

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 50005672 - 10	A08
Purchaser : ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT Venlo THE NETHERLANDS	A06	Purchase order No. : Purchaser's reference : Project Id. : 3000057	A07
Product : Seamless cold finished tube Dimension (OD x WT) : 19,05 x 1,24AW mm	B01/B04	Steel designation : 3R60 / 3R60 Melting process : AOD	B02
Technical requirements : ASME SA-213/SA213M - 2023 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 / TP316/316L / 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 [%]
	max 0.030	max 1.000	max 2.000	max 0.040	max 0.015
570294	0,017	0,390	1,650	0,028	0,009
570344	0,018	0,370	1,640	0,031	0,010

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]	Co [%]
	17.000-18.000	12.500-14.000	2.500-3.000	max 0.100	info
570294	17,460	13,190	2,620	0,033	0,120
570344	17,160	13,070	2,620	0,044	0,110

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Heat	Ti [%] info
570294	<0,003
570344	<0,003

Product check analysis

Heat	Lot	C [%] max 0.030	Si [%] max 1.000	Mn [%] max 2.000	P [%] max 0.040	S [%] max 0.015
570294	2134026-11	0,018	0,420	1,680	0,029	0,010
570344	2134028-11	0,018	0,380	1,680	0,032	0,010

Heat	Lot	Cr [%] 17.000-18.000	Ni [%] 12.500-14.000	Mo [%] 2.500-3.000	N [%] max 0.100
570294	2134026-11	17,360	12,950	2,600	0,042
570344	2134028-11	17,210	13,040	2,600	0,059

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
570294	2134026-11	ALLEIMA SE	1	246	1 476.000	813.276
570344	2134028-11	ALLEIMA SE	1	331	1 986.000	1 094.286

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 : 9.5.2024

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
570294	2134026-11	WnF	pass
570294	2134026-11	EnF	pass
570344	2134028-11	WnF	pass
570344	2134028-11	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
570294	2134026-11	pass
570344	2134028-11	pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
570294	2134026-11	W	pass
570294	2134026-11	E	pass
570344	2134028-11	W	pass
570344	2134028-11	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
570294	2134026-11	78,000	yes
570294	2134026-11	77,000	yes
570344	2134028-11	78,000	yes
570344	2134028-11	75,000	yes

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	Test result [pass/fail]
		pass
570294	2134026-11	pass
570344	2134028-11	pass

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

Heat	Lot	Test result [pass/fail]
		pass
570294	2134026-11	pass
570344	2134028-11	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
570294	2134026-11	344,300	618,600	47,600	24,000	48,400
570294	2134026-11	331,700	608,200	48,200	24,000	50,200
570344	2134028-11	308,700	584,200	50,600	24,000	52,000
570344	2134028-11	313,600	591,200	49,400	24,000	51,100

Heat	Lot	Rp1,0 [MPa]
		min 250.000
570294	2134026-11	383,100
570294	2134026-11	364,700
570344	2134028-11	344,400
570344	2134028-11	350,400

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
570294	2134026-11	No	6,000
570344	2134028-11	No	6,000

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. E426/EN ISO 10893-1

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.