

Type of inspection document : Inspection certificate acc. to EN 10204 / 3.1	A02	Internal order No.: 10076354 - 50	A08
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Purchaser : ALLEIMA BENELUX B.V. AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	A06	Purchase order No. : 800817 Purchaser's reference : 800817 Project Id. : 4003682	A07
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Product : Seamless cold finished tube	B01/B04	Steel designation : 3R60 / 3R60	B02
Dimension (OD x WT) : 16,00 x 2,00AW mm	B09/B10	Melting process : AOD	C70

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
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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 length 6000 mm (-0/+5 mm)			B14
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The products, covered by this certificate, comply with specification and requirements of the order.			Z01
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Originator of the document : QA - AC	A05/Z02	Inspector's stamp:  <small>Digitally signed by Soňa Müllerová DN: cn=Soňa Müllerová, o=Soňa Müllerová, c=CZ, Czech Republic, e=soňa.mullerova@alleima.com R.G. =soňa.mullerova@alleima.com Reason: I am the author of this document Location: Date: 2024-02-22 08:15+01:00</small>	Z03
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Chemical composition (Heat analysis)

Heat	C [%]	Si [%]	Mn [%]	P [%]	S [%]
568639	max 0,030 0,018	max 1,000 0,490	max 2,000 1,670	max 0,040 0,027	max 0,015 0,009

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]	Co [%]
568639	17,000-18,000 17,190	12,500-14,000 13,120	2,500-3,000 2,610	max 0,100 0,041	info 0,130

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Heat	Ti [%] info
568639	<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
568639	2122081-11	0,019	0,510	1,730	0,028	0,006

Heat	Lot	Cr [%] 17.000-18.000	Ni [%] 12.500-14.000	Mo [%] 2.500-3.000	N [%] max 0.100
568639	2122081-11	17,230	13,120	2,540	0,037

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles ¹⁾	Pieces	Total length [m]	Total weight [kg] ²⁾
568639	2122078-11	ALLEIMA SE	1	585	3 510.000	2 449.980
568639	2122081-11	ALLEIMA SE	1	212	1 272.000	887.856

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 : 22.2.2024

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568639	2122078-11	WnF	pass
568639	2122078-11	EnF	pass
568639	2122081-11	WnF	pass
568639	2122081-11	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
568639	2122078-11	pass
568639	2122081-11	pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
568639	2122078-11	W	pass
568639	2122078-11	E	pass
568639	2122081-11	W	pass
568639	2122081-11	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
568639	2122078-11	77,000	yes
568639	2122078-11	77,000	yes
568639	2122081-11	78,000	yes
568639	2122081-11	76,000	yes

Intergranular corrosion testing in acc. with ASTM A262E

Heat	Lot	Test result [pass/fail]
		pass
568639	2122078-11	pass
568639	2122081-11	pass

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

Heat	Lot	Test result [pass/fail]
		pass
568639	2122078-11	pass
568639	2122081-11	pass

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

Heat	Lot	Rp0,2 [MPa]	Rm [MPa]	A2" [%]	A5 [%]	Rp1,0 [MPa]
		min 220.000	515.000-690.000	min 35.000	min 40.000	min 250.000
568639	2122078-11	266,900	564,800	53,800	50,900	299,700
568639	2122078-11	277,600	574,800	51,800	49,800	310,300
568639	2122081-11	278,400	574,900	55,000	53,100	312,500
568639	2122081-11	277,300	573,000	56,000	53,800	310,000

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
568639	2122078-11	No	6,000
568639	2122081-11	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. ASTM E426

Test results comply with specified criteria.

NDT - Visual inspection

Test results comply with specified criteria.

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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.