
571156	2149183-11		pass
571156	2149184-11		pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
571120	2149185-11		pass
571120	2149185-11		pass
571120	2149210-11		pass
571120	2149210-11		pass
571120	2149211-11		pass
571120	2149211-11		pass
571120	2149212-11		pass
571120	2149212-11		pass
571156	2149183-11		pass
571156	2149183-11		pass
571156	2149184-11		pass
571156	2149184-11		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
571120	2149185-11		77,000	yes
571120	2149185-11		76,000	yes
571120	2149210-11		75,000	yes
571120	2149210-11		76,000	yes
571120	2149211-11		73,000	yes
571120	2149211-11		74,000	yes
571120	2149212-11		77,000	yes
571120	2149212-11		76,000	yes
571156	2149183-11		75,000	yes
571156	2149183-11		76,000	yes
571156	2149184-11		78,000	yes
571156	2149184-11		76,000	yes

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result
			[pass/fail]
			pass
571120	2149185-11		pass
571120	2149210-11		pass
571120	2149211-11		pass
571120	2149212-11		pass
571156	2149183-11		pass
571156	2149184-11		pass

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

Heat	Lot	ST	Test result
			[pass/fail]
			pass
571120	2149185-11		pass
571120	2149210-11		pass
571120	2149211-11		pass
571120	2149212-11		pass
571156	2149183-11		pass
571156	2149184-11		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
571120	2149185-11		294,000	563,100	56,000	55,000	324,800
571120	2149210-11		276,800	564,700	58,800	61,000	304,500
571120	2149211-11		281,600	580,100	56,600	56,800	313,700
571120	2149212-11		279,800	565,700	60,000	62,500	308,500
571156	2149183-11		294,000	580,600	56,000	60,000	327,100
571156	2149184-11		287,800	576,700	61,000	60,500	316,700

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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
571120	2149185-11		No	6,000
571120	2149210-11		No	6,000
571120	2149211-11		No	6,000
571120	2149212-11		No	6,000
571156	2149183-11		No	6,000
571156	2149184-11		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.

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Straightness check

Test results comply with specified criteria.