SOUTH QUALITY

PROFICIENCY TESTING PROVIDER

REPORT No 11419

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Status: FINAL REPORT

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ASTM E1086

ANALYSIS OF AUSTENITIC STAINLESS STEEL BY SPARK ATOMIC EMISSION SPECTROMETRY

Program: SQ-0072

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Prepared by:	Reviewed by:	Approved by:
cn=SERGIO E. ANDRADA, o=PT SOUTH QUALITY SAS, ou=PT SOUTH QUALITY SAS, email=tech@ptsouthquality.com, c=AR 2025.10.30 11:12:50 -03'00'	cn=ALFREDO M. SCHMIDT, o=PT SOUTH QUALITY SAS, ou=SOUTH QUALITY, email=aschmidt@ptsouthquality.com, c=AR 2025.10.30 15:38:19 -03'00'	cn=Emiliano Medina, o=SOUTH QUALITY, ou=PT SOUTH QUALITY SAS, email=quality@ptsouthquality.com, c=ES 2025.10.31 16:34:15 -03'00'
Sergio Andrada Assistant Technician	**Eng. Alfredo Schmidt** Metallurgical expert	**Eng. Emiliano Medina** Quality Assurance Lead

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1. FOREWORD

This report summarizes the results of the **SQ-0072** proficiency testing program on the determination of the composition of austenitic stainless steel by spark atomic emission spectrometry. This program is conducted in a bilateral format, following the A.3.3 classification of the ISO 17043 standard ("Split-sample testing schemes").

South Quality conducted the testing program in October 2025 with the aim of assessing the laboratory's ability to competently perform the designated tests.

2. ORGANIZATION

Program Coordinator:	Eng. Alfredo Schmidt
Assistant Technician:	Sergio Andrada
Statistic:	Lic. Manuel Tozaki
Supervision:	Eng. Emiliano Medina

3. OBJECTIVE

The objective of this proficiency testing program is to determine the composition of austenitic stainless steels, using the following standard:

Standard
ASTM E1086: 2022

To verify this, austenitic stainless steel samples have been selected.

Participants in this program have not been previously informed about the expected values or value ranges of the samples they receive.

4. PARTICIPANT

Company:	**GRUNDFOS Holding A/S**
Laboratory:	**Material and Analytical Laboratory**
Country:	Denmark
Client ID:	E517
Contact person:	Paul Lyck Hansen Laboratory Manager phansen@grundfos.com

5. HOMOGENEITY

Several batches were prepared identically by the staff at South Quality.

Subsequently, a homogeneity study was conducted with an ISO 17025 accredited laboratory.

The control process followed ISO Guide 35: 2017, clause 7.4.1.2. Stratified random sampling was employed, and samples were chosen using random number generation software.

The results of this test are presented below:

Size of each batch: **50 units** Tested samples from each batch: **10 units**

DETERMINATION	HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES		
	BATCH: LM2035	BATCH: LM2036	BATCH: LM2037
MASS FRACTION	NO	YES	YES

Size of each batch: **50 units** Tested samples from each batch: **10 units**

DETERMINATION	HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES		
	BATCH: LM2817	BATCH: LM2818	BATCH: LM2819
MASS FRACTION	YES	YES	NO

Samples for this program are taken from the selected batches identified as LM2037 and LM2817.

For the indicated batches, the values determined in the homogeneity study are utilized as the assigned values.

The analysis of the test data indicated that the selected samples exhibited sufficient homogeneity for the program. Therefore, the results of participants identified as outliers cannot be attributed to sample variability.

6. SAMPLE INFORMATION

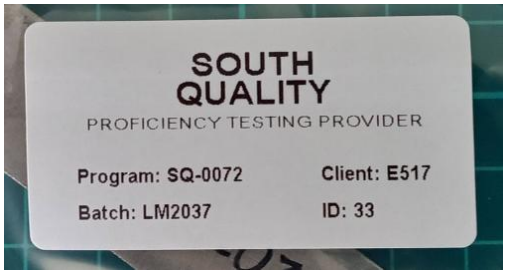
The following samples were sent to be tested:

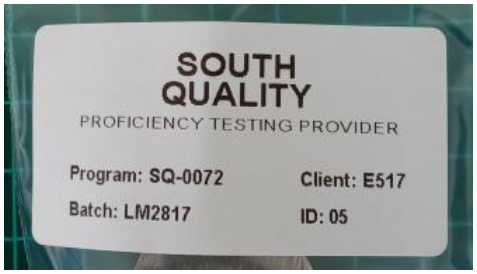
Batch:	LM2037
Sample ID:	33
Characteristics:	Austenitic stainless steel (AISI 304) - 100.5 x 19.5 x 6.2 mm

Batch:	LM2817
Sample ID:	05
Characteristics:	Austenitic stainless steel (AISI 304) - Ø 25.4 x 20 mm

7. IMAGES

SAMPLES





8. ASSIGNED VALUES

BATCH	MASS FRACTION, % (Standard deviation)				
	CHROMIUM	NICKEL	MOLYBDENUM	MANGANESE	SILICON
LM2037	18.15 (0.72)	8.02 (0.65)	0.339 (0.025)	1.241 (0.092)	0.3105 (0.016)
LM2817	18.38 (0.85)	8.41 (0.72)	0.345 (0.015)	1.556 (0.085)	0.4125 (0.0356)

BATCH	MASS FRACTION, % (Standard deviation)			
	COPPER	CARBON	PHOSPHOROUS	SULFUR
LM2037	0.4598 (0.026)	0.0235 (0.0016)	0.0372 (0.004)	0.0049 (0.0004)
LM2817	0.553 (0.048)	0.0167 (0.0012)	0.0388 (0.005)	0.0268 (0.002)

9. PARTICIPANT RESULTS (SEE APPENDIX)

CODE	MASS FRACTION, %				
	CHROMIUM	NICKEL	MOLYBDENUM	MANGANESE	SILICON
LM2037-33	18.07	7.94	0.3273	1.27	0.3071
LM2817-05	18.23	8.136	0.366	1.574	0.4038

CODE	MASS FRACTION, %			
	COPPER	CARBON	PHOSPHOROUS	SULFUR
LM2037-33	0.4553	0.0257	0.0308	0.0044
LM2817-05	0.546	0.0189	0.0349	0.0239

10. STATISTICS

The results must be treated as quantitative.

The comparison is made according B.3.1.3 of ISO 17043 and the appropriate technique is to compare participant results with the assigned values. The results can be compare using percent difference ***z score.***

$$z = \frac{x - X}{\hat{\sigma}}$$

x is the participant's result

X is the assigned value

$\hat{\sigma}$ is the standard deviation

The performance evaluation of each sample is carried out with the following criteria:

$|z| \leq 2.0$ indicates "satisfactory" performance and generates no signal;

$2.0 < |z| < 3.0$ indicates "questionable" performance and generates a warning signal;

$|z| \geq 3.0$ indicates "unsatisfactory" performance and generates an action signal;

11. EVALUATION OF PERFORMANCE

A. BATCH LM2037

ELEMENT	MASS FRACTION, %		| z score |	PERFORMANCE RESULT
	PARTICIPANT RESULT	ASSIGNED VALUE		
CHROMIUM	18.07	18.15	**0.11**	SATISFACTORY
NICKEL	7.94	8.02	**0.12**	SATISFACTORY
MOLYBDENUM	0.3273	0.339	**0.47**	SATISFACTORY
MANGANESE	1.27	1.241	**0.32**	SATISFACTORY
SILICON	0.3071	0.3105	**0.21**	SATISFACTORY
COPPER	0.4553	0.4598	**0.17**	SATISFACTORY
CARBON	0.0257	0.0235	**1.38**	SATISFACTORY
PHOSPHORUS	0.0308	0.0372	**1.60**	SATISFACTORY
SULFUR	0.0044	0.0049	**1.25**	SATISFACTORY

B. BATCH LM2817

ELEMENT	MASS FRACTION, %		| z score |	PERFORMANCE RESULT
	PARTICIPANT RESULT	ASSIGNED VALUE		
CHROMIUM	18.23	18.38	**0.18**	**SATISFACTORY**
NICKEL	8.136	8.41	**0.38**	**SATISFACTORY**
MOLYBDENUM	0.366	0.345	**1.40**	**SATISFACTORY**
MANGANESE	1.574	1.556	**0.21**	**SATISFACTORY**
SILICON	0.4038	0.4125	**0.24**	**SATISFACTORY**
COPPER	0.546	0.553	**0.15**	**SATISFACTORY**
CARBON	0.0189	0.0167	**1.83**	**SATISFACTORY**
PHOSPHORUS	0.0349	0.0388	**0.78**	**SATISFACTORY**
SULFUR	0.0239	0.0268	**1.45**	**SATISFACTORY**

12. CONCLUSIONS

The overall performance on this **SQ-0072** program from the participant laboratory **GRUNDFOS Holding A/S - Material and Analytical Laboratory**, is **SUFFICIENT** based on expected results.

The criteria used for the evaluation of the overall performance is the following:

- **SUFFICIENT** performance: No unsatisfactory/questionable results were obtained.
- **ALMOST SUFFICIENT** performance: No unsatisfactory results were obtained, but one questionable result was found.
- **INSUFFICIENT** performance: An unsatisfactory result or two questionable results were obtained.

APPENDIX

PARTICIPANT RESULTS

(Results form)

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INSTRUCTIVE
&
RESULTS FORM

PROGRAM:	Analysis of austenitic stainless steel by spark atomic emission spectrometry
CODE:	SQ-0072
VERSION:	-
STANDARD:	ASTM E1086
COORDINATOR:	Eng. Alfredo Schmidt (aschmidt@ptsouthquality.com)

1 - General

This document is intended to be filled with the results of the **SQ-0072** program.

Results must be typed, not handwritten.

2 - Standard

ASTM E1086: 2022

3 - Tests involved

TEST
Determination of composition of austenitic stainless steel by spark atomic emission spectrometry

4 - Samples

CODE	SAMPLE	QUANTITY
LM2037-33	Austenitic stainless steel - 100.5 x 19.5 x 6.2 mm	1
LM2817-05	Austenitic stainless steel - Ø 25.4 x 20 mm	1

5 - Notes

a) Being a bilateral program, there is no deadline for submitting results.
b) The tables in this document may be modified as needed to add data or observations.
c) Samples must be retained until the end of the program, which concludes with the submission of the final report.
d) For LM2037 samples, verification must be performed on the opposite side of the ID. For LM2817 samples, verification can be performed on either side.
e) Participants may improve the surface to obtain better testing conditions. If so, the procedure must be detailed in the 'Observations' box.
f) Samples should be treated as routine laboratory samples. All testing, recording, and reporting must be performed in accordance with ASTM E1086.
g) To review the results, test images would be appreciated. Images can be attached at the end of this document or sent by email.
h) Once this document is completed, it should be converted into a PDF file and sent to the program coordinator.

6 - **Test conditions**

Procedure:	According to standard ASTM E1086-22
Final grinding:	80 -grit

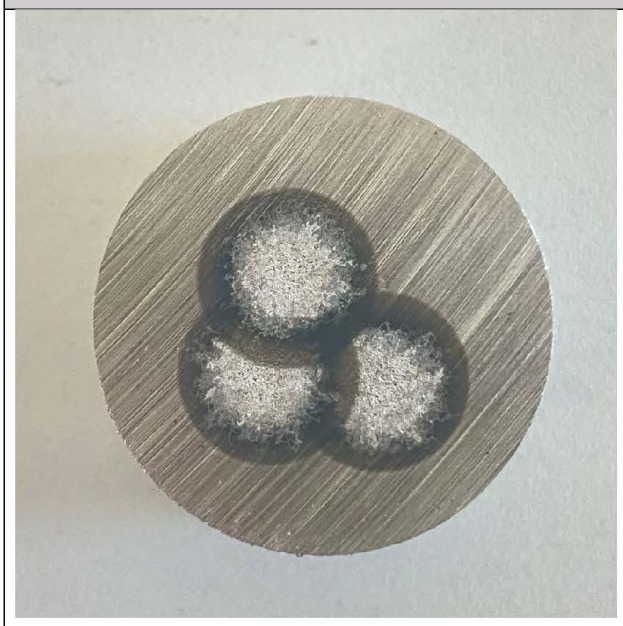
7 - **Test results**

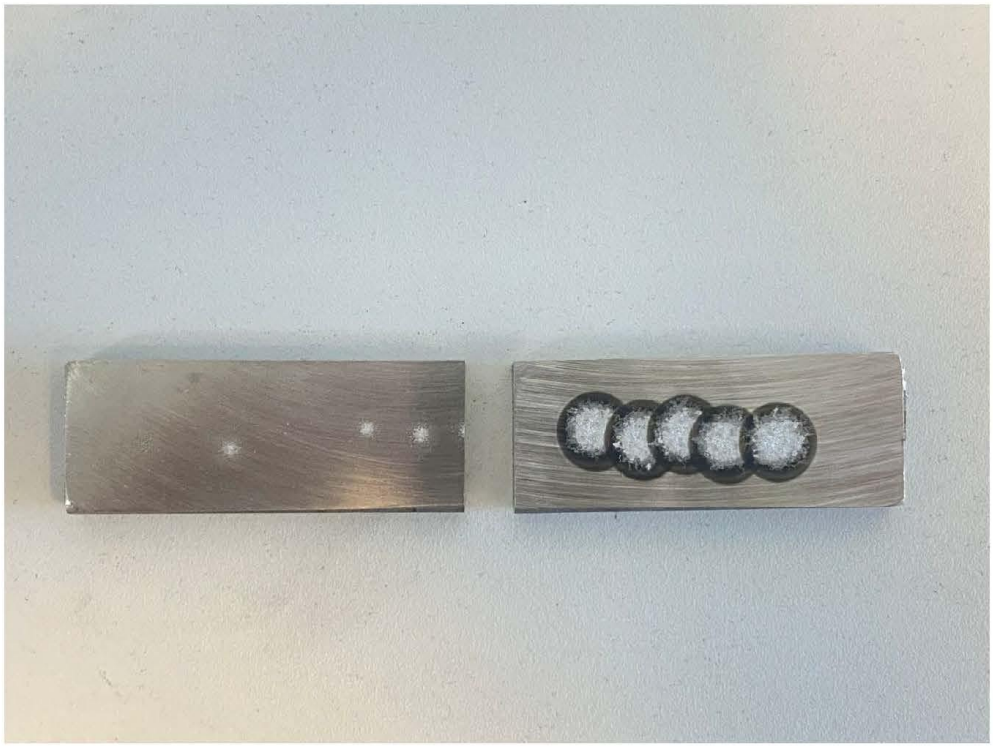
ELEMENT	MASS FRACTION, %	
	LM2037-33	LM2817-05
CHROMIUM	18,07	18,23
NICKEL	7,940	8,136
MOLYBDENUM	0,3273	0,3660
MANGANESE	1,270	1,574
SILICON	0,3071	0,4038
COPPER	0,4553	0,5460
CARBON	0,0257	0,0189
PHOSPHORUS	0,0308	0,0349
SULFUR	0,0044	0,0239

OBSERVATIONS

- Sample LM2037-33 was cut in half to ease the handling of the sample. Subsequently the sample was milled on the measurement surface prior to grinding on grit 80 to obtain a sufficient area of measurement.
- The average reported for sample LM2817-05 is constructed to from two separate grindings as the sample surface was not large enough to contain the number of measurements which is procedure for the laboratory.
- All reported values are an average of five measurements/sparks.

PHOTOGRAPHS





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