

REPORT No 11977

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ISO 6508-1

ROCKWELL HARDNESS TEST - HRC

Program: SQ-0026

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1. FOREWORD

This report summarizes the results of the **SQ-0026** proficiency testing program on the determination of Rockwell hardness number on metallic materials. This program is conducted in a bilateral format, following the “split-sample” design described in clause A.4.2 of ISO/IEC 17043: 2023 (Alternative interlaboratory comparisons).

South Quality conducted the testing program in May 2026 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
 Statistics: Lic. Manuel Tozaki
 Supervision: Eng. Emiliano Medina

3. OBJECTIVE

The objective of this proficiency testing program is to determine the Rockwell hardness number on metallic materials, using the following standard:

Standard
ISO 6508-1: 2023

To verify this, samples of steel 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 (Pty) Ltd**
 Laboratory: **Mechanical Laboratory**
 Country: South Africa
 Client ID: F290
 Contact person: Susan Masela
 Technician Production
masela.susan@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 33405: 2024, clauses 7.4.1.1 / 7.4.1.2. Stratified random sampling was applied, and samples were selected 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 (MEDIUM CARBON STEEL)		
	BATCH: LM4848	BATCH: LM4849	BATCH: LM4850
HRC	NO	NO	YES

Size of each batch: **50 units**

Tested samples from each batch: **10 units**

DETERMINATION	HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES (HIGH CARBON STEEL)		
	BATCH: LM4904	BATCH: LM4905	BATCH: LM4906
HRC	YES	YES	YES

Samples for this program are taken from the selected batches identified as **LM4850** and **LM4905**.

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

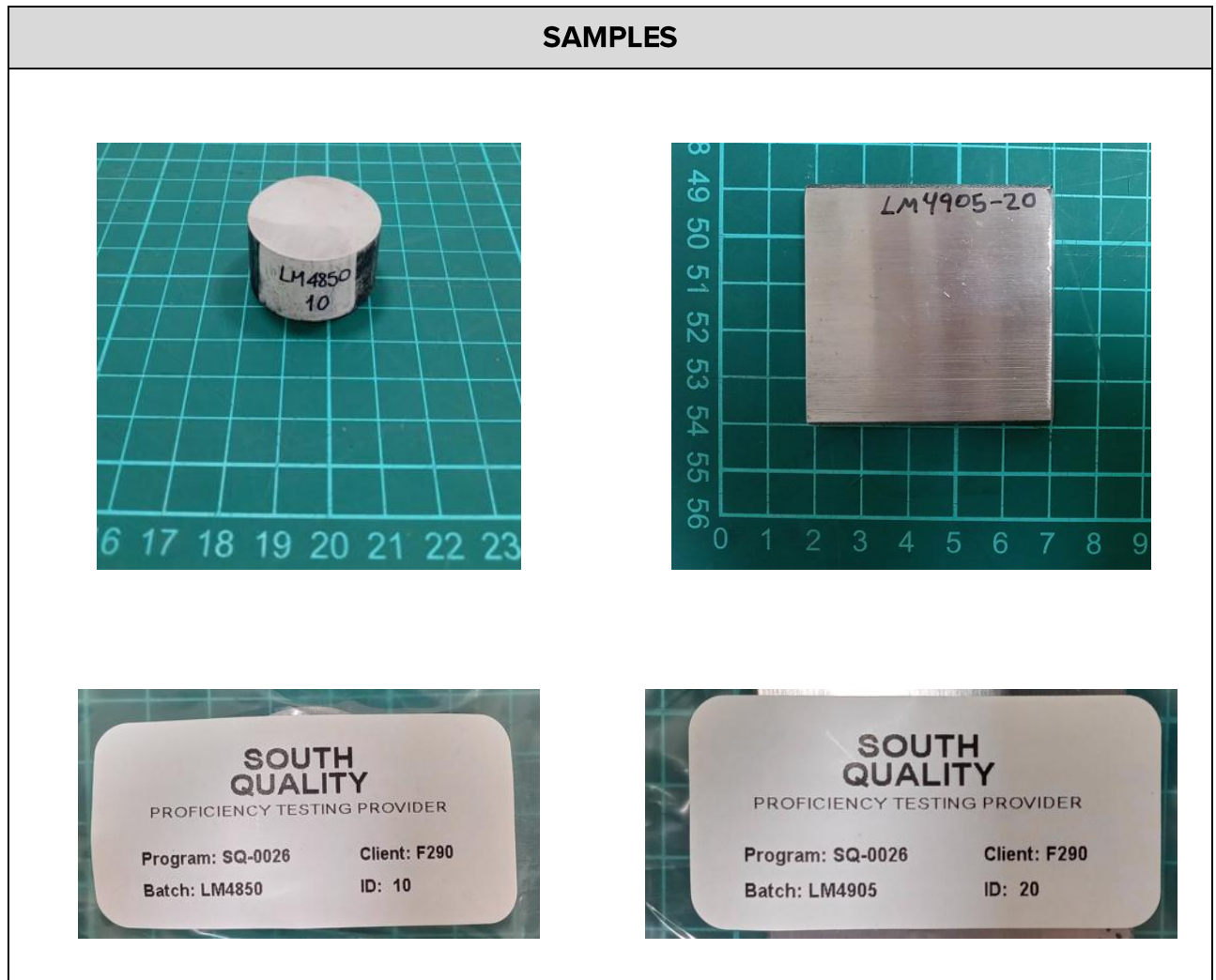
6. SAMPLE INFORMATION

The following samples were sent for testing:

Batch:	LM4850
Sample ID:	10
Characteristics:	Medium carbon steel (AISI 4140) - $\varnothing 31.7 \times 20$ mm

Batch:	LM4905
Sample ID:	20
Characteristics:	High carbon steel (AISI 5160) - $50 \times 50 \times 2.8$ mm

7. IMAGES



8. ASSIGNED VALUES

BATCH	HRC	<i>U</i>
LM4850	41.2	1.4
LM4905	55.4	1.4

9. PARTICIPANT RESULTS (SEE APPENDIX)

BATCH	HRC	<i>U</i>
LM4850-10	40.6	1.9
LM4905-20	55.8	1.9

10. STATISTICS

The results must be treated as qualitative.

According to B.4.1.3 of ISO 17043 the appropriate technique is to compare participant results with the assigned values. The results can be compared using E_n .

$$E_n = \frac{x - X}{\sqrt{U_{\text{lab}}^2 + U_{\text{ref}}^2}}$$

x is the participant's result

X is the assigned value

U_{lab} is the expanded uncertainty of a participant's result

U_{ref} is the expanded uncertainty of the reference laboratory's assigned value

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

$|E_n| \leq 1.0$ indicates "satisfactory" performance and generates no signal;

$|E_n| > 1.0$ indicates "unsatisfactory" performance and generates an action signal;

11. EVALUATION OF PERFORMANCE

BATCH	HRC		$ E_n $	PERFORMANCE RESULT
	PARTICIPANT RESULT	ASSIGNED VALUE		
LM4850	40.6	41.2	0.25	SATISFACTORY
LM4905	55.8	55.4	0.17	SATISFACTORY

12. CONCLUSIONS

The overall performance on this **SQ-0026** program from the participant laboratory **Columbus Stainless (Pty) Ltd - Mechanical Laboratory**, is **SUFFICIENT** based on expected results.

The criteria used for the evaluation of the overall performance are 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)



INSTRUCTIONS & RESULTS FORM

PROGRAM:	Rockwell hardness test - HRC	
CODE:	SQ-0026	
VERSION:	-	
STANDARD:	ISO 6508-1	
COORDINATOR:	Eng. Alfredo Schmidt (aschmidt@ptsouthquality.com)	

1 - General

This document serves as a guide for managing the results of the **SQ-0026** program.

Results must be typed, not handwritten.

2 - Standard

ISO 6508-1: 2023

3 - Tests involved

TEST
Determination of Rockwell hardness number

4 - Samples

CODE	SAMPLE	QUANTITY
LM4850-10	Medium carbon steel - D31.7x20 mm	1
LM4905-20	Stainless steel - 50x50x2.8 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 by the participant, if desired, to include data or observations.
- c) The samples are to be handled as routine lab samples, with all testing, documentation, and reporting adhering to **ISO 6508-1: 2023**.
- d) The surfaces where the indentations must be carried out are as follows:
 - i. **LM4850**: On the side above the identification mark.
 - ii. **LM4905**: On the side of the sample bearing the identification mark.
- e) Samples must be retained until the end of the program, which concludes with the submission of the final report.
- f) To review the results, test images would be appreciated. Images can be attached at the end of this document or sent by email.
- g) Once this document is completed, it must be converted into a PDF file and sent to the program coordinator.

6 - Test results

Test date:	21/05/2026	Temperature:	21
Equipment:	Indentec Rockwell Hardness Tester (S/N: 961662)	Date calibration:	23/06/2026
Resolution:	0.1	Resolution uncertainty:	0.029

SAMPLE	MEASUREMENT No	RESULT HRC
LM4850-10	1	39.5
	2	41.7
	3	39.7
	4	41.6
	5	40.4
	AVG	40.6
	Expanded uncertainty (U), K=2	1.9

OBSERVATIONS
Sample LM4850-10 is not completely flat - this could be a contributing factor to variation.

Test date:	21/05/2026	Temperature:	21
Equipment:	Indentec Rockwell Hardness Tester (S/N: 961662)	Date calibration:	23/06/2026
Resolution:	0.1	Resolution uncertainty:	0.029

SAMPLE	MEASUREMENT No	RESULT HRC
LM4905-20	1	55.7
	2	56.6
	3	55.0
	4	56.1
	5	55.5
	AVG	55.8
	Expanded uncertainty (U), K=2	1.9

OBSERVATIONS

PHOTOGRAPHS



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