Alleima INSPECTION CERTIFICATE

C-11966/80 Rev. 00

Type of inspection document : A02	**Internal order No.:** A08
Inspection certificate acc. to EN 10204 / 3.1	10073302 - 80

Purchaser : A06	**Purchase order No. :** A07
ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT VENLO THE NETHERLANDS	800805 **Purchaser's reference :** 800805 **Project Id. :** 4003609

Product : B01/B04	**Steel designation :** B02
Seamless cold finished tube	3R60 / 3R60
Dimension (OD x WT) : B09/B10	**Melting process :** C70
28,00 x 2,00AW mm	AOD

Technical requirements : B03

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

Supplementary information : B14

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)

The products, covered by this certificate, comply with specification and requirements of the order. Z01

Originator of the document : A05/Z02	**Inspector's stamp:** Z03
QA - AC	Digitally signed by Ivana Petrová DN: cn=Ivana Petrová gn=Ivana Petrová c=CZ Czech Republic l=CZ Czech Republic o=Alleima CZ spol. s r.o. e=ivana.petrova@alleima.com Date: 2024-02-29 10:16+01:00

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
569645	0,021	0,380	1,720	0,030	0,010

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]	Co [%]
	17,000-18,000	12,500-14,000	2,500-3,000	max 0,100	info
569645	17,220	13,130	2,630	0,039	0,120

Manufacturer's works A01

Alleima CZ spol. s r.o., ID No. 60278773, VAT No. CZ60278773, V. Nezvala 5502, 430 01 Chomutov, Czech Republic, www.alleima.com

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Heat	Ti [%] info
569645	<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
569645	2121537-11	0,018	0,390	1,770	0,029	0,011

Heat	Lot	Cr [%] 17,000-18,000	Ni [%] 12,500-14,000	Mo [%] 2,500-3,000	N [%] max 0,100
569645	2121537-11	17,250	13,040	2,600	0,042

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles [1)]	Pieces	Total length [m]	Total weight [kg] [2)]
569645	2121536-11	ALLEIMA SE	1	280	1 680.000	2 178.960
569645	2121537-11	ALLEIMA SE	1	117	702.000	910.494

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 : 29.2.2024

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
569645	2121536-11	EnF	pass
569645	2121536-11	WnF	pass
569645	2121537-11	EnF	pass
569645	2121537-11	WnF	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
569645	2121536-11	pass
569645	2121537-11	pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
569645	2121536-11	E	pass
569645	2121536-11	W	pass
569645	2121537-11	E	pass
569645	2121537-11	W	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 ≤22HRC [yes/no]
		max 80,000	yes
569645	2121536-11	75,000	yes
569645	2121536-11	75,000	yes
569645	2121537-11	76,000	yes
569645	2121537-11	75,000	yes

Intergranual corrosion testing in acc. with ASTM A262E

Heat	Lot	Test result [pass/fail]
		pass
569645	2121536-11	pass
569645	2121537-11	pass

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

Heat	Lot	Test result [pass/fail]
		pass
569645	2121536-11	pass
569645	2121537-11	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
569645	2121536-11	291,300	606,000	51,600	24,000	46,700
569645	2121536-11	279,800	588,300	55,200	24,000	50,100
569645	2121537-11	278,700	576,200	54,400	24,000	49,700
569645	2121537-11	287,200	587,400	53,800	24,000	48,700

Heat	Lot	Rp1,0 [MPa]
		min 250.000
569645	2121536-11	325,500
569645	2121536-11	313,900
569645	2121537-11	310,200
569645	2121537-11	319,200

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
569645	2121536-11	No	7,000
569645	2121537-11	No	7,000

Dimensional check

Test results comply with specified criteria.

HT - Final heat treatment of straight tubes

All tubes have been be 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.