

REPORT No 11350

Date of issue: September 12, 2025

Status: FINAL REPORT

ASTM E1086

ANALYSIS OF AUSTENITIC STAINLESS STEEL BY SPARK ATOMIC EMISSION SPECTROMETRY

Program: SQ-0072

This document is issued by the Company subject to its Terms and Conditions, available on request or accessible at <https://www.ptsouthquality.com/terms-and-conditions>. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

Copyright © 2024 South Quality, Buenos Aires, ARGENTINA



Prepared by:	Reviewed by:	Approved by:
Sergio Andrada Assistant Technician	Eng. Alfredo Schmidt Metallurgical expert	Eng. Emiliano Medina Quality Assurance Lead

TABLE OF CONTENTS

1. FOREWORD	3
2. ORGANIZATION	3
3. OBJECTIVE	3
4. PARTICIPANT	3
5. HOMOGENEITY	4
6. SAMPLE INFORMATION	4
7. IMAGES	5
8. ASSIGNED VALUES	5
9. PARTICIPANT RESULTS	6
10. STATISTICS	6
11. EVALUATION OF PERFORMANCE	7
12. CONCLUSIONS	7
APPENDIX	
PARTICIPANT RESULTS (RESULTS FORM)	8

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 August 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: **COLUMBUS STAINLESS**
 Laboratory: **Instrument Laboratory**
 Country: South Africa
 Client ID: F290
 Contact person: Kebuile Moseki
 Lab Specialist
moseki.kebuile@columbus.co.za

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: LM2725	BATCH: LM2726	BATCH: LM2727
MASS FRACTION	NO	YES	NO

Samples for this program are taken from the selected batches identified as LM2037 and LM2726.

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:	32
Characteristics:	Austenitic stainless steel (AISI 304) - 100.5 x 19.3 x 6.2 mm

Batch:	LM2726
Sample ID:	05
Characteristics:	Austenitic stainless steel (AISI 304) - 100 x 20.5 x 9.6 mm

7. IMAGES



8. ASSIGNED VALUES

BATCH	MASS FRACTION, % (Standard deviation)				
	CHROMIUM	NICKEL	MOLYBDENUM	MANGANESE	SILICON
LM2037	14.58 (0.72)	8.02 (0.65)	0.339 (0.025)	-	-
LM2726	14.68 (0.85)	8.41 (0.72)	0.0135 (0.0009)	-	-

BATCH	MASS FRACTION, % (Standard deviation)			
	COPPER	CARBON	PHOSPHOROUS	SULFUR
LM2037	-	0.0215 (0.0016)	-	-
LM2726	-	0.0135 (0.0020)	-	-

9. PARTICIPANT RESULTS (SEE APPENDIX)

CODE	MASS FRACTION, %				
	CHROMIUM	NICKEL	MOLYBDENUM	MANGANESE	SILICON
LM2037-32	14.45	8.12	0.333	-	-
LM2726-05	14.50	8.55	0.0143	-	-

CODE	MASS FRACTION, %			
	COPPER	CARBON	PHOSPHOROUS	SULFUR
LM2037-32	-	0.0222	-	-
LM2726-05	-	0.0151	-	-

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	14.45	14.58	0.18	SATISFACTORY
NICKEL	8.12	8.02	0.15	SATISFACTORY
MOLYBDENUM	0.333	0.339	0.24	SATISFACTORY
CARBON	0.0222	0.0215	0.44	SATISFACTORY

B. BATCH LM2726

ELEMENT	MASS FRACTION, %		z score	PERFORMANCE RESULT
	PARTICIPANT RESULT	ASSIGNED VALUE		
CHROMIUM	14.5	14.68	0.21	SATISFACTORY
NICKEL	8.55	8.41	0.19	SATISFACTORY
MOLYBDENUM	0.0143	0.0135	0.89	SATISFACTORY
CARBON	0.0151	0.0135	0.80	SATISFACTORY

12. CONCLUSIONS

The overall performance on this **SQ-0072** program from the participant laboratory **COLUMBUS STAINLESS - Instrument 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)



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
LM2037-32	Austenitic stainless steel - 100.5 x 19.3 x 6.2 mm	1
LM2726-05	Austenitic stainless steel - 100 x 20.5 x 9.6 mm	1

5 - Notes

- a) Being a bilateral program there is no deadline to accomplish sending results.
- b) Tables in this document can be modified at will for the addition of data or observations.
- c) The samples must be kept until the end of the program, which closes with the submission of the final report.
- d) The surfaces where the tests must be carried out should be the ones opposite the IDs.
- e) Participants may improve the surface to provide a better testing surface. If this is done, the procedure must be detailed in the 'observations' box.
- f) Samples should be treated as a routine laboratory sample. All testing, recording and reporting is to be performed in accordance with ASTM E1086.
- g) To review the results, sending images of the tests will be appreciated. Images can be attached at the end of this document or can be sent by email.
- h) Once this document is completed, it is requested to transform it into a pdf file and send it to the program coordinator.

6 - Test conditions

Procedure:	According to standard
Final grinding:	P180 -grit

7 - Test results

ELEMENT	MASS FRACTION, %	
	LM2037-32	LM2726-05
CHROMIUM	14.45	14.50
NICKEL	8.12	8.55
MOLYBDENUM	0.333	0.0143
MANGANESE		
SILICON		
COPPER		
CARBON	0.0222	0.0151
PHOSPHORUS		
SULFUR		

OBSERVATIONS
NONE

PHOTOGRAPHS

Before analysis



After analysis



----- END OF REPORT -----