

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10062609 - 30	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	A06	Purchase order No. : 800777 Purchaser's reference : 800777 Project Id. : 4003435	A07
Product : Seamless cold finished tube	B01/B04	Steel designation : 3R60 / 3R60	B02
Dimension (OD x WT) : 10,00 x 1,00AW 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 [%]
568033	max 0.030 0,019	max 1.000 0,400	max 2.000 1,650	max 0.040 0,028	max 0.015 0,007

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]
568033	17.000-18.000 17,300	12.500-14.000 13,330	2.500-3.000 2,620	max 0.100 0,049

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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
568033	2099080-11	0,020	0,410	1,670	0,028	0,009

Heat	Lot	Cr [%]	Ni [%]	Mo [%]	N [%]
		17.000-18.000	12.500-14.000	2.500-3.000	max 0.100
568033	2099080-11	17,250	13,110	2,660	0,048

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
568033	2099076-11	ALLEIMA SE	1	603	3 618.000	810.432
568033	2099078-11	ALLEIMA SE	1	560	3 360.000	752.640
568033	2099080-11	ALLEIMA SE	1	601	3 606.000	807.744
568033	2099083-11	ALLEIMA SE	1	576	3 456.000	774.144
568033	2099084-11	ALLEIMA SE	1	600	3 600.000	806.400
568033	2099085-11	ALLEIMA SE	1	547	3 282.000	735.168

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 : 20.6.2023

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568033	2099076-11		pass
568033	2099076-11		pass
568033	2099078-11		pass
568033	2099078-11		pass
568033	2099080-11		pass
568033	2099080-11		pass
568033	2099083-11		pass
568033	2099083-11		pass
568033	2099084-11		pass
568033	2099084-11		pass
568033	2099085-11		pass
568033	2099085-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result [pass/fail]
			pass
568033	2099076-11		pass
568033	2099078-11		pass
568033	2099080-11		pass
568033	2099083-11		pass
568033	2099084-11		pass
568033	2099085-11		pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568033	2099076-11		pass
568033	2099076-11		pass
568033	2099078-11		pass
568033	2099078-11		pass
568033	2099080-11		pass
568033	2099080-11		pass
568033	2099083-11		pass
568033	2099083-11		pass
568033	2099084-11		pass
568033	2099084-11		pass
568033	2099085-11		pass
568033	2099085-11		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
568033	2099076-11		73,000	yes
568033	2099076-11		73,000	yes
568033	2099078-11		75,000	yes
568033	2099078-11		74,000	yes
568033	2099080-11		74,000	yes
568033	2099080-11		74,000	yes
568033	2099083-11		73,000	yes
568033	2099083-11		74,000	yes
568033	2099084-11		75,000	yes
568033	2099084-11		72,000	yes
568033	2099085-11		73,000	yes
568033	2099085-11		74,000	yes

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result
			[pass/fail]
			pass
568033	2099076-11		pass
568033	2099078-11		pass
568033	2099080-11		pass
568033	2099083-11		pass
568033	2099084-11		pass
568033	2099085-11		pass

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

Heat	Lot	ST	Test result
			[pass/fail]
			pass
568033	2099076-11		pass
568033	2099078-11		pass
568033	2099080-11		pass
568033	2099083-11		pass
568033	2099084-11		pass
568033	2099085-11		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
568033	2099076-11		302,600	591,400	48,200	55,300	338,000
568033	2099078-11		298,200	578,800	50,600	55,700	330,800
568033	2099080-11		290,100	576,900	46,800	51,700	326,700
568033	2099083-11		296,900	587,500	50,400	56,000	332,600
568033	2099084-11		301,700	590,800	50,600	54,300	336,100
568033	2099085-11		295,700	567,400	45,200	51,000	327,000

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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
568033	2099076-11		No	7,000
568033	2099078-11		No	7,000
568033	2099080-11		No	7,000
568033	2099083-11		No	7,000
568033	2099084-11		No	6,000
568033	2099085-11		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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Straightness check

Test results comply with specified criteria.