Alleima INSPECTION CERTIFICATE

C-12230/10 Rev. 00

Type of inspection document : A02 Inspection certificate acc. to EN 10204 / 3.1	**Internal order No.:** A08 50005061 - 10
Purchaser : A06 ALLEIMA BENELUX B.V. . AMUNDSENWEG 4 5928 LT Venlo THE NETHERLANDS	**Purchase order No. :** A07 **Purchaser's reference :** **Project Id. :** 3000042
Product : B01/B04 Seamless cold finished tube **Dimension (OD x WT) :** B09/B10 9,53 x 2,11AW mm	**Steel designation :** B02 3R60 / 3R60 **Melting process :** C70 AOD

Technical requirements : B03

ASME SA213/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 QA - AC	**Inspector's stamp:** Z03 Digitally signed by Soňa Müllerová DN: cn=Soňa Müllerová gn=Soňa Müllerová c=CZ Czech Republic l=CZ Czech Republic o=ALLEIMA CZ SPOL. S R.O. e=sona.mullerova@alleima.com Reason: I am the author of this document Location: Date: 2024-05-03 09:38+02:00

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
570343	0,015	0,370	1,660	0,030	0,005

Heat	Cr [%]	Ni [%]	Mo [%]	N [%]	Co [%]
	17.000-18.000	12.500-14.000	2.500-3.000	max 0.100	info
570343	17,260	13,090	2,640	0,047	0,110

Manufacturer's works
A01

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Heat	Ti [%] info
570343	<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
570343	2133548-11	0,015	0,370	1,710	0,029	0,002

Heat	Lot	Cr [%] 17,000-18,000	Ni [%] 12,500-14,000	Mo [%] 2,500-3,000	N [%] max 0,100
570343	2133548-11	17,550	12,710	2,610	0,058

Extent of material delivery

Heat	Lot	Hollow supp.	No. of HTcycles [1)]	Pieces	Total length [m]	Total weight [kg] [2)]
570343	2133548-11	ALLEIMA SE	1	660	3 960.000	1 544.400
570343	2133549-11	ALLEIMA SE	1	123	738.000	287.820

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 : 3.5.2024

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Flaring test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
570343	2133548-11		pass
570343	2133548-11		pass
570343	2133549-11		pass
570343	2133549-11		pass

Flaring test in acc. with EN 10216-5

Heat	Lot	ST	Test result [pass/fail]
			pass
570343	2133548-11		pass
570343	2133549-11		pass

Flattening test in acc. with ASTM A 1016

Heat	Lot	ST	Test result [pass/fail]
			pass
570343	2133548-11		pass
570343	2133548-11		pass
570343	2133549-11		pass
570343	2133549-11		pass

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

Heat	Lot	ST	Hardness [HRB]	Hardness ≤22HRC [yes/no]
			max 80,000	yes
570343	2133548-11		69,000	yes
570343	2133548-11		69,000	yes
570343	2133549-11		69,000	yes
570343	2133549-11		69,000	yes

Intergranual corrosion testing in acc. with ASTM A262E

Heat	Lot	ST	Test result [pass/fail]
			pass
570343	2133548-11		pass
570343	2133549-11		pass

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

Heat	Lot	ST	Test result [pass/fail]
			pass
570343	2133548-11		pass
570343	2133549-11		pass

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

Heat	Lot	ST	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
570343	2133548-11		261,300	546,600	60,000	62,800	288,700
570343	2133549-11		253,300	543,100	64,400	64,200	280,200

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 [No/Yes]	Grain size [(G)]
			No	5.000-14.000
570343	2133548-11		No	5,000
570343	2133549-11		No	5,000

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. E426/EN ISO 10893-1

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.