SOUTH QUALITY

PROFICIENCY TESTING PROVIDER

REPORT No 11412

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Status: FINAL REPORT

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ISO 868

DETERMINATION OF INDENTATION HARDNESS BY MEANS OF A DUROMETER (SHORE HARDNESS)

Program: SQ-0538.V2

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1. FOREWORD

This report summarizes the results of the **SQ-0538.V2** proficiency testing program on the determination of indentation hardness by means of a durometer (Shore hardness). 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 September 2025 with the aim of assessing the laboratory's ability to competently perform the designated tests.

2. ORGANIZATION

Program Coordinator:	Lic. Esther Casas
Assistant Technician:	Berenice Ferrel
Statistic:	Lic. Manuel Tozaki
Supervision:	Eng. Emiliano Medina

3. OBJECTIVE

The objective of this proficiency testing program is determination of the indentation hardness of plastics and ebonite, using the following standard:

Standard
ISO 868: 2003

To verify this, batches of plastic sheets have been selected.

Participants in this program have not been previously informed about the expected behavior of the samples they receive.

4. PARTICIPANT

Company:	**TENARIS CONFAB**
Laboratory	**Coating Laboratory**
Country:	Brazil
Client ID:	C083
Contact person:	Wanilson da Silva QUALIDADE wanilsonrosa@tenaris.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 samples** Tested samples from each batch: **10 samples**

DETERMINATION	HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES		
	BATCH: LP1801	BATCH: LP1802	BATCH: LP1803
INDENTATION HARDNESS (Shore D)	YES	NO	YES

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

DETERMINATION	HOMOGENEITY OF RESULTS IN THE ANALYZED SAMPLES		
	BATCH: LP2095	BATCH: LP2096	BATCH: LP2097
INDENTATION HARDNESS (Shore D)	YES	YES	YES

Samples for this program are taken from the selected batches identified as **LP1801** and **LP2096**.

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

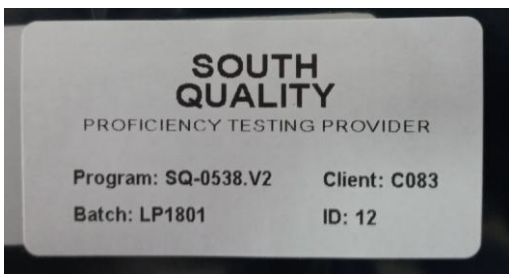
The following samples were sent to be tested:

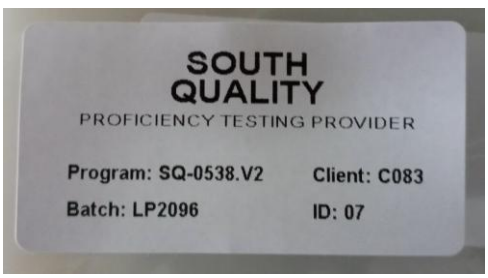
Batch:	LP1801
Sample ID:	12
Characteristics:	Black plastic sheet - 100 x 100 x 4.5 mm

Batch:	LP2096
Sample ID:	07
Characteristics:	White plastic sheet - 100 x 100 x 15 mm

7. IMAGES

SAMPLES





8. ASSIGNED VALUES

BATCH	INDENTATION HARDNESS	
	SHORE D - AVG	SD
LP1801	77.1	0.42
LP2096	75.2	0.45

9. PARTICIPANT RESULTS (SEE APPENDIX B)

CODE	INDENTATION HARDNESS SHORE D - AVG
LP1801-12	76.4
LP2096-07	75.6

10. STATISTICS

The results must be treated as quantitative.

According B.3.1.3 of ISO 17043 the appropriate technique is to compare participant results with the assigned values. The results can be compare using 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

BATCH	INDENTATION HARDNESS SHORE D - AVG		| z score |	PERFORMANCE RESULT
	PARTICIPANT RESULT	ASSIGNED VALUE		
LP1801	76.4	77.1	**1.67**	**SATISFACTORY**
LP2096	75.6	75.2	**0.89**	**SATISFACTORY**

12. CONCLUSIONS

The overall performance on this **SQ-0538.V2** program from the participant laboratory **TENARIS CONFAB - Coating 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 and one questionable result were obtained.
- **INSUFFICIENT** performance: An unsatisfactory result was obtained or two questionable results were obtained.

APPENDIX A

PARTICIPANT RESULTS

(Results form)

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INSTRUCTIONS

PROGRAM:	Determination of indentation hardness by means of a durometer (Shore hardness)
CODE:	SQ-0538
VERSION:	2
STANDARD:	ISO 868
COORDINATOR:	Lic. Esther Casas (ecasas@ptsouthquality.com)

1 - General

This document is a guide for managing the results of the **SQ-0538.V2** program.

2 - Standard

ISO 868: 2003

3 - Tests involved

TEST
Determination of the indentation hardness of plastics

4 - Samples

CODE	SAMPLE	QUANTITY
LP1801-12	Black plastic sheet - 100 x 100 x 4.5 mm	1
LP2096-07	White plastic sheet - 100 x 100 x 15 mm	1

5 - Notes

a) Being a bilateral program there is no deadline to accomplish sending results.
b) Participants must submit the results in the usual report used by their laboratory.
c) In the samples, the indentations must be made on the side opposite to the ID location.
d) The samples must be kept until the end of the program, which closes with the submission of the final report.
e) To review the results, sending images of the tests will be appreciated. Images can be attached to the end of this document or inserted into your regular report.

PHOTOGRAPHS

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APPENDIX B

PARTICIPANT RESULTS (TEST REPORT)

HARDNESS SHORE D / REVESTIMENTO: DUREZA SHORE D								
PIPE TUBO	ORDER DATE DATA DO PEDIDO	COATING REVESTIMENTO	PE/PP BATCH LOTE DO PE/PP	SHORE D 1	SHORE D 2	SHORE D 3	SHORE D 4	SHORE D 5
LP1801-12	01/09/2025			76	76	77	77	76
LP2096-07	01/09/2025			76	76	76	75	75
FBE = FUSION BONDED EPOXY 3LPP =THREE LAYER POLYPROPYLENE 3LPE =THREE LAYER POLYETHYLENE								

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