

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10059516 - 20	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	A06	Purchase order No. : 800764 Purchaser's reference : 800764 Project Id. : 4003391	A07
Product : Seamless cold finished tube	B01/B04	Steel designation : 3R60 / 3R60	B02
Dimension (OD x WT) : 19,05 x 1,24AW mm	B09/B10	Melting process : AOD	C70
Technical requirements : ASME SA-213/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 length 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 [%]
568390	max 0.030 0,017	max 1.000 0,400	max 2.000 1,650	max 0.040 0,032	max 0.015 0,008

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]
568390	17.000-18.000 17,350	12.500-14.000 13,150	2.500-3.000 2,610	max 0.100 0,035

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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
568390	2102552-11	0,019	0,420	1,710	0,033	0,009

Heat	Lot	Cr [%]	Ni [%]	Mo [%]	N [%]
		17.000-18.000	12.500-14.000	2.500-3.000	max 0.100
568390	2102552-11	17,530	12,840	2,550	0,037

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
568390	2102551-11	ALLEIMA SE	1	414	2 484.000	1 368.684
568390	2102552-11	ALLEIMA SE	1	362	2 172.000	1 196.772

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 : 14.8.2023

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568390	2102551-11	EnF	pass
568390	2102551-11	WnF	pass
568390	2102552-11	WnF	pass
568390	2102552-11	EnF	pass

ST (sample type): WnF-West end, tube did not not used for flattening test,Enf-East end, tube did not not used for flattening test;

Flaring test in acc. with EN 10216-5

Heat	Lot	Test result [pass/fail]
		pass
568390	2102551-11	pass
568390	2102552-11	pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568390	2102551-11	E	pass
568390	2102551-11	W	pass
568390	2102552-11	W	pass
568390	2102552-11	E	pass

ST (sample type): E-East end of tube; W-West end of tube;

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

Heat	Lot	Hardness [HRB]	Hardness \leq 22HRC [yes/no]
		max 80,000	yes
568390	2102551-11	78,000	yes
568390	2102551-11	75,000	yes
568390	2102552-11	76,000	yes
568390	2102552-11	77,000	yes

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	Test result [pass/fail]
		pass
568390	2102551-11	pass
568390	2102552-11	pass

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

Heat	Lot	Test result [pass/fail]
		pass
568390	2102551-11	pass
568390	2102552-11	pass

Longitudinal tensile test in acc. with A370 / EN ISO 6892-1

Heat	Lot	Rp0,2 [MPa]	Rm [MPa]	A2" [%]	Amb.temper. [°C]	A5 [%]
		min 220.000	515.000-690.000	min 35.000	10.000-35.000	min 40.000
568390	2102551-11	296,300	577,600	50,400	24,000	51,100
568390	2102551-11	312,000	591,200	48,400	24,000	50,200
568390	2102552-11	291,400	577,300	48,400	24,000	49,600
568390	2102552-11	274,600	575,000	48,600	24,000	50,200

Heat	Lot	Rp1,0 [MPa]
		min 250.000
568390	2102551-11	332,000
568390	2102551-11	348,500
568390	2102552-11	331,300
568390	2102552-11	317,800

Microstructure evaluation and Grain size WI-3815/ASTM E112

The structure is free from grain boundary chromium carbide precipitations.

Heat	Lot	G.B.Cr.Carbides [No/Yes]	Grain size [(G)]
		No	5.000-14.000
568390	2102551-11	No	7,000
568390	2102552-11	No	7,000

Dimensional check

Test results comply with specified criteria.

HT - Final heat treatment of straight tubes

All tubes have been solution annealed followed by accelerated cooling.
Solution annealing temperature 1090°C, soaking time min. 2 minutes.
Quench medium - protective 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.

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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.

Straightness check

Test results comply with specified criteria.