

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10060137 - 10	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	A06	Purchase order No. : 800771 Purchaser's reference : 800771 Project Id. : 4003405	A07
Product : Seamless cold finished tube	B01/B04	Steel designation : 3R60 / 3R60	B02
Dimension (OD x WT) : 9,53 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 [%]
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	2099139-11	0,019	0,400	1,700	0,028	0,008

Heat	Lot	Cr [%]	Ni [%]	Mo [%]	N [%]
		17.000-18.000	12.500-14.000	2.500-3.000	max 0.100
568033	2099139-11	17,330	13,190	2,560	0,044

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
568033	2099139-11	ALLEIMA SE	1	584	3 504.000	897.024
568033	2099140-11	ALLEIMA SE	1	585	3 510.000	898.560
568033	2099144-11	ALLEIMA SE	1	581	3 486.000	892.416
568033	2099147-11	ALLEIMA SE	1	573	3 438.000	880.128
568033	2099175-11	ALLEIMA SE	1	544	3 264.000	835.584
568033	2099176-11	ALLEIMA SE	1	539	3 234.000	827.904
568033	2099177-11	ALLEIMA SE	1	583	3 498.000	895.488

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 : 28.6.2023

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568033	2099139-11		pass
568033	2099139-11		pass
568033	2099140-11		pass
568033	2099140-11		pass
568033	2099144-11		pass
568033	2099144-11		pass
568033	2099147-11		pass
568033	2099147-11		pass
568033	2099175-11		pass
568033	2099175-11		pass
568033	2099176-11		pass
568033	2099176-11		pass
568033	2099177-11		pass
568033	2099177-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result [pass/fail]
			pass
568033	2099139-11		pass
568033	2099140-11		pass
568033	2099144-11		pass
568033	2099147-11		pass
568033	2099175-11		pass
568033	2099176-11		pass
568033	2099177-11		pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568033	2099139-11		pass
568033	2099139-11		pass
568033	2099140-11		pass
568033	2099140-11		pass
568033	2099144-11		pass
568033	2099144-11		pass
568033	2099147-11		pass
568033	2099147-11		pass
568033	2099175-11		pass
568033	2099175-11		pass
568033	2099176-11		pass
568033	2099176-11		pass
568033	2099177-11		pass
568033	2099177-11		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	2099139-11		79,000	yes
568033	2099139-11		78,000	yes
568033	2099140-11		77,000	yes
568033	2099140-11		77,000	yes
568033	2099144-11		78,000	yes
568033	2099144-11		76,000	yes
568033	2099147-11		79,000	yes
568033	2099147-11		78,000	yes
568033	2099175-11		77,000	yes
568033	2099175-11		78,000	yes
568033	2099176-11		76,000	yes
568033	2099176-11		75,000	yes
568033	2099177-11		76,000	yes
568033	2099177-11		78,000	yes

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result
			[pass/fail]
			pass
568033	2099139-11		pass
568033	2099140-11		pass
568033	2099144-11		pass
568033	2099147-11		pass
568033	2099175-11		pass
568033	2099176-11		pass
568033	2099177-11		pass

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

Heat	Lot	ST	Test result
			[pass/fail]
			pass
568033	2099139-11		pass
568033	2099140-11		pass
568033	2099144-11		pass
568033	2099147-11		pass
568033	2099175-11		pass
568033	2099176-11		pass
568033	2099177-11		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
568033	2099139-11		304,800	585,000	52,200	57,700	334,300
568033	2099140-11		287,100	567,100	53,200	53,700	314,600
568033	2099144-11		283,600	559,600	53,000	54,700	312,000
568033	2099147-11		291,600	582,700	51,600	58,700	323,900
568033	2099175-11		281,500	569,100	51,000	58,000	318,100
568033	2099176-11		269,300	575,000	54,000	58,300	301,400
568033	2099177-11		290,300	570,500	54,400	62,000	319,100

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	2099139-11		No	6,000
568033	2099140-11		No	6,000
568033	2099144-11		No	6,000
568033	2099147-11		No	6,000
568033	2099175-11		No	6,000
568033	2099176-11		No	6,000
568033	2099177-11		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.