

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10059511 - 40	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	A06	Purchase order No. : 800762 Purchaser's reference : 800762 Project Id. : 4003389	A07
Product : Seamless cold finished tube	B01/B04	Steel designation : 3R60 / 3R60	B02
Dimension (OD x WT) : 12,70 x 1,24AW mm	B09/B10	Melting process : AOD	C70
Technical requirements : ASME SA213/SA213M-2021 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 / TP316L / 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 [%]
568344	max 0.030 0,020	max 1.000 0,390	max 2.000 1,640	max 0.040 0,031	max 0.015 0,009

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]
568344	17.000-18.000 17,440	12.500-14.000 13,160	2.500-3.000 2,610	max 0.100 0,037

Type of inspection document :

A02

Inspection certificate acc. to EN 10204 / 3.1

Internal order No.:

A08

10059511 - 40

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
568344	2101876-11	0,020	0,400	1,690	0,029	0,006

Heat	Lot	Cr [%]	Ni [%]	Mo [%]	N [%]
		17.000-18.000	12.500-14.000	2.500-3.000	max 0.100
568344	2101876-11	17,460	12,880	2,530	0,040

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
568344	2101874-11	ALLEIMA SE	1	439	2 634.000	932.436
568344	2101875-11	ALLEIMA SE	1	439	2 634.000	932.436
568344	2101876-11	ALLEIMA SE	1	454	2 724.000	964.296
568344	2101877-11	ALLEIMA SE	1	453	2 718.000	962.172
568344	2101878-11	ALLEIMA SE	1	458	2 748.000	972.792
568344	2101880-11	ALLEIMA SE	1	445	2 670.000	945.180

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 : 10.7.2023

Type of inspection document :

A02

Inspection certificate acc. to EN 10204 / 3.1

Internal order No.:

A08

10059511 - 40

Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568344	2101874-11		pass
568344	2101874-11		pass
568344	2101875-11		pass
568344	2101875-11		pass
568344	2101876-11		pass
568344	2101876-11		pass
568344	2101877-11		pass
568344	2101877-11		pass
568344	2101878-11		pass
568344	2101878-11		pass
568344	2101880-11		pass
568344	2101880-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result [pass/fail]
			pass
568344	2101874-11		pass
568344	2101875-11		pass
568344	2101876-11		pass
568344	2101877-11		pass
568344	2101878-11		pass
568344	2101880-11		pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568344	2101874-11		pass
568344	2101874-11		pass
568344	2101875-11		pass
568344	2101875-11		pass
568344	2101876-11		pass
568344	2101876-11		pass
568344	2101877-11		pass
568344	2101877-11		pass
568344	2101878-11		pass
568344	2101878-11		pass
568344	2101880-11		pass
568344	2101880-11		pass

Type of inspection document :

A02

Inspection certificate acc. to EN 10204 / 3.1

Internal order No.:

A08

10059511 - 40

Hardness test (HRB/HRC) in acc. with E18/S-08921/NACE

Heat	Lot	ST	Hardness	Hardness ≤22HRC
			[HRB]	[yes/no]
			max 80,000	yes
568344	2101874-11		78,000	yes
568344	2101874-11		78,000	yes
568344	2101875-11		78,000	yes
568344	2101875-11		77,000	yes
568344	2101876-11		77,000	yes
568344	2101876-11		77,000	yes
568344	2101877-11		77,000	yes
568344	2101877-11		75,000	yes
568344	2101878-11		76,000	yes
568344	2101878-11		77,000	yes
568344	2101880-11		77,000	yes
568344	2101880-11		78,000	yes

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result
			[pass/fail]
			pass
568344	2101874-11		pass
568344	2101875-11		pass
568344	2101876-11		pass
568344	2101877-11		pass
568344	2101878-11		pass
568344	2101880-11		pass

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

Heat	Lot	ST	Test result
			[pass/fail]
			pass
568344	2101874-11		pass
568344	2101875-11		pass
568344	2101876-11		pass
568344	2101877-11		pass
568344	2101878-11		pass
568344	2101880-11		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
568344	2101874-11		301,100	570,800	58,200	60,200	330,700
568344	2101875-11		295,300	564,500	57,400	58,200	324,200
568344	2101876-11		300,200	564,700	59,200	60,000	330,100
568344	2101877-11		295,000	562,900	59,600	61,200	323,600
568344	2101878-11		293,200	553,200	61,000	62,500	321,000
568344	2101880-11		295,100	567,300	61,200	64,500	325,500

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A02

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A08

10059511 - 40

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
568344	2101874-11		No	5,000
568344	2101875-11		No	6,000
568344	2101876-11		No	6,000
568344	2101877-11		No	5,000
568344	2101878-11		No	5,000
568344	2101880-11		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.

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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10059511 - 40

Straightness check

Test results comply with specified criteria.