



CERTIFICATE

A03/Z02

No. A/20-918095

Rev 00

Date

2020-10-23

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A02/Z03

INSPECTION CERTIFICATE acc to EN 10204 3.1

A06

SANDVIK MATERIALS TECHNOLOGY
982 GRIFFIN POND ROAD
CLARKS SUMMIT, PA 18411
USA

INSPECTION STAMP

SVQ

Customer References A07 PO68172 450-00991 LANGLEY ALLOY	Sandvik References A08 <table border="0"> <tr> <td>Order No.</td> <td>Subs No.</td> <td>ABSMT</td> <td>Dispatch note</td> </tr> <tr> <td></td> <td>103428</td> <td>39363/53</td> <td></td> </tr> <tr> <td>ABSMT No.</td> <td>C.Code</td> <td colspan="2"></td> </tr> <tr> <td>284-13746</td> <td>03</td> <td colspan="2"></td> </tr> </table>	Order No.	Subs No.	ABSMT	Dispatch note		103428	39363/53		ABSMT No.	C.Code			284-13746	03		
Order No.	Subs No.	ABSMT	Dispatch note														
	103428	39363/53															
ABSMT No.	C.Code																
284-13746	03																

Material description B01/B04 HOT WORKED STAINLESS BAR STEEL ROLLED ANNEALED & STRAIGHTENED PEEL TURNED <table border="0"> <tr> <td>Metallurgical process</td> <td>Origin</td> <td style="text-align: right;">C70</td> </tr> <tr> <td>E+AOD+LRF</td> <td>Sweden</td> <td></td> </tr> </table>	Metallurgical process	Origin	C70	E+AOD+LRF	Sweden		Steel/material Designations B02 <table border="0"> <tr> <td>Sandvik</td> <td>UNS</td> </tr> <tr> <td>SAF 2507</td> <td>S32750</td> </tr> <tr> <td>EN no</td> <td></td> </tr> <tr> <td>1.4410</td> <td></td> </tr> </table>	Sandvik	UNS	SAF 2507	S32750	EN no		1.4410	
Metallurgical process	Origin	C70													
E+AOD+LRF	Sweden														
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Technical requirements B03 EN 10088-3:-2014, NACE MR0175/ISO 15156-3:-2015, NACE MR0103/ISO 17945-1:-2015 ASTM A-276-17, ASTM A-479-19, ASTM A-484-18A, ASTM A-182-19A*, Produced per Langley specification PS:47V:32750 REV 9 and Sandvik DDR PS:SD-3275:B Rev. 2 NORSOK M-630 ED-6, NORSOK MDS D57 REV. 5* NORSOK M-650 ED-4 QTR NO: 25 Cr Duplex SS *For detailed information, please see the appendix

EXTENT OF DELIVERY B07-B13								
It	Product designation	Heat	Lot	Pieces	Kg	Lbs		
01	MBR-SAF2507-5"	559353	60361	7	3869.0	8530.00		
				Total	7	3869.0 8530.00		
TEST RESULTS								
Reduction ratio (times)								
Lot								
60361	6.8							
Chemical composition (weight%) acc. to ASTM A-751								
Heat	PRE							
559353	42.0							
Chemical composition (weight%)								
Heat	C	Si	Mn	P	S	Cr	Ni	Mo
559353	0.014	0.33	0.78	0.020	<0.0005	24.89	6.91	3.80
	W	Cu	N					
559353	0.01	0.14	0.287					

Quality assurance - Erik Jansson/QA-manager Primary Products MTC Service / Certificates	A05/Z02
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A01

AB SANDVIK MATERIALS TECHNOLOGY Reg No. 556234-6832 VAT No. SE556234683201
SE-81181 SANDVIKEN SWEDEN www.materials.sandvik mtc_service.smt@sandvik.com



INS



Tensile test at room temperature acc to ASTM A-370

Longitudinal

Location half radius

Lot	Yield strength		Tensile strength	Elongation	
	Mpa	MPa	Mpa	%	%
60361	Rp0.2	Rp1.0	Rm	A	2"
	559	646	803	43	43
	Red.of Area				
	%				
	Z				
	75				

Transversal

Location half radius

Lot	Yield strength		Tensile strength	Elongation	
	MPa	MPa	MPa	%	%
60361	Rp0.2	Rp1.0	Rm	A	2"
	560	661	824	38	38
	Red.of Area				
	%				
	Z				
	69				

Hardness test acc. to ASTM E-10

Location half radius

Lot	HBW		
60361	238	238	238
	- Near Surface		
Lot	HBW		
60361	225	229	213

Impact test, J, Longitudinal acc. to ASTM A-370/ISO 148-1

Location half radius

Lot	Single values			Avg.	Temperature
	Joule			Joule	°C
60361	286	299	322	302	-50

Lateral expansion

Lot				Temperature
	mm			°C
60361	2.12	2.14	2.27	-50

Impact test, J, Transversal acc. to ASTM A-370/ISO 148-1

Location half radius

Lot	Single values			Avg.	Temperature
	Joule			Joule	°C
60361	164	152	128	148	-50
	SHEAR FRACTURE				
	%				
	60	60	60		

Lateral expansion

Lot				Temperature
	mm			°C
60361	1.30	1.40	1.00	-50



Corrosion test according to ASTM G-48A, 50°C +/-1°C for 24 hours.

In delivery condition. No pitting corrosion found at 20x enlargement.

Test location acc to NORSOK MDS D57

Specimen weight loss

Lot	g/m ²
60361	0.28

Ferrite acc to ASTM E-562

Location half radius

20 Points and 25 Fields

Lot	%
60361	43.7

- Near Surface

Lot	%
60361	47.0

Following controls/tests have been satisfactorily performed:

- Material Identification.
- Ultrasonic testing (*)
- Visual inspection and dimensional control.
- Austenite spacing per DNV- RP-F112 Section 7 = 18.20 mym

HEAT TREATMENT:

20 - 70mm: Material soaking 1100°C, min. 30 minutes. Quenched in water. Water temp pre-quench max 40°C, after quench max 50°C

75 - 180mm: Material soaking 1090°C, min. 30 minutes. Quenched in water. Water temp pre-quench max 40°C, after quench max 50°C

185 - 250mm: Material soaking 1100°C, min. 60 minutes. Quenched in water. Water temp pre-quench max 40°C, after quench max 50°C

The raw material is free from radioactive contamination.

Microscopic Examination X 500 acc. to ASTM A 923 Method A/NORSOK M630
Free from grain boundary carbides and intermetallic phases.

ASTM A923 samples etched using agent NaOH listed in ASTM E-407.
NORSOK M650 Samples etched using agent NaOH listed in ASTM E-407.

Material free from mercury contamination.

No welding or weld repair.

Certified acc. Pressure Equipment Directive (2014/68/EU Annex 1 para 4.3) TUEV CERT-Certification body for pressure equipment of the TUEV NORD GRUPPE; notified body, reg.-no. 0045.

The delivered products comply with the specifications and requirements of the order.

The material is manufactured according to a Quality system, approved and registered to ISO 9001:2015.





No unauthorized alterations. The contents of this Inspection Certificate may not be modified or revised in any way without the prior written approval of AB Sandvik Materials Technology. Unauthorized alterations to the Inspection Certificate, including introduction of false, fictitious or fraudulent statements or entries, may be punishable by fines, imprisonment, or both. This Inspection Certificate may be copied only in the manner and for the purposes specified in Section 6 of EN 10204:2004. Contravention of this notice will be prosecuted to the fullest extent of applicable law.

The certificate is produced with EDP and valid without signature.

ADDITIONAL INFORMATION

Lab accreditation

Our lab is accredited under SWEDAC Accreditation number 1636 for testing as per ISO/IEC 17025.

Applicable only to specific dimensions

20mm - 250mm: Norsok M-630 Ed. 6 - Norsok MDS D57 Rev.5*

Suitable for manufacturing of components in acc. with *ASTM A-182, F53

Test location

Mechanical, austenite testing

Bar dim ≤ 50 mm - Longitudinal test pieces in center of the bar

Bar dim > 50 mm - 250 mm - Longitudinal test pieces, 1/4 T and minimum 100 mm from any second surface.

Bar dim > 100mm - 250 mm - Transversal test pieces, 1/4 T and minimum 100 mm from any second surface.

Ferrite, austenite spacing and hardness testing same as for tensile testing area, and near surface.

One set of test samples per heat treatment lot.

Maximum lot size 15 ton.

Ultrasonic test

Dim 29 - 74 mm : EN 10308 quality class 3

Dim 75 - 260 mm: Ultrasonic test acc to EN 10228-4, Scan coverage 1, Quality Class 3, Tab 4 and ASTM A-388, API 6A PSL3/3G.

Furnace calibration every third month according to API 6A

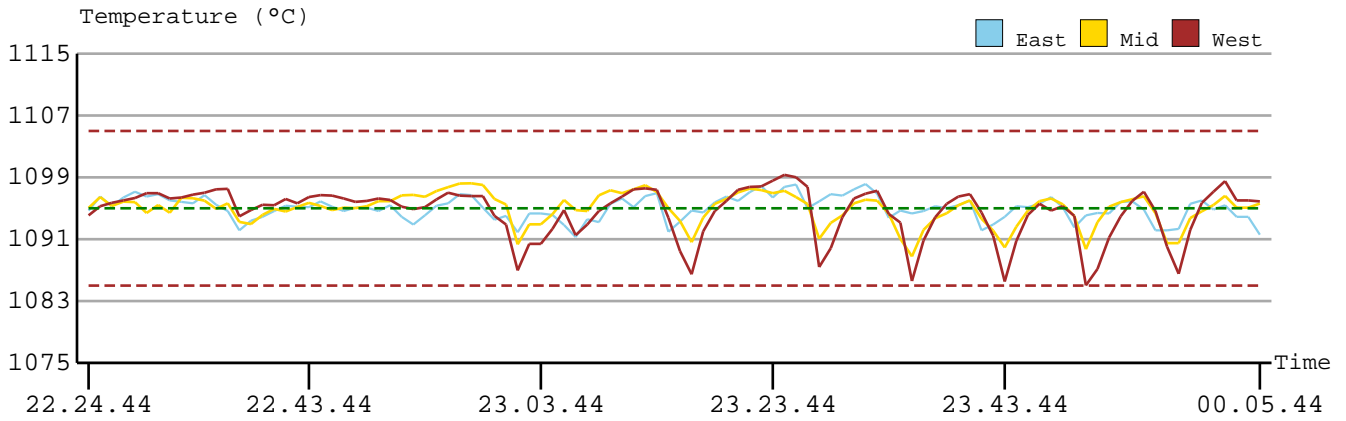
Thermocouples of S-type (+/- 5°C tolerance) are used to monitor the furnace temperature.



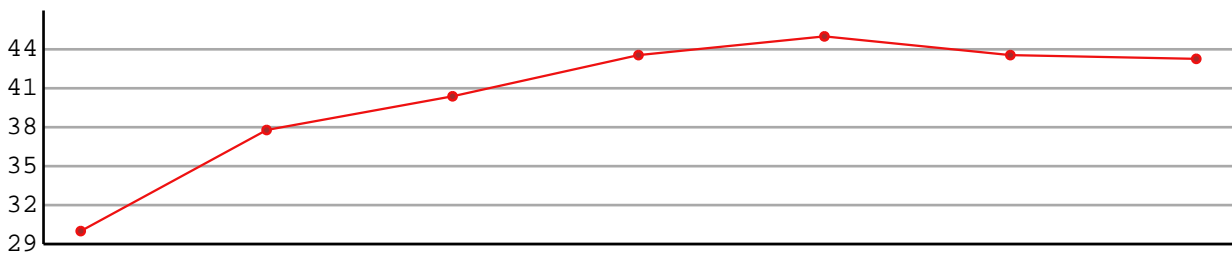


						Setpoints					
Work order	Num. of pieces	Dim (mm)	Weight (kg)	Steel Grade	Heat Number	Strategy	Zone 3 (°C)	Mtrl. temp. out furn. (°C)	Total time (mm)	Cooling time 1 (mm:ss)	Cooling time 2 (mm:ss)
60361	7	134.8	4368	2RD99	559353	60	1095	1090	102	4:30	5:10

Heating Temperature (°C) - Zone 3 - Soaking



Temperature after cooling (°C)



Date 2020-06-18	Customer Langley Alloys Ltd	Specification EN 10228-4, EN 10308, ASTM A388 and API 6A PSL 3/3G		
SANDVIK Order No	Grade 2RD99	Procedure No. 72-4031	Testpiece No. 37538	
Level 1 Operator		Level 2 Technician		
Performed by 58172 - Campara		Approved by 67190 - Nordström		



EQUIPMENTS

Apparatus EcoMAC FD4	Sorting	Marking	Alarm X	Recording X	
Apparatus	Sorting	Marking	Alarm	Recording	
Apparatus	Sorting	Marking	Alarm	Recording	
Transducer Technisonic	Type ILD-0208-SP 2.25MHz/6"	Size 25,4 mm	Beam width mm	Focal length mm	Freq 2,25 MHz
Transducer	Type	Size mm	Beam width mm	Focal length mm	Freq MHz
Transducer	Type	Size mm	Beam width mm	Focal length mm	Freq MHz

EQUIPMENTS

<input type="checkbox"/>	Contact	Rotation Speed of							
X	Immersion	<input checked="" type="checkbox"/> Tube/Bar	<input type="checkbox"/> Transducer	90,2 RPM	Pitch 44 mm/Rev	Testspeed 3,97 m/min			
	Scanning	Sensitivity/calibration			/testing				
	Axial	/testing							
	Longitudinal Defects, Two Way Search								
	Axial	Sensitivity/calibration			/testing				
	Transverse Defects, Two Way Search								
		Sensitivity/calibration			/testing				
	Axial Straight Beam								
X	Circumferential Straight Beam	Sensitivity/calibration			/testing				
		FBH Ø 3,0 mm			100%				
	Couplant	Surface condition							
	Water	Peeled							
Note									

RESULT OF TESTING

Dim in mm	Lot No	Heat No	Number of tested tubes/bars	Accepted without report	Accepted with report	Not Accepted	Note
Ø 127	60361	559353	7	7			



Microstructure Examination Report

Material Information

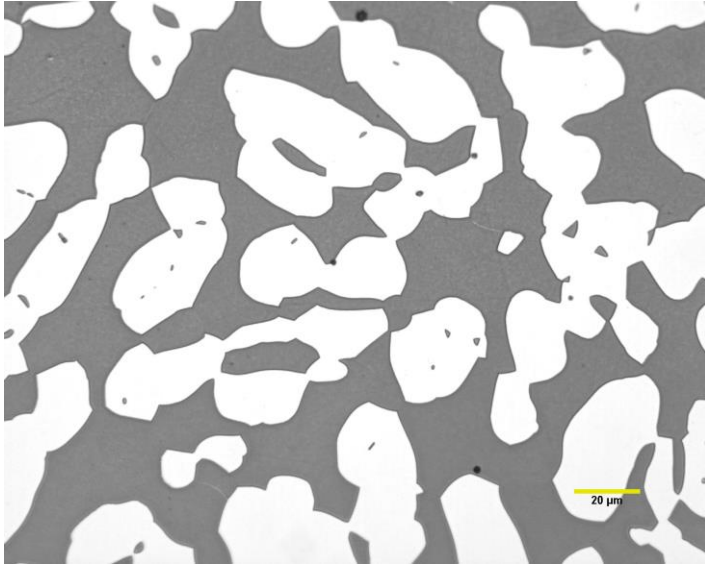
Grade SAF2507
Heat 559353
Lot 60361
Dim 127.00 x 0.00

Technical Information

Certificate No. A/20-918095
Test Date 2020-06-25
Etchant NAOH
Test Result OK

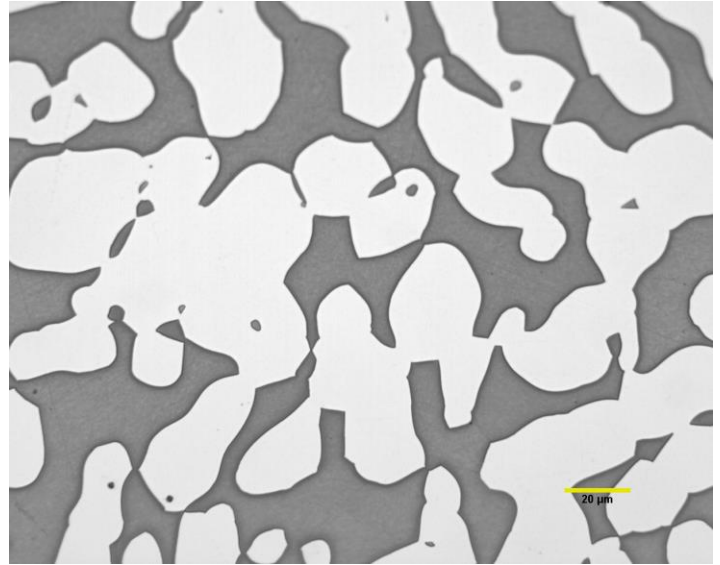
Test No: 2128

Magnification: 500x



Test No: 2129

Magnification: 500x



Test No: 2130

Magnification: 500x

