

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10073820 - 40	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	A06	Purchase order No. : 800809 Purchaser's reference : 800809 Project Id. : 4003633	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 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
569405	0,019	0,390	1,650	0,030	0,009
569467	0,023	0,400	1,710	0,029	0,008

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]	Co [%]
	17.000-18.000	12.500-14.000	2.500-3.000	max 0.100	info
569405	17,250	13,390	2,620	0,041	0,120
569467	17,290	13,120	2,630	0,035	0,120

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Heat	Ti [%] info
569405	<0,003
569467	<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
569405	2120772-11	0,018	0,410	1,710	0,030	0,005
569467	2120766-11	0,023	0,390	1,730	0,031	0,007

Heat	Lot	Cr [%] 17.000-18.000	Ni [%] 12.500-14.000	Mo [%] 2.500-3.000	N [%] max 0.100
569405	2120772-11	17,290	13,250	2,560	0,036
569467	2120766-11	17,580	12,910	2,510	0,040

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
569405	2120772-11	ALLEIMA SE	1	150	900.000	246.600
569467	2120766-11	ALLEIMA SE	1	470	2 820.000	772.680
569467	2120767-11	ALLEIMA SE	1	470	2 820.000	772.680
569467	2120768-11	ALLEIMA SE	1	475	2 850.000	780.900
569467	2120769-11	ALLEIMA SE	1	488	2 928.000	802.272
569467	2120770-11	ALLEIMA SE	1	476	2 856.000	782.544
569467	2120771-11	ALLEIMA SE	1	405	2 430.000	665.820

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 : 15.2.2024

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
569405	2120772-11		pass
569405	2120772-11		pass
569467	2120766-11		pass
569467	2120766-11		pass
569467	2120767-11		pass
569467	2120767-11		pass
569467	2120768-11		pass
569467	2120768-11		pass
569467	2120769-11		pass
569467	2120769-11		pass
569467	2120770-11		pass
569467	2120770-11		pass
569467	2120771-11		pass
569467	2120771-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result [pass/fail]
			pass
569405	2120772-11		pass
569467	2120766-11		pass
569467	2120767-11		pass
569467	2120768-11		pass
569467	2120769-11		pass
569467	2120770-11		pass
569467	2120771-11		pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
569405	2120772-11		pass
569405	2120772-11		pass
569467	2120766-11		pass
569467	2120766-11		pass
569467	2120767-11		pass
569467	2120767-11		pass
569467	2120768-11		pass
569467	2120768-11		pass
569467	2120769-11		pass
569467	2120769-11		pass
569467	2120770-11		pass
569467	2120770-11		pass
569467	2120771-11		pass
569467	2120771-11		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
569405	2120772-11		73,000	yes
569405	2120772-11		74,000	yes
569467	2120766-11		74,000	yes
569467	2120766-11		74,000	yes
569467	2120767-11		72,000	yes
569467	2120767-11		71,000	yes
569467	2120768-11		72,000	yes
569467	2120768-11		72,000	yes
569467	2120769-11		73,000	yes
569467	2120769-11		73,000	yes
569467	2120770-11		72,000	yes
569467	2120770-11		73,000	yes
569467	2120771-11		71,000	yes
569467	2120771-11		73,000	yes

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result
			[pass/fail]
			pass
569405	2120772-11		pass
569467	2120766-11		pass
569467	2120767-11		pass
569467	2120768-11		pass
569467	2120769-11		pass
569467	2120770-11		pass
569467	2120771-11		pass

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

Heat	Lot	ST	Test result
			[pass/fail]
			pass
569405	2120772-11		pass
569467	2120766-11		pass
569467	2120767-11		pass
569467	2120768-11		pass
569467	2120769-11		pass
569467	2120770-11		pass
569467	2120771-11		pass

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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
569405	2120772-11		299,600	577,500	55,400	61,100	325,900
569467	2120766-11		304,000	591,200	55,400	61,100	331,000
569467	2120767-11		294,700	572,300	58,200	62,900	321,500
569467	2120768-11		291,600	575,500	59,200	63,400	317,900
569467	2120769-11		302,100	578,300	56,800	63,400	328,300
569467	2120770-11		297,800	577,900	57,000	62,300	324,100
569467	2120771-11		297,300	569,700	59,400	65,700	322,500

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
569405	2120772-11		No	7,000
569467	2120766-11		No	6,000
569467	2120767-11		No	6,000
569467	2120768-11		No	6,000
569467	2120769-11		No	6,000
569467	2120770-11		No	6,000
569467	2120771-11		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.

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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.

Straightness check

Test results comply with specified criteria.