

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10056964 - 20	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	A06	Purchase order No. : 800758 Purchaser's reference : 800758 Project Id. : 4003352	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-2021 ASTM A213/A213M-2022 ASTM A269/A269M-2015a (Reap.2019) EN 10216-5 TC1 2021 EN 10305-1 (Only Tolerances-Table 5) PED 2014/68/EU Alleima SPEC S-08921 AD 2000 Merkblatt W2 2022 AD 2000 W10 - 2019			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 [%]
567588	max 0.030 0,019	max 1.000 0,380	max 2.000 1,730	max 0.040 0,030	max 0.015 0,007

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]
567588	17.000-18.000 17,200	12.500-14.000 13,130	2.500-3.000 2,610	max 0.100 0,047

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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
567588	2089648-11	0,020	0,380	1,690	0,033	0,007

Heat	Lot	Cr [%]	Ni [%]	Mo [%]	N [%]
		17.000-18.000	12.500-14.000	2.500-3.000	max 0.100
567588	2089648-11	17,440	12,970	2,600	0,052

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
567588	2089647-11	ALLEIMA SE	1	394	2 364.000	929.052
567588	2089648-11	ALLEIMA SE	1	402	2 412.000	947.916
567588	2089649-11	ALLEIMA SE	1	390	2 340.000	919.620
567588	2089650-11	ALLEIMA SE	1	442	2 652.000	1 042.236
567588	2089651-11	ALLEIMA SE	1	437	2 622.000	1 030.446
567588	2089652-11	ALLEIMA SE	1	445	2 670.000	1 049.310
567588	2089653-11	ALLEIMA SE	1	444	2 664.000	1 046.952
567588	2089656-11	ALLEIMA SE	1	436	2 616.000	1 028.088

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 : 7.3.2023

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
567588	2089647-11		pass
567588	2089647-11		pass
567588	2089648-11		pass
567588	2089648-11		pass
567588	2089649-11		pass
567588	2089649-11		pass
567588	2089650-11		pass
567588	2089650-11		pass
567588	2089651-11		pass
567588	2089651-11		pass
567588	2089652-11		pass
567588	2089652-11		pass
567588	2089653-11		pass
567588	2089653-11		pass
567588	2089656-11		pass
567588	2089656-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result [pass/fail]
			pass
567588	2089647-11		pass
567588	2089648-11		pass
567588	2089649-11		pass
567588	2089650-11		pass
567588	2089651-11		pass
567588	2089652-11		pass
567588	2089653-11		pass
567588	2089656-11		pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
567588	2089647-11		pass
567588	2089647-11		pass
567588	2089648-11		pass
567588	2089648-11		pass
567588	2089649-11		pass
567588	2089649-11		pass
567588	2089650-11		pass
567588	2089650-11		pass
567588	2089651-11		pass
567588	2089651-11		pass
567588	2089652-11		pass
567588	2089652-11		pass
567588	2089653-11		pass
567588	2089653-11		pass
567588	2089656-11		pass
567588	2089656-11		pass

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Hardness test (HRB) in acc. with ASTM E18 / 7-2-1261

Heat	Lot	ST	Hardness [HRB]
			max 80,000
567588	2089647-11		78,000
567588	2089647-11		78,000
567588	2089648-11		74,000
567588	2089648-11		74,000
567588	2089649-11		78,000
567588	2089649-11		78,000
567588	2089650-11		77,000
567588	2089650-11		76,000
567588	2089651-11		77,000
567588	2089651-11		76,000
567588	2089652-11		77,000
567588	2089652-11		78,000
567588	2089653-11		77,000
567588	2089653-11		77,000
567588	2089656-11		77,000
567588	2089656-11		77,000

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result [pass/fail]
			pass
567588	2089647-11		pass
567588	2089648-11		pass
567588	2089649-11		pass
567588	2089650-11		pass
567588	2089651-11		pass
567588	2089652-11		pass
567588	2089653-11		pass
567588	2089656-11		pass

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

Heat	Lot	ST	Test result [pass/fail]
			pass
567588	2089647-11		pass
567588	2089648-11		pass
567588	2089649-11		pass
567588	2089650-11		pass
567588	2089651-11		pass
567588	2089652-11		pass
567588	2089653-11		pass
567588	2089656-11		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
567588	2089647-11		294,200	571,400	61,200	66,200	322,000
567588	2089648-11		281,700	579,200	61,200	62,100	312,000
567588	2089649-11		287,200	565,400	62,000	66,600	316,200
567588	2089650-11		292,200	573,200	60,800	63,100	321,200
567588	2089651-11		288,700	585,700	60,000	65,500	320,100
567588	2089652-11		290,400	570,500	61,000	65,200	320,800
567588	2089653-11		310,500	572,800	59,200	64,500	339,400
567588	2089656-11		293,200	572,000	60,800	65,800	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
567588	2089647-11		No	6,000
567588	2089648-11		No	6,000
567588	2089649-11		No	6,000
567588	2089650-11		No	6,000
567588	2089651-11		No	6,000
567588	2089652-11		No	6,000
567588	2089653-11		No	6,000
567588	2089656-11		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.