INTER LABORATORY TESTING SCHEME

ON

"Testing of Chemical parameters in Textile Material"

TC/ILTS/025/CHEM/2019-20

Conducted by

Proficiency Testing Provider Laboratories

TEXTILES COMMITTEE

(Ministry of Textiles, Government of India)

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2019-2020

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SCHEME : INTER LABORATORY TESTING SCHEME -**TC/ILTS/25/CHEM/2019-20-**Testing of Chemical parameters in Textile Materials

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CONFIDENTIALITY :

All the information furnished by the participants shall be kept confidential by the PT Provider and the same shall not be revealed to others. However, if the accrediting body, for example NABL, requests the PT provider to furnish the performance of any of the participants, the same shall be provided to them directly, after obtaining permission of the concerned participant

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Disclaimer: The PT Programmes are meant for evaluation of performance of the participants for the specified tests undertaken in the programme only and are voluntary in nature. Further, it is clarified that reasonable care has been taken to meet the requirement of ISO/IEC 17043, while designing and conducting the programmes. Participants are expected to exercise due diligence while carrying out the tests and meet all safety, statutory and accreditation body's requirements. PT Provider and Textiles Committee will not be responsible for any claim/damages arising out of participating in this programme.

I N D E X

Report on Inter Laboratory Testing Scheme
(TC/ILTS/25/CHEM/2019-20)

➢ Preamble:

Increasing awareness on textile quality and the buyer requirements are forcing textile manufacturers and traders to test textile products from reputed laboratories. Reputation of any laboratory depends upon the result it produces. The test report given by the laboratory should be precise, accurate, repeatable and reproducible. This means, a set of results obtained within a laboratory by testing a representative sample at any time interval should be comparable. And also, the result obtained over testing a representative sample in any laboratory should compare with that of other laboratory and fall within the statistical tolerance limit. In other words, the laboratory should be able to generate comparable results by performing the same test.

The repeatability and reproducibility of any test result involves the laboratory's competence in doing an assigned task/testing including the testing equipment, the skill and knowledge of technical manpower working in the laboratory, the testing conditions and test method adopted. In this pursuit, the laboratory has to meet a requirement of maintaining its own management system as per ISO/IEC 17025 as also, participate in Inter Laboratory Comparison (ILC) and/or Inter Laboratory Proficiency Testing Scheme (ILPT).

Inter laboratory Comparison is defined as' *"Organization, performance and evaluation of tests on the same or similar test items by two or more laboratories in accordance with predetermined conditions."* The goal of the Inter-laboratory Comparisons (ILC) is to provide verification of each participating laboratory's technical capability by obtaining a measurement that agrees with all other Laboratories using different make & model of testing equipment and man-power. The requirement for inter laboratory comparisons remains in place today, and has been further entrenched into metrology management systems by its incorporation in the requirements of IS0/IEC 17025.

➢ Textiles Committee:

Textiles Committee is a statutory organization under the Ministry of Textiles, Government of India, established in the year 1963. The Committee has set up 19 laboratories throughout the country for catering to the testing requirements of the textile trade and industry in different centers. Fourteen laboratories of Textiles Committee are accredited as per ISO/IEC 17025 by National Accreditation Board for testing & calibration Laboratories (NABL), India.

➢ PT-Provider:

The Laboratory, Textiles Committee at Mumbai participates in Inter Laboratory Proficiency Testing (ILPT) schemes conducted by different professional bodies like American Standard for Testing and Materials (ASTM), USA, Institute for Inter laboratory Studies (IIS), The Netherlands and NABL, India, from time to time. Apart from this, Textiles committee also conducts Inter Laboratory Comparisons (ILC) schemes by including its own laboratories and inviting other laboratories. In order to offer ILPT schemes professionally as a PT Provider, the laboratory of Textiles Committee at Mumbai has implemented the Management System in accordance with the requirements stipulated in ILAC G13 and ISO/IEC 17043. The PT Provider has conducted 25 schemes since 2007. The details are given in Table – 1.

Table – 1 ILPT schemes conducted by the PT Provider

S. No	Identity of the ILPT	Year	Field	PT items	No. of test parameters	No. of Labs participated
1	TC/ILTS/MECH/01/07	2007	Mechanical	Fibre, Yarn & Fabric	17	70
2	TC/ILTS/CHEM/02/07	2007	Chemical	Fabric	13	70
3	TC/ILTS/MECH/03/08	2008	Mechanical	Fabric	11	60
4	TC/ILTS/CHEM/04/08	2008	Chemical	Fabric	10	60
5	TC/ILTS/MECH/05/09	2009	Mechanical	Fabric	11	50
6	TC/ILTS/MECH/06/09	2009	Mechanical	Yarn	12	31
7	TC/ILTS/MECH/07/09	2009	Mechanical	Fibre	15	14
8	TC/ILTS/CHEM/08/09	2009	Chemical	Fabric	7	51
9	TC/ILTS/CHEM/09/09	2009	Chemical	Fabric	4	45
10	TC/ILTS/CHEM/10/09	2009	Chemical	Fabric	2	20
11	TC/ILTS/MECH/11/10-11	2010-11	Mechanical	Fabric	10	65
12	TC/ILTS/CHEM/12/10-11	2010-11	Chemical	Fabric	10	70
13	TC/ILTS/MECH-13/2012-13	2012-13	Mechanical	Yarn and Fabric	13	42
14	TC/ILTS/Chem -14/2012-13	2012-13	Chemical	Fabric & Metal clothing accessories	12	56
15	TC/ILTS/15/MECH-2/2014	2014	Mechanical	Fabric	8	50
16	TC/ILTS/16/CHEM-2/2014	2014	Chemical	Fabric	8	45
17	TC/ILTS/17MECH-3/2015	2015	Mechanical	Fabric	8	24
18	TC/ILTS/18/CHEM -3/2015	2015	Chemical	Fabric	9	51
19	TC/ILTS/19/CHEM -3/2015	2015	Chemical	Fabric	2	30
20	TC/ILTS/20/MECH/2017-18	2017-18	Mechanical	Fabric	7	35
21	TC/ILTS/21/CHEM/2017-18	2017-18	Chemical	Fabric	8	29
22	TC/ILTS/22/MECH/2017-18	2017-18	Mechanical	Fabric	7	28
23	TC/ILTS/23/CHEM/2017-18	2017-18	Chemical	Fabric	8	36
24	TC/ILTS/24/MECH/2019-20	2019-20	Mechanical	Yarn and Fabric	6	17
25	TC/ILTS/25/CHEM/2019-20	2019-20	Chemical	Fabric	7	29

- **The Present Program:**

Design: In order to assess the re- producibility of the test results being reported by the various textile testing laboratories, a Proficiency Testing Scheme for Chemical testing - **TC/ILTS/025/CHEM//2019-20** was designed. The test parameters thus covered in the present PT Scheme are given in Table – 2.

Table – 2 : Tests covered in TC/ILTS/25/CHEM/2019-20

S.No.	Test parameter	Standards suggested
1	Colour fastness to organic solvents	IS 688 or equivalent
2	Colour fastness to Light (Xenon Arc Lamp)	ISO 105 B02 or equivalent
3	Colour fastness to washing with soap or soap and soda	IS/ISO 105 C10 or equivalent
4	Amount of Free & Hydrolyzed Formaldehyde extracted	ISO 14184-1 or equivalent
5	Detection and quantification of banned azo colourants in coloured textiles	IS 15570 or equivalent
6	Method for determining the water repellency of fabrics by cone test	IS: 7941 or equivalent
7	Determination of Dimensional Changes on soaking in water	IS 665 or equivalent

While designing the Scheme the following objectives were considered.

(1) Each accredited participant laboratory should get benefit so that at least one parameter may be covered under the lab's scope of accreditation.

(2) Both geometry and performance verifying parameters to be included.

(3) Both trade and industry oriented parameters to be included.

(4) Test methods of ISO, AATCC, Indian Standards and Validated method may be covered.

To satisfy the above objectives (1) Scope of accreditation of about 50 laboratories were consulted. (2) To enable the participant laboratories in *evaluation of the performance for specific tests or measurements and monitoring laboratories' continuing performance* (Ref: ISO/IEC 17043), (3) To satisfy Trade and industry requirements, performance parameters viz., Colour fastness to Light (Xenon Arc Lamp), Colour fastness to washing with soap or soap and soda, Determining the water repellency of fabrics by cone test, Determination of Dimensional Changes on soaking in water and eco parameter like amount of Free & Hydrolyzed Formaldehyde extracted and Detection & quantification of banned azo colourants in coloured textiles were included.

- **Participants:**

In all 29 laboratories was participated in this scheme. Laboratories accredited by National Accreditation Board for testing and calibration Laboratories (NABL), India were participated in this scheme.

- **Proficiency Test Proceedings:**

The laboratory of Textiles Committee (PT Provider), Mumbai, procured sufficient quantity of fabric (PT item) from a reputed textiles mill for designing and conducting Inter Laboratory Testing Scheme, on the basis of expected number of participants.

Population of PT items: On receipt of the procured materials, PT items meant for (i) homogeneity testing, (ii) stability testing, (iii) distribution among the participant laboratories, (iv) additional reserve samples for replacement in case of loss or damage, were prepared. While preparing the PT items for the above, it was ensured that the quantity of each PT item is adequate for the testing of all the parameters included in the scheme. The PT items thus prepared from the material procured were numbered serially. The prepared PT items were packed in polyethylene bags and labeled bearing the PT item identity such that the same are ready for dispatch. Thus a finite population of PT item was produced.

Sampling of PT items: Allotments of PT items were done by following appropriate Sampling procedures adopted by using Random Numbers generated by using computer. In order to evaluate the confidentiality of samples among the participants, three different set of samples were dispatched for the same parameter (Formaldehyde extracted) and conducted performance evolution accordingly.

Sampling procedure for Homogeneity testing, Stability testing and for distribution among participant laboratories are provided in Table – 3:

Table – 3: Sampling procedure adopted for different purpose

1	**Homogeneity testing**,	Systematic random sampling without replacement
2	**Stability Testing**	Systematic random sampling without replacement from the remaining population after homogeneity testing
3	**Distribution to participant laboratories**	Simple random sampling without replacement from the remaining population after homogeneity and stability testing.

The remaining part of the population was kept as reserve for replacement in case of loss or damage. Henceforth, the allotted PT items can be referred as sample.

Homogeneity testing: To verify the homogeneity of the population of PT items homogeneity testing was conducted at the laboratory of Textiles Committee at Mumbai for all the test parameters covered in the scheme by adopting one of the suggested methods. However, while conducting performance evaluation of the participants, the “between- samples SD” calculated during homogeneity testing by a particular method was used for calculating “SD of PT assessment” for different methods adopted by the participants, as the inherent variation in the sample (degree of non homogeneity) is independent of the test method adopted. The procedure given in ISO 13528 was followed for conducting homogeneity testing.

The homogeneity of population was found to be satisfactory based on analysis of variance conducted on the test results obtained in homogeneity testing.

Stability testing: In order to verify the stability of the PT items, stability testing was conducted in accordance with ISO 13528, after the lapse of a week from the last date of conducting homogeneity testing. The stability was confirmed by testing the hypothesis that the difference between the average values obtained for each of the test parameters during homogeneity testing and stability testing were insignificant.

Dispatch of PT items: Given the challenging situation of the COVID 19 pandemic, we followed as per the Guideline of Competent authority, the Team of Proficiency cell has taken all possible measures and accordingly work from home and rejoining the office after the lock-down period, we have fabricated the ILPT samples freshly and test homogeneity test accordingly. To avoid the further delay the Proficiency Testing items were dispatched to the respective participant laboratories in three different lots, on 20th August 2020, 24th November 2020 and 16th December 2020 respectively, along with the following:

(a) Instructions to the participants in the Inter Laboratory Testing Scheme
(b) Form for reporting test results by the participants in the Inter Laboratory Testing Scheme

The participant laboratories were requested to send the test results lot-1 by 11h November 2020, lot-2 by 14-December 2020 and lot-3 by 23rd December 2020.

The participant laboratories were also requested to

- Treat the samples in the same manner as regularly tested samples and accordingly, codify the samples such that the technical staff testing them are not aware that they are meant for PT purposes;
- Adopt the latest test method which is routinely used by the laboratory for the testing of regular samples which may be any standard or validated in-house method;
- Forward (i) copy of the in-house method adopted (if applicable) for testing any parameter and also (ii) specify the standard method against which the validation has been done; and,
- Forward photo copy of NABL accreditation certificate as a proof of accreditation for the test method adopted (applicable to accredited laboratories only).

Table-4 : Estimates of population parameters

S.No	Test	Parameter	Estimation		
1	Amount of Free & Hydrolyzed Formaldehyde extracted ISO 14184-1 or equivalent Batch-1	Population mean (μ) =	507.40		
		Population SD (σ) =	33.5		
		95% confidential limits for Population mean =	478.04	≤ μ ≤	536.76
2	Amount of Free & Hydrolyzed Formaldehyde extracted ISO 14184-1 or equivalent Batch-2	Population mean (μ) =	858.30		
		Population SD (σ) =	31.8		
		95% confidential limits for Population mean =	841.25	≤ μ ≤	875.35
3	Amount of Free & Hydrolyzed Formaldehyde extracted ISO 14184-1 or equivalent Batch-3	Population mean (μ) =	2045.4		
		Population SD (σ) =	39.4		
		95% confidential limits for Population mean =	1963.44	≤ μ ≤	2127.36
		Population SD (σ) =	13.97		
		95% confidential limits for Population mean =	728.69	≤ μ ≤	743.32
4	Detection and quantification of banned azo colourants in coloured textiles IS 15570 or equivalent Quantity of individual amine released in (mg/kg)	Population mean (μ) =	69.3		
		Population SD (σ) =	32.16		
		95% confidential limits for Population mean =	53.54	≤ μ ≤	85.06
5	Method for determining the water repellency of fabrics by cone test	Population mean (μ) =	381.38		
		Population SD (σ) =	10.78		
		95% confidential limits for Population mean =	373.90	≤ μ ≤	388.85
6	Determination of Dimensional Changes on soaking in water- Warp direction	Population mean (μ) =	-1.57		
		Population SD (σ) =	0.254		
		95% confidential limits for Population mean =	-1.68	≤ μ ≤	-1.45
	Determination of Dimensional Changes on soaking in water- Weft direction	Population mean (μ) =	0.41		
		Population SD (σ) =	0.175		
		95% confidential limits for Population mean =	0.32	≤ μ ≤	0.49

The participant laboratories were informed that, in the absence of proof of accreditation, the laboratory's value will not be considered for arriving at "Assigned Value" for the concerned test parameter, although, performance of the laboratory will be evaluated for this parameter. Further, it was also informed that the test results that may be inappropriate for statistical evaluation, for

example, gross errors, miscalculations and transpositions may be excluded for calculation of summary statistics and performance evaluation of participants.

- **Compilation of the Test Results:**

In order to maintain the confidentiality of the participants of the PT Scheme, the individual participant laboratories were given Code numbers which are generated by using computer. Subsequently, the test results reported by the participant laboratories were tabulated and statistically analyzed for the basic statistics viz., Mean, Median, Mode, Maximum, Minimum, Standard Deviation, etc., While doing so, test results inappropriate for statistical evaluation like gross errors, miscalculations and transpositions were examined.

- **Determination Assigned Value:**

To ensure the measurement traceability, only **accredited laboratories** are considered for evaluating the Assigned Values. Thus due weightage is given to the accredited laboratories. However, this weightage is given only when the laboratory has submitted their Scope of accreditation and accredited for the specific test in which the ILPT is conducted.

As in present Proficiency Testing Scheme for Chemical testing i.e. **TC/ILTS/025/CHEM/2019-20** for Ordinal/Subjective test parameters, mode of the values reported by accredited participant laboratories for that test is considered as Assigned Value. The deviation of laboratory result by more than ½ grade compared to Assigned Value is taken as unsatisfactory (outliers) and all other results are taken as satisfactory.

The Assigned Value of both the parameters thus arrived are given in **Table–5**.

Table 5: Assigned Values

S.No.	Test	Assigned Value	Robust SD of Assigned Value	Uncertainty of Assigned Value	No. of Accredited Laboratories contributed	Total number of participants
1	Colour fastness to organic solvents IS 688 or equivalent		N.A.	1/2 grading	09	17
	Change in Color	1				
	Staining on Acetate/Cotton/Polyamide Polyester/Acrylic/Wool	4-5/4-5/4-5/ 4-5/4-5/4-5				
2	Colour fastness to Light (Xenon Arc Lamp) ISO 105 B02 or equivalent		N.A.	1/2 grading	13	14
	Numerical Light fastness rating	1				
3	Colour fastness to washing with soap IS/ISO 105 C10 or equivalent		N.A.	1/2 grading	19	21
	a) Change in Color	3-4				
	b) Staining on Acetate/Cotton/Polyamide Polyester/Acrylic/Wool	4/1-2/3/4-5/3-4/4-5				

S.No.	Test	Assigned Value	Robust SD of Assigned Value	Uncertainty of Assigned Value	No. of Accredited Laboratories contributed	Total number of participants
4	Amount of Free & Hydrolyzed Formaldehyde extracted ISO 14184-1 or equivalent					
	Whether Detectable/Not detectable	Detectable	-	-	15	16
	Amount of Free & Hydrolyzed Formaldehyde extracted ISO 14184-1 or equivalent- **Lot-1**					
	Amount of formaldehyde extracted from the specimen in (mg/kg)	498.2	33.5	19.8	5	5
	Amount of Free & Hydrolyzed Formaldehyde extracted ISO 14184-1 or equivalent- **Lot-2**					
	Amount of formaldehyde extracted from the specimen in (mg/kg)	905.2	12.3	4.04	6	6
	Amount of Free & Hydrolyzed Formaldehyde extracted ISO 14184-1 or equivalent - **Lot-3**					
	Amount of formaldehyde extracted from the specimen in (mg/kg)	2009.3	57.7	27.9	4	5
5	Detection and quantification of banned azo colourants in coloured textiles IS 15570 or equivalent					
	Whether Positive/ Negative	Positive	N.A	N.A	5	19
	Detection and quantification of banned azo colourants in coloured textiles IS 15570 or equivalent					
	Quantity of individual amine released in (mg/kg)	89.2	5.62	4.09	5	16
6	Method for determining the water repellency of fabrics by cone test. IS: 7941 or equivalent	384.74	5.34	2.52	5	8
7	Determination of Dimensional Changes on soaking in water IS 665 or equivalent					
	Warp direction	-1.51	0.22	0.09	7	18
	Weft direction	0.28	0.15	0.06	7	18

- **Performance Evaluation of Participants:**

The performance of the individual laboratory was evaluated by adopting Robust Z score technique given in ISO 13528, For Subjective test the deviation of laboratory result by more than ½ grade compared to Assigned Value is taken as unsatisfactory (and outliers) and all other results are taken as satisfactory.

Table – 6: Interpretation of Performance comment

Range	Performance of Laboratory
Subjective Test	
$\lvert$ Reported Value – Assigned Value $\rvert \leq$ ½ grade	**Satisfactory**
$\lvert$ Reported Value - Assigned Value $\rvert >$ ½ grade	**Outlier**

Overall performance of all the laboratories is good. The Outlier analysis and Parameter-wise outliers are given in Table– 7 and Table – 8 respectively.

Table – 7: Outlier Analysis

S. No	Test	No. of Labs Participated	Valid Results	No. of Outliers	% of Outliers	No. of Stragglers	% of Stragglers
1	**Colour fastness to organic solvents IS 688 or equivalent**						
	Change in Color	17	17	0	0	N.A.	N.A.
	Staining on Acetate			0	0	N.A.	N.A.
	Staining on Cotton			0	0	N.A.	N.A.
	Staining on Nylon			0	0	N.A.	N.A.
	Staining on Polyester			0	0	N.A.	N.A.
	Staining on Acrylic			0	0	N.A.	N.A.
	Staining on Wool			0	0	N.A.	N.A.
2	**Colour fastness to Light (Xenon Arc Lamp) ISO 105 B02 or equivalent**						
	Numerical Light fastness rating	14	14	4	28.6	N.A.	N.A.
3	**Colour fastness to washing with soap IS/ISO 105 C10 or equivalent**						
	Change in Color	21	21	1	4.8	N.A.	N.A.
	Staining on Acetate			0	0	N.A.	N.A.
	Staining on Cotton			0	0	N.A.	N.A.
	Staining on Nylon			0	0	N.A.	N.A.
	Staining on Polyester			0	0	N.A.	N.A.
	Staining on Acrylic			0	0	N.A.	N.A.
	Staining on Wool			1	4.8	N.A.	N.A.
4	**Amount of Free & Hydrolyzed Formaldehyde extracted** ISO 14184-1 or equivalent						
	Whether Detectable/Not detectable	16	16	0	0	N.A.	N.A.
	Amount of Free & Hydrolyzed Formaldehyde extracted ISO 14184-1 or equivalent						
	Lot-1	5	5	0	0	1	20.0
	Lot-2	6	6	2	33.3	0	0
	Lot-3	5	5	0	0	1	20.0
5	**Detection and quantification of banned azo colourants in coloured textiles IS 15570 or equivalent**						
	Whether Positive/ Negative	19	19	1	5.3	N.A.	N.A.
	Detection and quantification of banned azo colourants in coloured textiles IS 15570 or equivalent						
		16	16	9	56.2	0	0
6	**Method for determining the water repellency of fabrics by cone test. IS: 7941 or equivalent**						
		8	8	1	12.5	1	12.5
7	**Determination of Dimensional Changes on soaking in water IS 665 or equivalent**						
	Warp direction	18	18	1	5.6	1	5.6
	Weft direction	18	18	3	16.7	4	22.2

Table – 8: List of Outliers

S. No	Test	No. of Outliers	Outlier Lab codes	No. of Stragglers	Stragglers Lab codes
1	**Colour fastness to organic solvents IS 688 or equivalent**				
	Change in Color	0	N.A.	N.A.	N.A.
	Staining on Acetate	0	N.A.	N.A.	N.A.
	Staining on Cotton	0	N.A.	N.A.	N.A.
	Staining on Nylon	0	N.A.	N.A.	N.A.
	Staining on Polyester	0	N.A.	N.A.	N.A.
	Staining on Acrylic	0	N.A.	N.A.	N.A.
	Staining on Wool	0	N.A.	N.A.	N.A.
2	**Colour fastness to Light (Xenon Arc Lamp) ISO 105 B02 or equivalent**				
	Numerical Light fastness rating	4	C-10, C-11, C-12,C-21	N.A.	N.A.
3	**Colour fastness to washing with soap IS/ISO 105 C10 or equivalent**				
	Change in Color	1	C-19	N.A.	N.A.
	Staining on Acetate	0	N.A.	N.A.	N.A.
	Staining on Cotton	0	N.A.	N.A.	N.A.
	Staining on Nylon	0	N.A.	N.A.	N.A.
	Staining on Polyester	0	N.A.	N.A.	N.A.
	Staining on Acrylic	0	N.A.	N.A.	N.A.
	Staining on Wool	1	C-19	N.A.	N.A.
4	**Amount of Free & Hydrolyzed Formaldehyde extracted ISO 14184-1 or equivalent**				
	Whether Detectable/ Not detectable	0	N.A.	N.A.	N.A.
	Amount of Free & Hydrolyzed Formaldehyde extracted ISO 14184-1 or equivalent				
	Lot-1	0	N.A.	1	C-39
	Lot-2	2	C-15, C-21	0	N.A.
	Lot-3	0	N.A.	1	C-17
5	**Detection and quantification of banned azo colourants in coloured textiles IS 15570 or equivalent**				
	Whether Positive/ Negative	1	C-33	N.A.	N.A.
	Detection and quantification of banned azo colourants in coloured textiles IS 15570 or equivalent				
		9	C-20,C-21,C-22, C-23,C-26,C-27, C-33,C-34,C-39	0	N.A.
6	**Method for determining the water repellency of fabrics by cone test. IS: 7941 or equivalent**				
		1	C-15	1	C-14
7	**Determination of Dimensional Changes on soaking in water IS 665 or equivalent**				
	Warp direction	1	C-28	1	C-11
	Weft direction	3	C-11,C-21,C-28	4	C-13, C-14, C-19, C-39

- **General Advise to the Laboratories on the performance:**

If the laboratory is found to be **"Outlier",** necessary corrective action should be taken after thorough investigation of the root cause of the problem.

Annexure

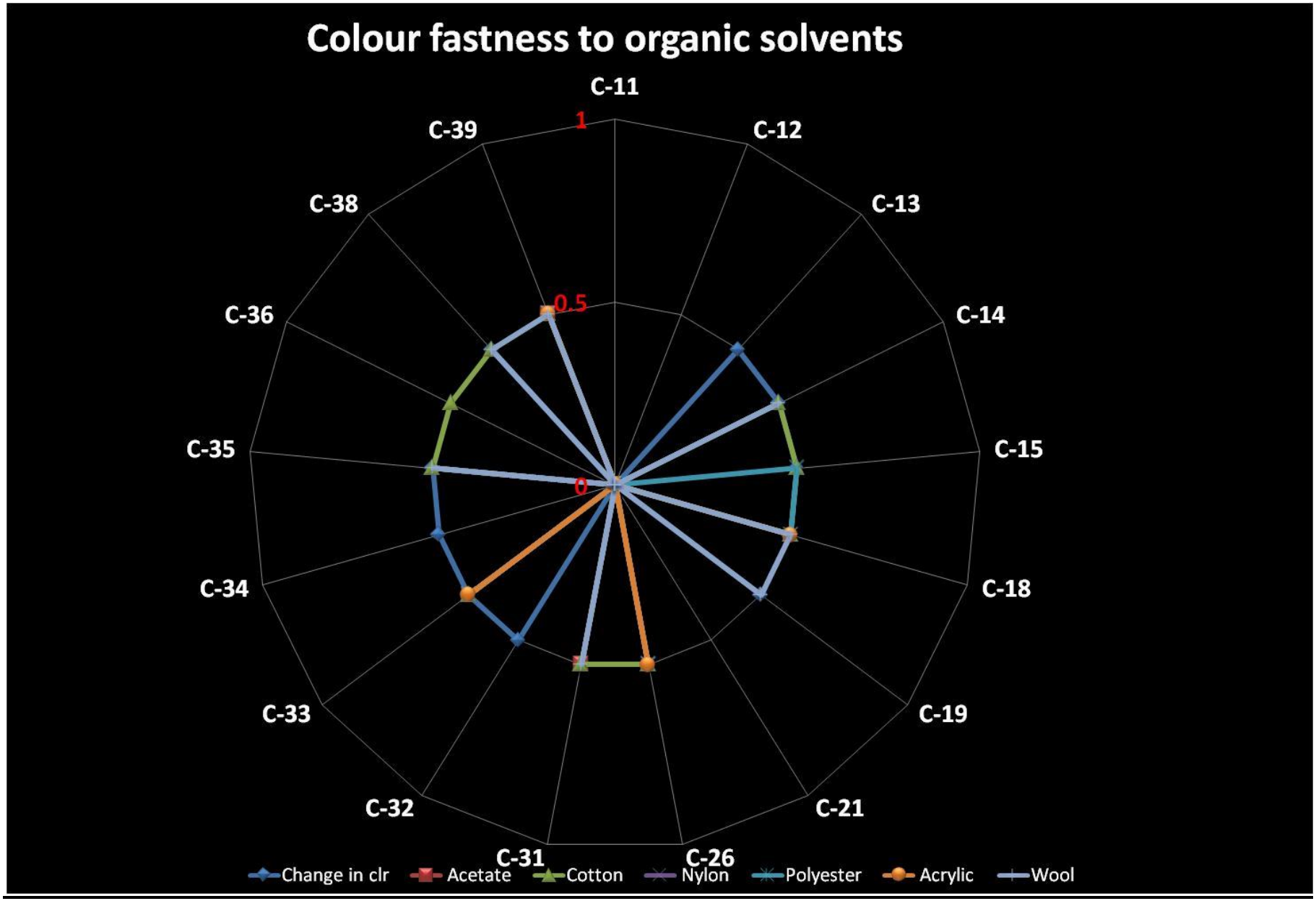
PERFORMANCE EVALUATION OF EACH LABORATORY- TEST WISE

1. Colour fastness to organic solvents

		Change in Color		Acetate		Cotton		Nylon		Polyester		Acrylic		Wool	
Assigned Value		1		4-5		4-5		4-5		4-5		4-5		4-5	
Lab No	Test method	Reported Value	Reported Value – Assigned Value	Reported Value	Reported Value – Assigned Value	Reported Value	Reported Value – Assigned Value	Reported Value	Reported Value – Assigned Value	Reported Value	Reported Value – Assigned Value	Reported Value	Reported Value – Assigned Value	Reported Value	Reported Value – Assigned Value
C-11	IS:688	1	0	4-5	0	4-5	0	4-5	0	4-5	0	4-5	0	4-5	0
C-12	IS:688	1	0	4-5	0	4-5	0	4-5	0	4-5	0	4-5	0	4-5	0
C-13	IS:688	1-2	0.5	4-5	0	4-5	0	4-5	0	4-5	0	4-5	0	4-5	0
C-14	IS:688	1-2	0.5	4-5	0	4	0.5	4-5	0	4-5	0	4-5	0	4	0.5
C-15	IS:688	1-2	0.5	4-5	0	4	0.5	4-5	0	4	0.5	4-5	0	4-5	0
C-18	IS:688	1-2	0.5	4-5	0	5	0.5	4-5	0	5	0.5	5	0.5	5	0.5
C-19	IS:688	1-2	0.5	4-5	0	4-5	0	4-5	0	4-5	0	4-5	0	4	0.5
C-21	IS:688	1	0	4-5	0	4-5	0	4-5	0	4-5	0	4-5	0	4-5	0
C-26	IS:688	1	0	4-5	0	4	0.5	4	0.5	4	0.5	4	0.5	4-5	0
C-31	IS:688	1	0	4	0.5	4	0.5	4-5	0	4-5	0	4-5	0	4	0.5
C-32	IS:688	1-2	0.5	4-5	0	4-5	0	4-5	0	4-5	0	4-5	0	4-5	0
C-33	IS:688	1-2	0.5	4-5	0	4	0.5	4	0.5	4	0.5	4	0.5	4-5	0
C-34	IS:688	1-2	0.5	4-5	0	4-5	0	4-5	0	4-5	0	4-5	0	4-5	0
C-35	IS:688	1-2	0.5	4-5	0	4	0.5	4-5	0	4-5	0	4-5	0	4	0.5
C-36	IS:688	1	0	4-5	0	4	0.5	4-5	0	4-5	0	4-5	0	4-5	0
C-38	IS:688	1-2	0.5	4-5	0	4	0.5	4-5	0	4-5	0	4-5	0	4	0.5
C-39	IS:688	1	0	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5	4	0.5
participant		17		17		17		17		17		17		17	
max		1-2		4-5		5		4-5		5		5		5	
min		1		4		4		4		4		4		4	

Subjective Test	
| Reported Value – Assigned Value | ≤ ½ grade	Satisfactory
| Reported Value - Assigned Value | > ½ grade	**Outlier**

Frequency distribution							
Grade	Change in Color	Staining on adjacent fabric					
		Acetate	Cotton	Nylon	Polyester	Acrylic	Wool
1	7	0	0	0	0	0	0
1-2	10	0	0	0	0	0	0
2	0	0	0	0	0	0	0
2-3	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
3-4	0	0	0	0	0	0	0
4	0	2	9	3	4	3	6
4-5	0	15	7	14	12	13	10
5	0	0	1	0	1	1	1
participants	17	17	17	17	17	17	17

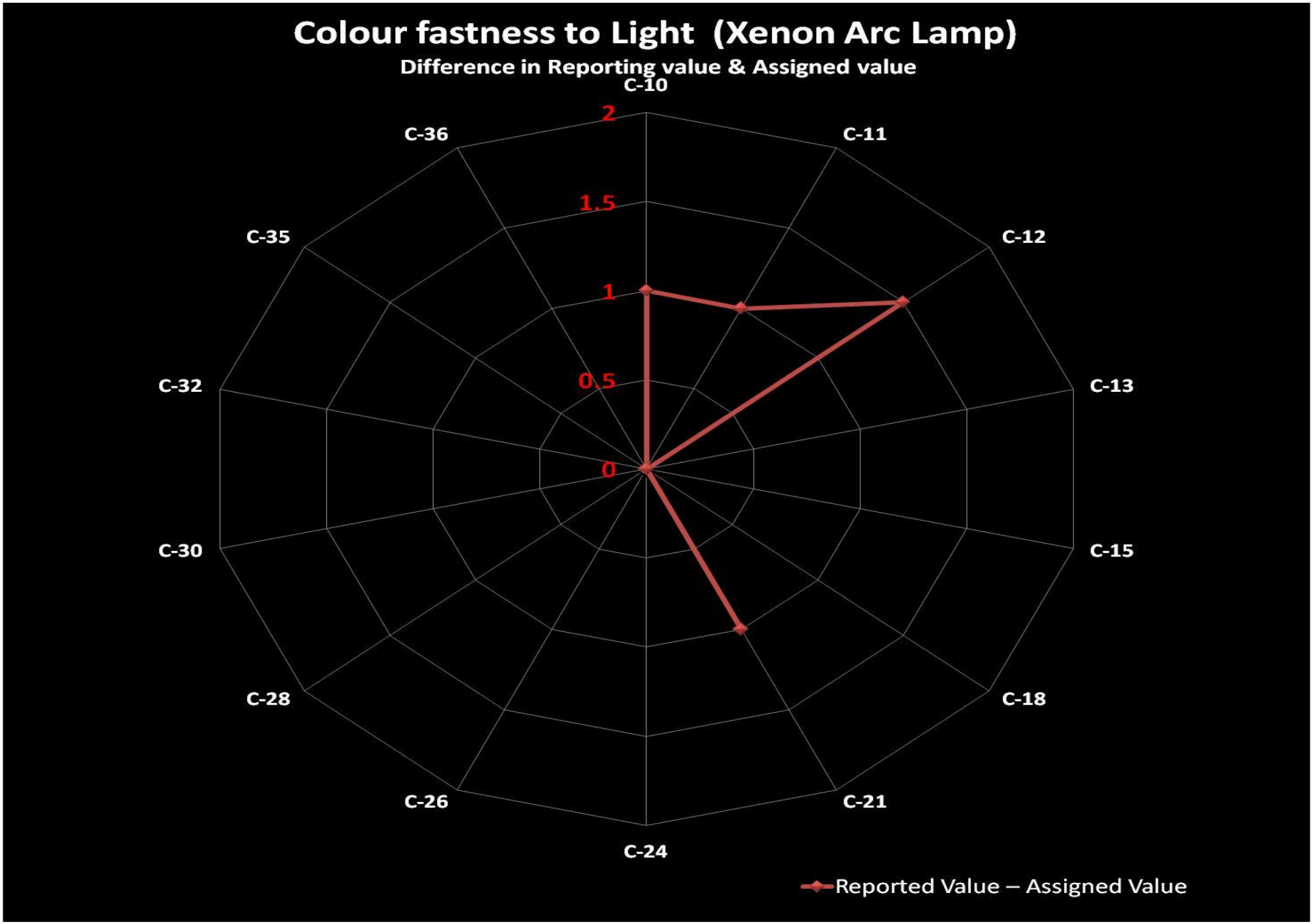

Colour fastness to organic solvents
C-11
C-12
C-13
C-14
C-15
C-18
C-19
C-21
C-26
C-31
C-32
C-33
C-34
C-35
C-36
C-38
C-39
1
0.5
0
Change in clr
Acetate
Cotton
Nylon
Polyester
Acrylic
Wool

2. Colour fastness to Light (Xenon Arc Lamp)

Assigned Value 1

Lab No	Test Method	Reported Value	Reported Value – Assigned Value	Comments on performance
C-10	ISO105B02:2014	2	1	Outlier
C-11	ISO105B02	2	1	Outlier
C-12	ISO105B02	2-3	1.5	Outlier
C-13	ISO105B02:2014	1	0	Satisfactory
C-15	ISO105B02:2014	1	0	Satisfactory
C-18	IS2454:1985	1	0	Satisfactory
C-21	ISO105B02	2	1	Outlier
C-24	ISO105B02	1	0	Satisfactory
C-26	ISO105B02	1	0	Satisfactory
C-28	ISO105B02:2014	1	0	Satisfactory
C-30	IS2454:1985	1	0	Satisfactory
C-32	ISO105B02	1	0	Satisfactory
C-35	ISO105B02	1	0	Satisfactory
C-36	ISO105B02	1	0	Satisfactory
participants		14		
max		2-3		
min		1		
median (M)		1		

	Frequency distribution
Grade	Numerical Light fastness rating
1	10
1-2	0
2	3
2-3	1
3	0
3-4	0
4	0
4-5	0
5	0
participants	14


Colour fastness to Light (Xenon Arc Lamp)
Difference in Reporting value & Assigned value
C-10
C-11
C-12
C-13
C-15
C-18
C-21
C-24
C-26
C-28
C-30
C-32
C-35
C-36
2
1.5
1
0.5
0
Reported Value – Assigned Value

3. Colour fastness to washing with soap

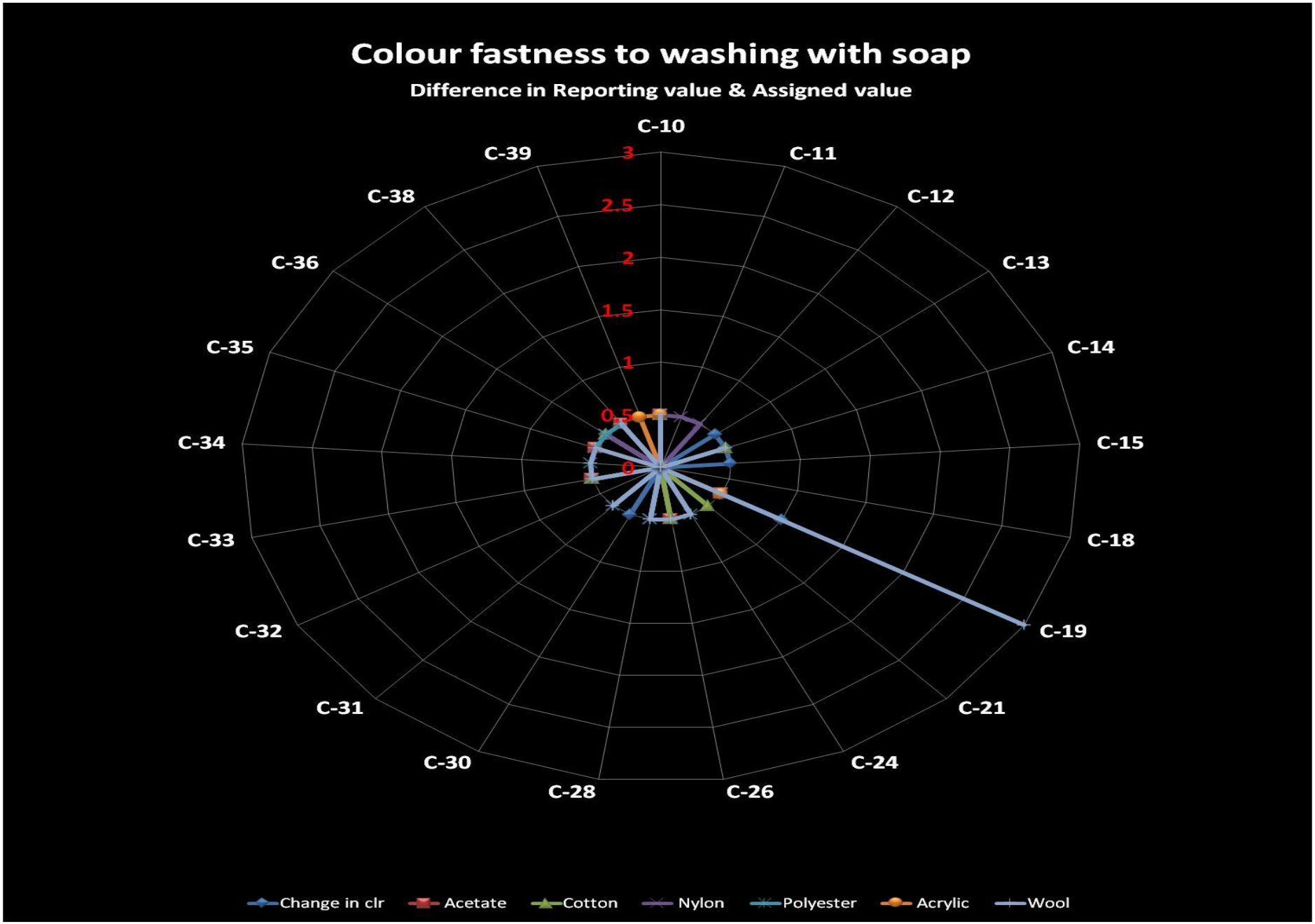
Assigned Value		3-4		4		1-2		3		4-5		3-4		4-5	
	Test Method	Change in Color		Acetate		Cotton		Nylon		Polyester		Acrylic		Wool	
Lab No		Reported Value	Reported Value – Assigned Value	Reported Value	Reported Value – Assigned Value	Reported Value	Reported Value – Assigned Value	Reported Value	Reported Value – Assigned Value	Reported Value	Reported Value – Assigned Value	Reported Value	Reported Value – Assigned Value	Reported Value	Reported Value – Assigned Value
C-10	ISO105C10 (A1)2016	3-4	0	3-4	0.5	2	0.5	2-3	0.5	4	0.5	3	0.5	4	0.5
C-11	ISO105C10 (A1)2006	3-4	0	4	0	1-2	0	2-3	0.5	4-5	0	3-4	0	4-5	0
C-12	ISO105C10 (A1)2006	3-4	0	4	0	1-2	0	2-3	0.5	4-5	0	3-4	0	4-5	0
C-13	ISO105C10 (A1)2006	3	0.5	4	0	1-2	0	3	0	4-5	0	3-4	0	4-5	0
C-14	IS/ISO105C10 (A1)2006	3	0.5	4	0	2	0.5	3	0	4-5	0	3-4	0	4	0.5
C-15	IS/ISO105C10 (A1)2006	3	0.5	4	0	1-2	0	3	0	4-5	0	3-4	0	4-5	0
C-18	IS/ISO105C10 (A1)2006	3-4	0	4	0	1-2	0	3	0	4-5	0	3-4	0	4-5	0
C-19	IS/ISO105C10 (A1)2006	2-3	1	4-5	0.5	1-2	0	2-3	0.5	4	0.5	3	0.5	1-2	3
C-21	IS/ISO105C10 (A1)2006	3-4	0	4	0	1	0.5	3	0	4-5	0	3-4	0	4-5	0
C-24	IS/ISO105C10 (A1)2006	3-4	0	4	0	1-2	0	3	0	4	0.5	3-4	0	4	0.5
C-26	IS/ISO105C10 (A1)2006	3-4	0	3-4	0.5	2	0.5	3	0	4-5	0	3-4	0	4	0.5
C-28	IS/ISO105C10 (A1)2006	3-4	0	4	0	1-2	0	3-4	0.5	4	0.5	3-4	0	4	0.5
C-30	IS/ISO105C10 (A1)2006	3	0.5	4	0	1-2	0	3	0	4-5	0	3-4	0	4-5	0
C-31	IS/ISO105C10 (A1)2006	3-4	0	4	0	1-2	0	3	0	4	0.5	3-4	0	4	0.5
C-32	IS/ISO105C10 (A1)2006	3-4	0	4	0	1-2	0	3	0	4-5	0	3-4	0	4-5	0
C-33	IS/ISO105C10 (A1)2006	3-4	0	3-4	0.5	2	0.5	3	0	4	0.5	3-4	0	4	0.5
C-34	IS/ISO105C10 (A1)2006	3-4	0	4	0	1-2	0	3	0	4	0.5	3-4	0	4	0.5
C-35	IS/ISO105C10 (A1)2006	3-4	0	3-4	0.5	1-2	0	3	0	4	0.5	3-4	0	4	0.5
C-36	IS/ISO105C10 (A1)2006	3	0.5	4	0	1	0.5	2-3	0.5	4	0.5	3-4	0	4-5	0
C-38	IS/ISO105C10 (A1)2006	3-4	0	3-4	0.5	1-2	0	3	0	4	0.5	3-4	0	4	0.5
C-39	IS/ISO105C10 (A1)2006	3-4	0	4	0	1-2	0	3	0	4-5	0	3	0.5	4-5	0
participants		21		21		21		21		21		21		21	

max		3-4		4-5		2		3-4		4-5		3-4		4-5	
min		2-3		3-4		1		2-3		4		3		1-2	
median (M)		3-4		4		1-2		3		4-5		3-4		4	
Mode		3-4		4		1-2		3		4-5		3-4		4	

Subjective Test	
| Reported Value – Assigned Value | ≤ ½ grade	Satisfactory
| Reported Value - Assigned Value | > ½ grade	**Outlier**

Frequency distribution

Grade	Change in Color	Staining on adjacent fabric					
		Acetate	Cotton	Nylon	Polyester	Acrylic	Wool
1	0	0	2	0	0	0	0
1-2	0	0	15	0	0	0	1
2	0	0	4	0	0	0	0
2-3	1	0	0	5	0	0	0
3	5	0	0	15	0	3	0
3-4	15	5	0	1	0	18	0
4	0	15	0	0	10	0	10
4-5	0	1	0	0	11	0	10
participants	21	21	21	21	21	21	21


Colour fastness to washing with soap
Difference in Reporting value & Assigned value
C-10
C-11
C-12
C-13
C-14
C-15
C-18
C-19
C-21
C-24
C-26
C-28
C-30
C-31
C-32
C-33
C-34
C-35
C-36
C-38
C-39
3
2.5
2
1.5
1
0.5
0
Change in clr
Acetate
Cotton
Nylon
Polyester
Acrylic
Wool

4.1 Amount of Free & Hydrolyzed Formaldehyde extracted -Whether Detectable/Not detectable

Assigned Value	Detectable

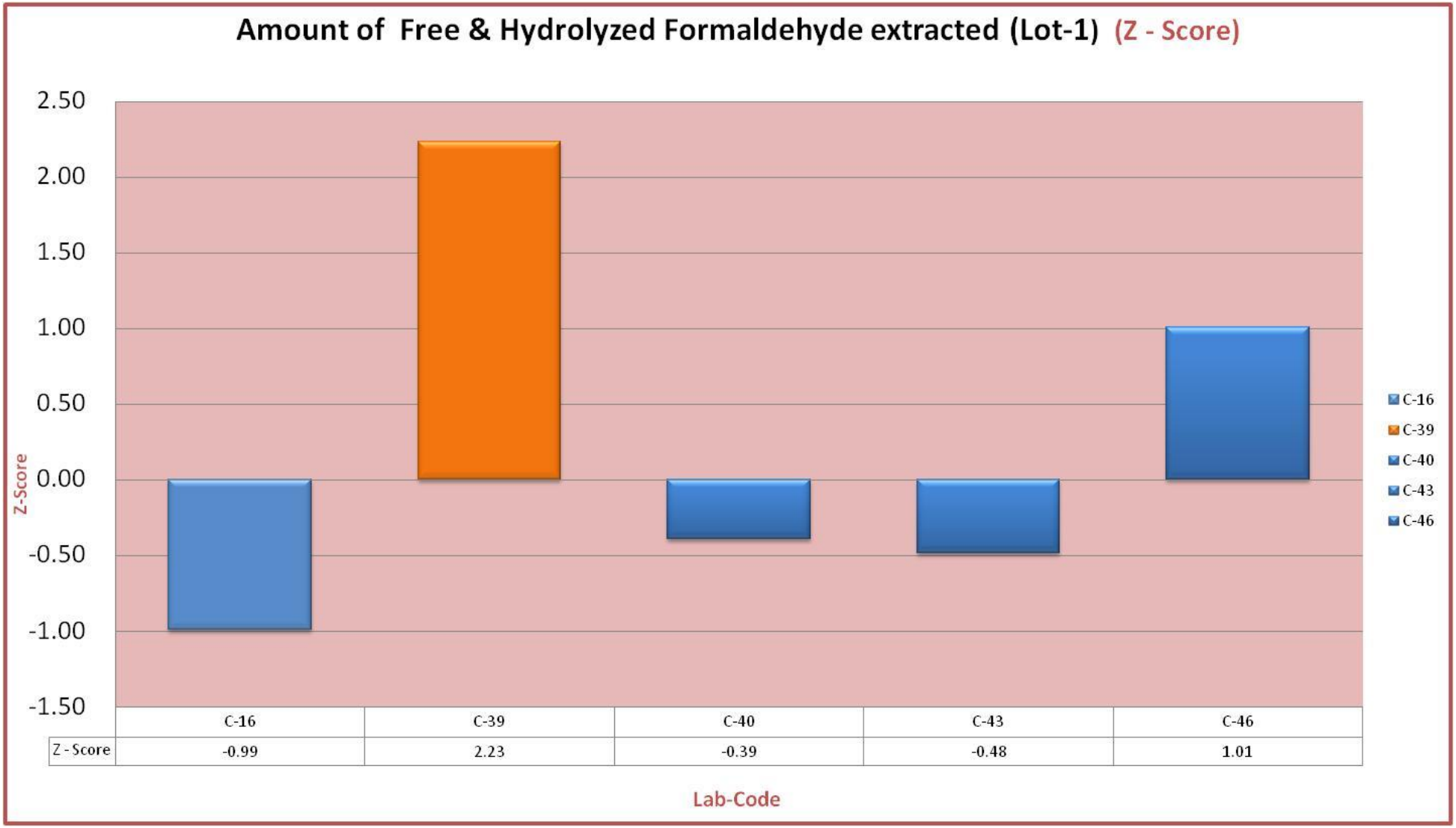
Lab code	Reported value	Test method adopted	Comments on performance
C-10	Detectable	ISO-14184-1-2011	Satisfactory
C-11	Detectable	ISO-14184-1-2011	Satisfactory
C-12	Detectable	ISO-14184-1-2011	Satisfactory
C-13	Detectable	ISO-14184-1-2011	Satisfactory
C-14	Detectable	ISO-14184-1-2011	Satisfactory
C-15	Detectable	ISO-14184-1-2011	Satisfactory
C-16	Detectable	ISO-14184-1-2011	Satisfactory
C-17	Detectable	ISO-14184-1-2011	Satisfactory
C-21	Detectable	ISO-14184-1-2011	Satisfactory
C-39	Detectable	ISO-14184-1-2011	Satisfactory
C-40	Detectable	ISO-14184-1-2011	Satisfactory
C-41	Detectable	ISO-14184-1-2011	Satisfactory
C-42	Detectable	ISO-14184-1-2011	Satisfactory
C-43	Detectable	ISO-14184-1-2011	Satisfactory
C-45	Detectable	ISO-14184-1-2011	Satisfactory
C-46	Detectable	ISO-14184-1-2011	Satisfactory

No. of participants	16
Maximum	Detectable
Minimum	-
Mean	-
Std Deviation	N.A.
Mode	Detectable

4.2 Amount of Free & Hydrolyzed Formaldehyde extracted (Lot-1)

Lab code	Reported value (mg/kg)	Test method adopted	Z- Score	Performance Remark
C-16	**465**	ISO-14184-1-2011	**-0.991**	**Satisfactory**
C-39	**573**	ISO-14184-1-2011	**2.233**	**Straggler**
C-40	**485**	ISO-14184-1-2011	**-0.394**	**Satisfactory**
C-43	**482**	ISO-14184-1-2011	**-0.484**	**Satisfactory**
C-46	**532**	ISO-14184-1-2011	**1.009**	**Satisfactory**
No. of participants	**5**			
Maximum	573.0			
Minimum	465.0			
Mean	507.4			
Std Deviation	44.3			
Median	485.0			

SUMMARY	
Robust Average=	**498.2**
Robust SD for all valid participants (σ_1) =	**33.5**
Between sample SD of Homogeneity testing (S_S) =	**8.228**
SD for PT Scheme with allowance for the heterogeneity if any (σ) =	**N.A.***
*** No Heterogeneity observed**	
Assigned Value (X) =	**498.2**
SD of PT Scheme (σ) =	**33.5**


Amount of Free & Hydrolyzed Formaldehyde extracted (Lot-1) (Z - Score)
2.50
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
Z-Score
C-16
C-39
C-40
C-43
C-46
Z - Score
-0.99
2.23
-0.39
-0.48
1.01
Lab-Code

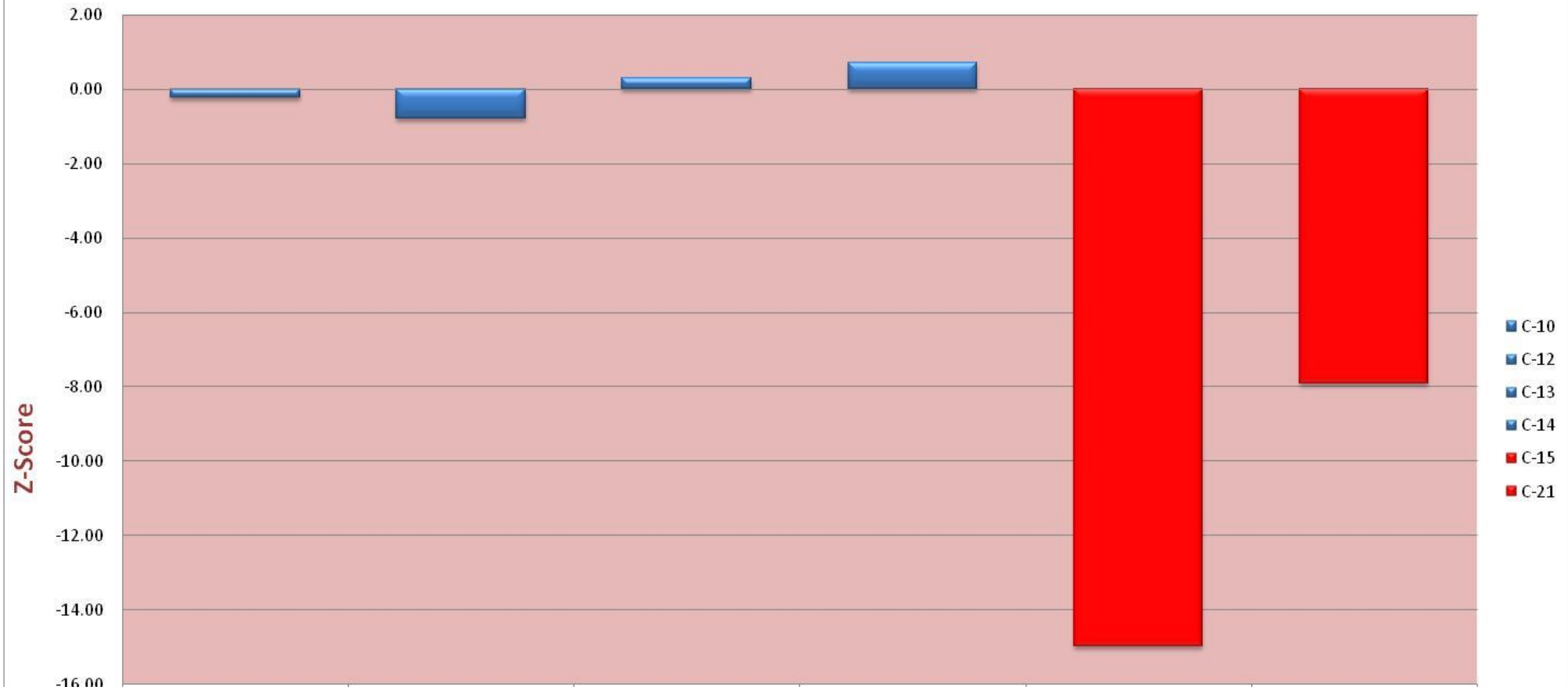
4.3 Amount of Free & Hydrolyzed Formaldehyde extracted Lot-2

Lab code	Reported value (mg/kg)	Test method adopted	Z- Score	Performance Remark
C-10	902.4	ISO-14184-1-2011	-0.227	Satisfactory
C-12	895.4	ISO-14184-1-2011	-0.796	Satisfactory
C-13	909	ISO-14184-1-2011	0.309	Satisfactory
C-14	914	ISO-14184-1-2011	0.715	Satisfactory
C-15	721	ISO-14184-1-2011	-14.960	Outlier
C-21	808	ISO-14184-1-2011	-7.894	Outlier

No. of participants	6
Maximum	914.0
Minimum	808.0
Mean	858.3
Std Deviation	77.9
Median	898.9

SUMMARY	
Robust Average=	893.76
Robust SD for all valid participants (σ_1) =	21.31
Between sample SD of Homogeneity testing (S_S) =	8.228
SD for PT Scheme with allowance for the heterogeneity if any (σ) =	12.313
Heterogeneity accounted	
Assigned Value (X) =	905.2
SD of PT Scheme (σ) =	12.31

Amount of Free & Hydrolyzed Formaldehyde extracted (Lot-2) (Z - Score)



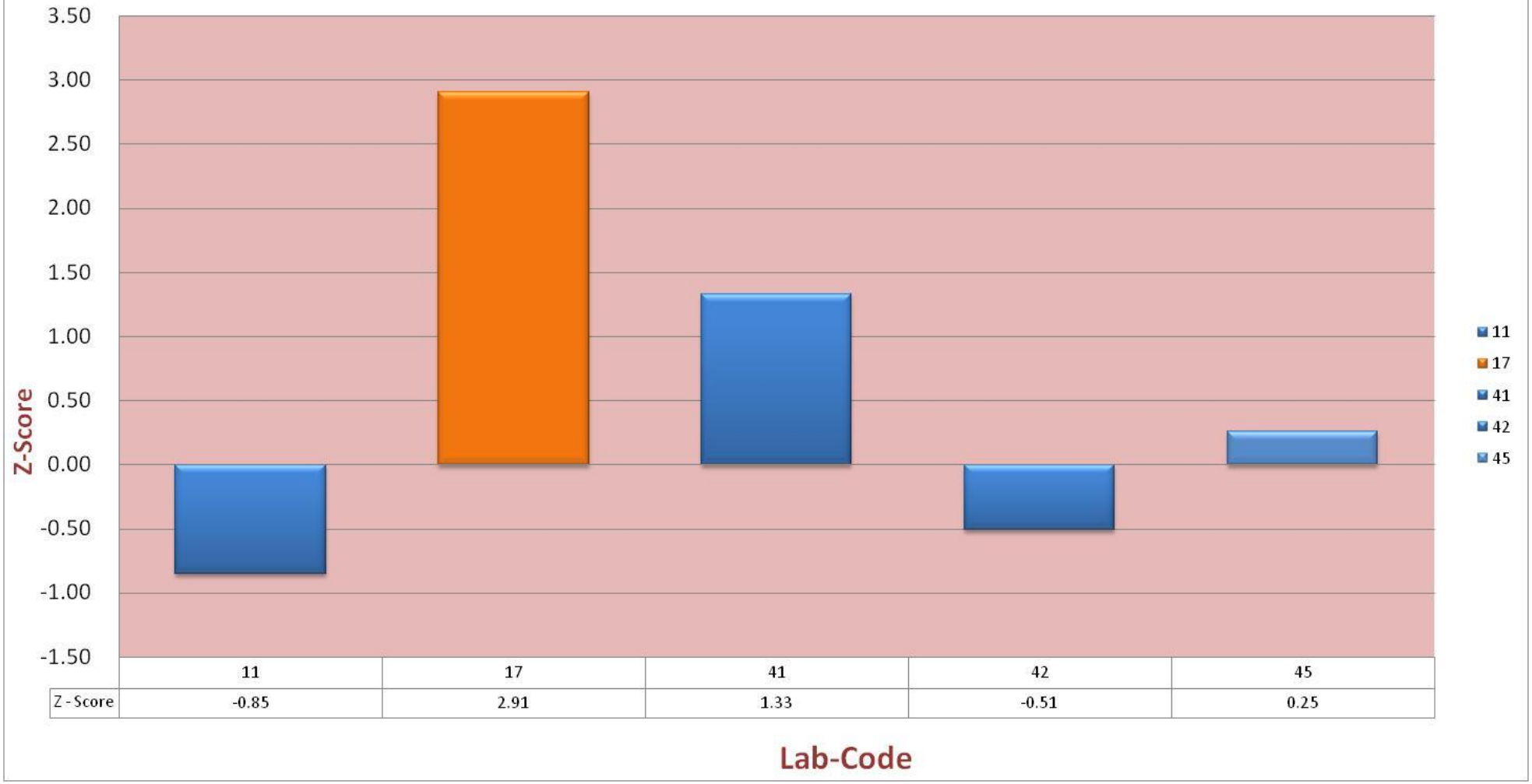
	C-10	C-12	C-13	C-14	C-15	C-21
Z - Score	-0.23	-0.80	0.31	0.71	-14.96	-7.89

4.4 Amount of Free & Hydrolyzed Formaldehyde extracted Lot-3

Lab code	Reported value (mg/kg)	Test method adopted	Z- Score	Performance Remark
C-11	1960	ISO-14184-1-2011	-0.855	Satisfactory
C-17	2177	ISO-14184-1-2011	2.907	Straggler
C-41	2086	ISO-14184-1-2011	1.330	Satisfactory
C-42	1980	ISO-14184-1-2011	-0.508	Satisfactory
C-45	2024	ISO-14184-1-2011	0.255	Satisfactory
No. of participants	5			
Maximum	2177.0			
Minimum	1960.0			
Mean	2045.4			
Std Deviation	88.0			
Median	2024.0			

SUMMARY	
Robust Average=	**2042.4**
Robust SD for all valid participants (σ_1) =	**93.5**
Between sample SD of Homogeneity testing (S_S) =	**8.432**
SD for PT Scheme with allowance for the heterogeneity if any (σ) =	**57.680**
Heterogeneity accounted	
Assigned Value (X) =	**2009.3**
SD of PT Scheme (σ) =	**57.7**

Amount of Free & Hydrolyzed Formaldehyde extracted (Lot-3) (Z - Score)



	11	17	41	42	45
Z - Score	-0.85	2.91	1.33	-0.51	0.25

5.1 Detection and quantification of banned azo colourants in coloured textiles -Whether Positive /Negative

Assigned Value	Positive

Lab code	Reported value	Test method adopted	Comments on performance
C-11	Positive	IS:15570:2005	Satisfactory
C-12	Positive	IS:15570:2005	Satisfactory
C-13	Positive	BSEN ISO 14362-1:2017	Satisfactory
C-15	Positive	ISO 14362-1:2017	Satisfactory
C-16	Positive	-	Satisfactory
C-17	Positive	EN ISO 14362-1:2017	Satisfactory
C-20	Positive		Satisfactory
C-21	Positive		Satisfactory
C-22	Positive	In-house validated method as per ISO 14362-1:2017	Satisfactory
C-23	Positive	IS:15570:2005	Satisfactory
C-24	Positive	-	Satisfactory
C-26	Positive	IS:15570:2005	Satisfactory
C-27	Positive	IS:15570:2005	Satisfactory
C-31	Positive	IS:15570:2005	Satisfactory
C-33	Negative	TCLAB TM 10	Outlier
C-34	Positive	IS:15570:2005	Satisfactory
C-36	Positive	IS:15570:2005	Satisfactory
C-37	Positive	IS:15570:2005	Satisfactory
C-39	Positive	IS:15570:2005	Satisfactory
No. of participants	19		
Maximum	Positive		
Minimum	Negative		
Mean	-		
Std Deviation	N.A.		
Mode	Positive		

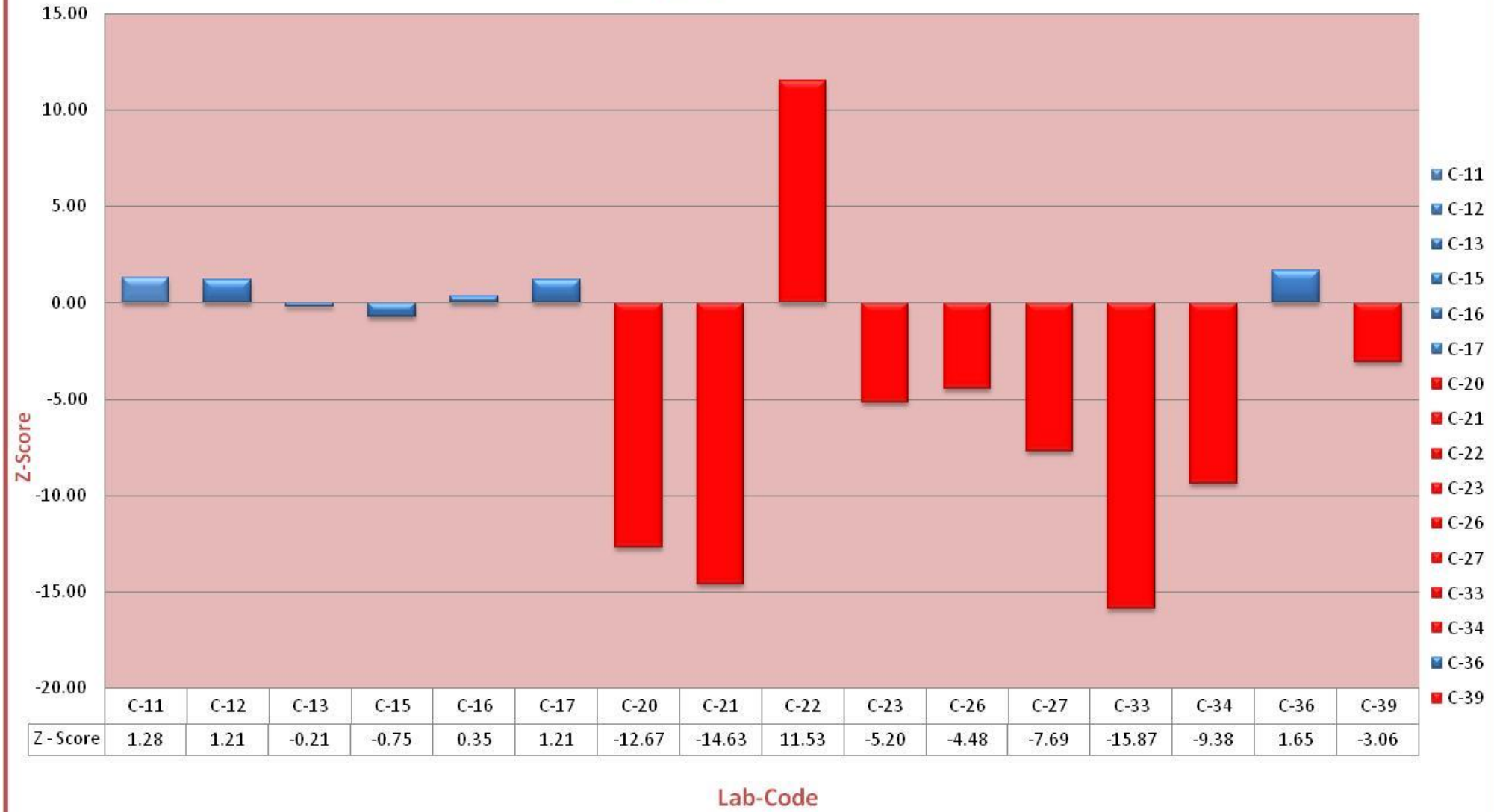
5.2 Detection and quantification of banned azo colourants in coloured textiles

Lab code	Reported value (mg/kg)	Test method adopted	Z- Score	Performance Remark
C-11	96.4	IS:15570:2005	1.28	Satisfactory
C-12	96	IS:15570:2005	1.21	Satisfactory
C-13	88	BSEN ISO 14362-1:2017	-0.21	Satisfactory
C-15	85	ISO 14362-1:2017	-0.75	Satisfactory
C-16	91.2	-	0.35	Satisfactory
C-17	96	EN ISO 14362-1:2017	1.21	Satisfactory
C-20	**18**	ISO 14362-1:2017	-12.67	Outlier
C-21	**7**	IS:15570:2005	-14.63	Outlier
C-22	**154**	In-house validated method as per ISO 14362-1:2017	11.53	Outlier
C-23	**60**	ISO 14362-1:2017	-5.20	Outlier
C-26	**64**	IS:15570:2005	-4.48	Outlier
C-27	**46**	IS:15570:2005	-7.69	Outlier
C-33	**0**	IS:15570:2005	-15.87	Outlier
C-34	**36.5**	IS:15570:2005	-9.38	Outlier
C-36	98.5	IS:15570:2005	1.65	Satisfactory
C-39	**72.0**	IS:15570:2005	-3.06	Outlier
No. of participants	16			
Maximum	154.0			
Minimum	0.0			
Mean	69.3			
Std Deviation	40.3			
Median	78.5			

SUMMARY	
Robust Average=	**71.99**
Robust SD for all valid participants (σ_1) =	**32.2**
Between sample SD of Homogeneity testing (S_S) =	5.50
SD for PT Scheme with allowance for the heterogeneity if any (σ) =	N.A.*
*** No Heterogeneity observed**	
Assigned Value (X) =	**89.2**
SD of PT Scheme (σ) =	**5.62**

Detection and quantification of banned azo colourants in coloured textiles

(Z - Score)



	C-11	C-12	C-13	C-15	C-16	C-17	C-20	C-21	C-22	C-23	C-26	C-27	C-33	C-34	C-36	C-39
Z - Score	1.28	1.21	-0.21	-0.75	0.35	1.21	-12.67	-14.63	11.53	-5.20	-4.48	-7.69	-15.87	-9.38	1.65	-3.06

Lab-Code

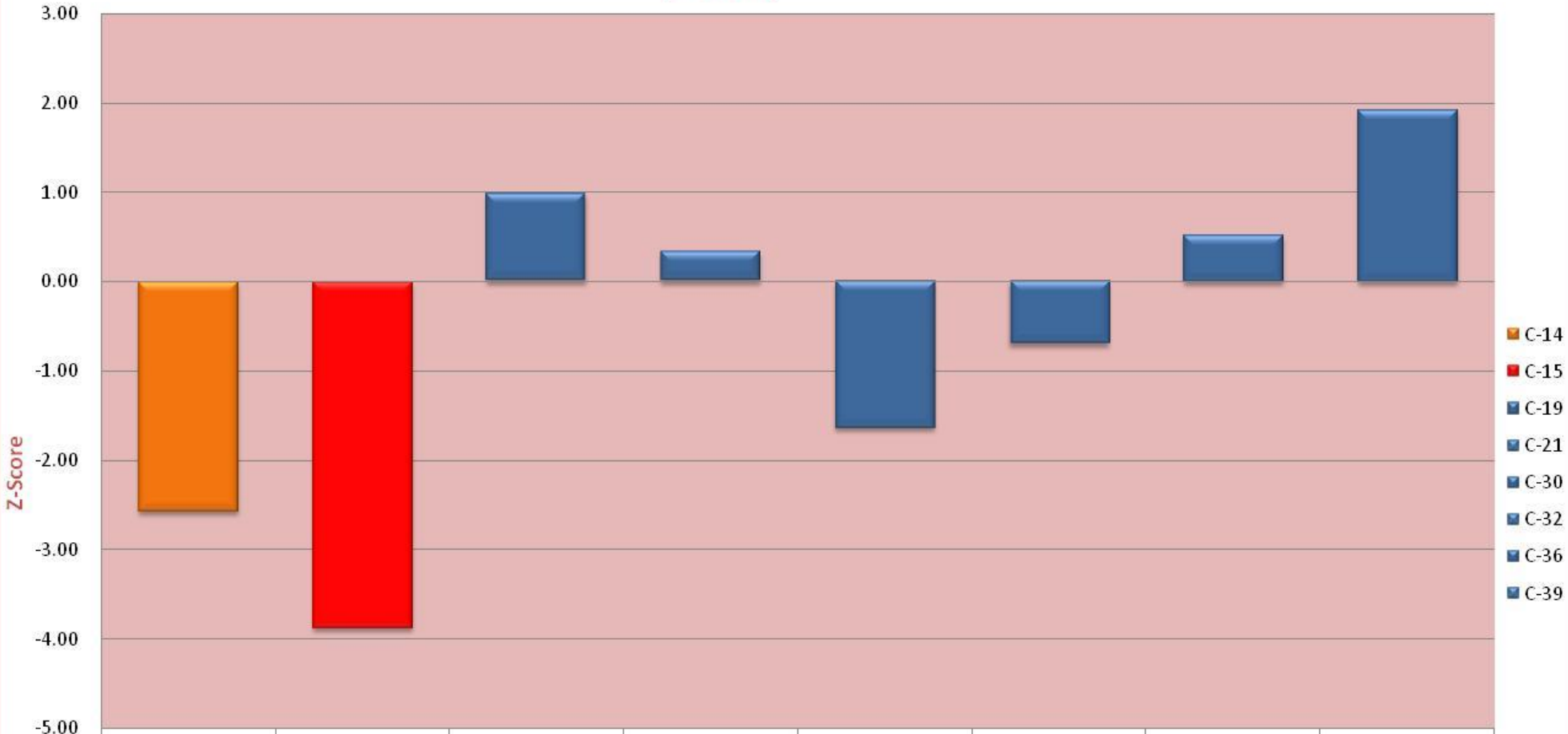
6 Method for determining the water repellency of fabrics by cone test

Lab code	Reported value (ml)	Test method adopted	Z- Score	Performance Remark
C-14	371.0	IS:7941	-2.573	Straggler
C-15	364.0	IS:7941	-3.884	Outlier
C-19	390.0	IS:7941	0.985	Satisfactory
C-21	386.5	-	0.330	Satisfactory
C-30	376.0	IS:7941	-1.637	Satisfactory
C-32	381.0	IS:7941	-0.700	Satisfactory
C-36	387.5	IS:7941	0.517	Satisfactory
C-39	395.0	IS:7941	1.921	Satisfactory
No. of participants	8			
Maximum	395.0			
Minimum	364.0			
Mean	381.4			
Std Deviation	10.4			
Median	383.8			

SUMMARY	
Robust Average=	**381.9**
Robust SD for all valid participants (σ_1) =	**10.78**
Between sample SD of Homogeneity testing (S_S) =	1.81
SD for PT Scheme with allowance for the heterogeneity if any (σ) =	N.A.*
*** No Heterogeneity observed**	
Assigned Value (X) =	**384.7**
SD of PT Scheme (σ) =	**5.34**

Method for determining the water repellency of fabrics by cone test

(Z - Score)



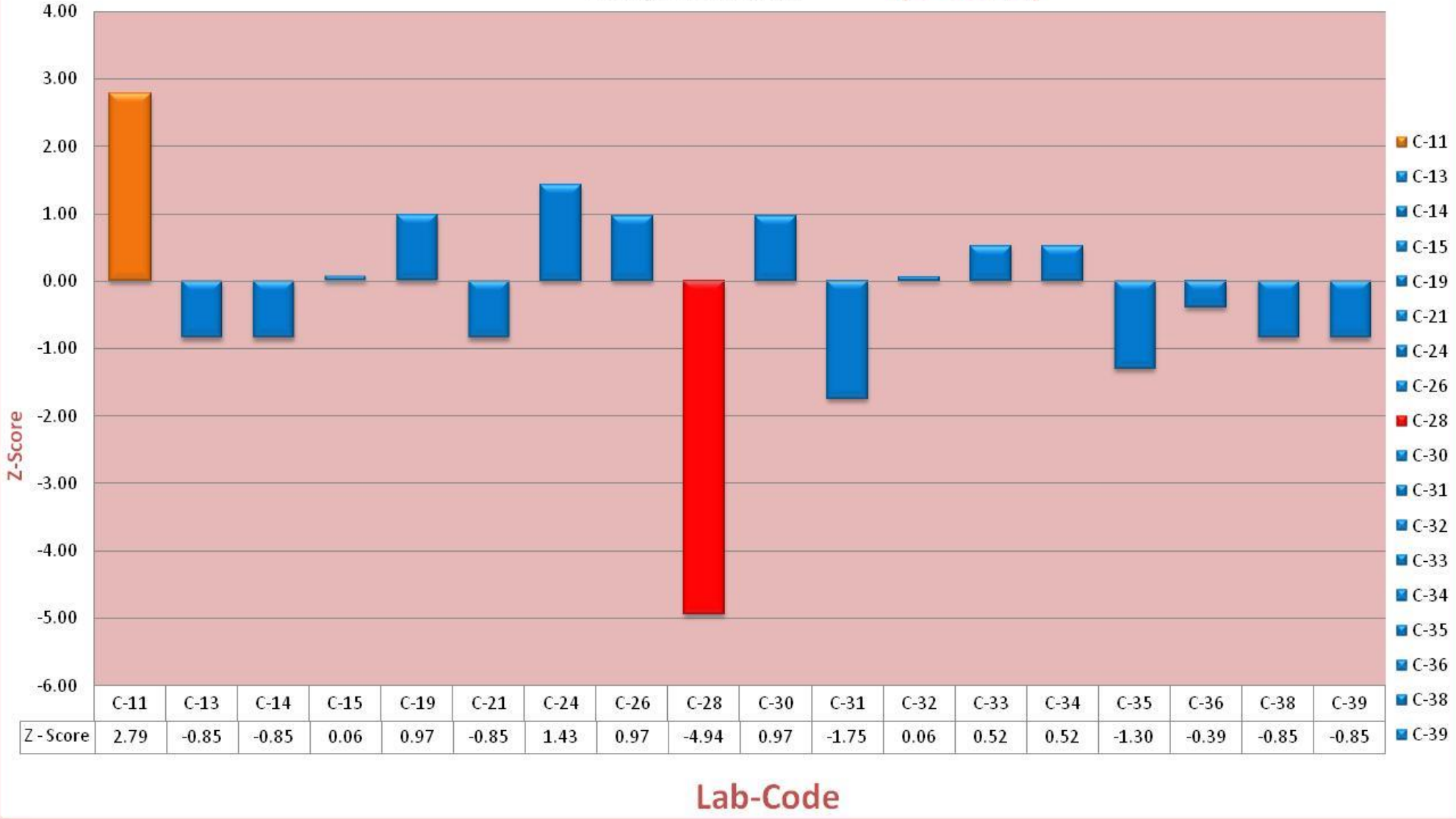
	C-14	C-15	C-19	C-21	C-30	C-32	C-36	C-39
Z - Score	-2.57	-3.88	0.99	0.33	-1.64	-0.70	0.52	1.92

7.1 Determination of Dimensional Changes on soaking in water –Warp Direction

Lab code	Reported value (%)	Test method adopted	Z- Score	Performance Remark
C-11	-0.9	-	2.791	Straggler
C-13	-1.7	IS:665:1989	-0.845	Satisfactory
C-14	-1.7	IS:665:1989	-0.845	Satisfactory
C-15	-1.5	IS:665:1989	0.064	Satisfactory
C-19	-1.3	IS:665:1989	0.973	Satisfactory
C-21	-1.7	IS:665:1989	-0.845	Satisfactory
C-24	-1.2	IS:665:1989	1.427	Satisfactory
C-26	-1.3	IS:665:1989	0.973	Satisfactory
C-28	**-2.6**	IS:665:1989	-4.936	Outlier
C-30	-1.3	IS:665:1989	0.973	Satisfactory
C-31	-1.9	IS:665:1989	-1.755	Satisfactory
C-32	-1.5	IS:665:1989	0.064	Satisfactory
C-33	-1.4	IS:665:1989	0.518	Satisfactory
C-34	-1.4	IS:665:1989	0.518	Satisfactory
C-35	-1.8	IS:665:1989	-1.300	Satisfactory
C-36	-1.6	IS:665:1989	-0.391	Satisfactory
C-38	-1.7	IS:665:1989	-0.845	Satisfactory
C-39	-1.7	IS:665:1989	-0.845	Satisfactory
No. of participants	18			
Maximum	-0.9			
Minimum	-2.6			
Mean	-1.6			
Std Deviation	0.4			
Median	-1.6			

SUMMARY	
Robust Average=	**-1.54**
Robust SD for all valid participants (σ_1) =	**0.25**
Between sample SD of Homogeneity testing (S_S) =	0.067
SD for PT Scheme with allowance for the heterogeneity if any (σ) =	N.A.*
*** No Heterogeneity observed**	
Assigned Value (X) =	**-1.51**
SD of PT Scheme (σ) =	**0.22**

Determination of Dimensional Changes on soaking in water –Warp Direction (Z - Score)

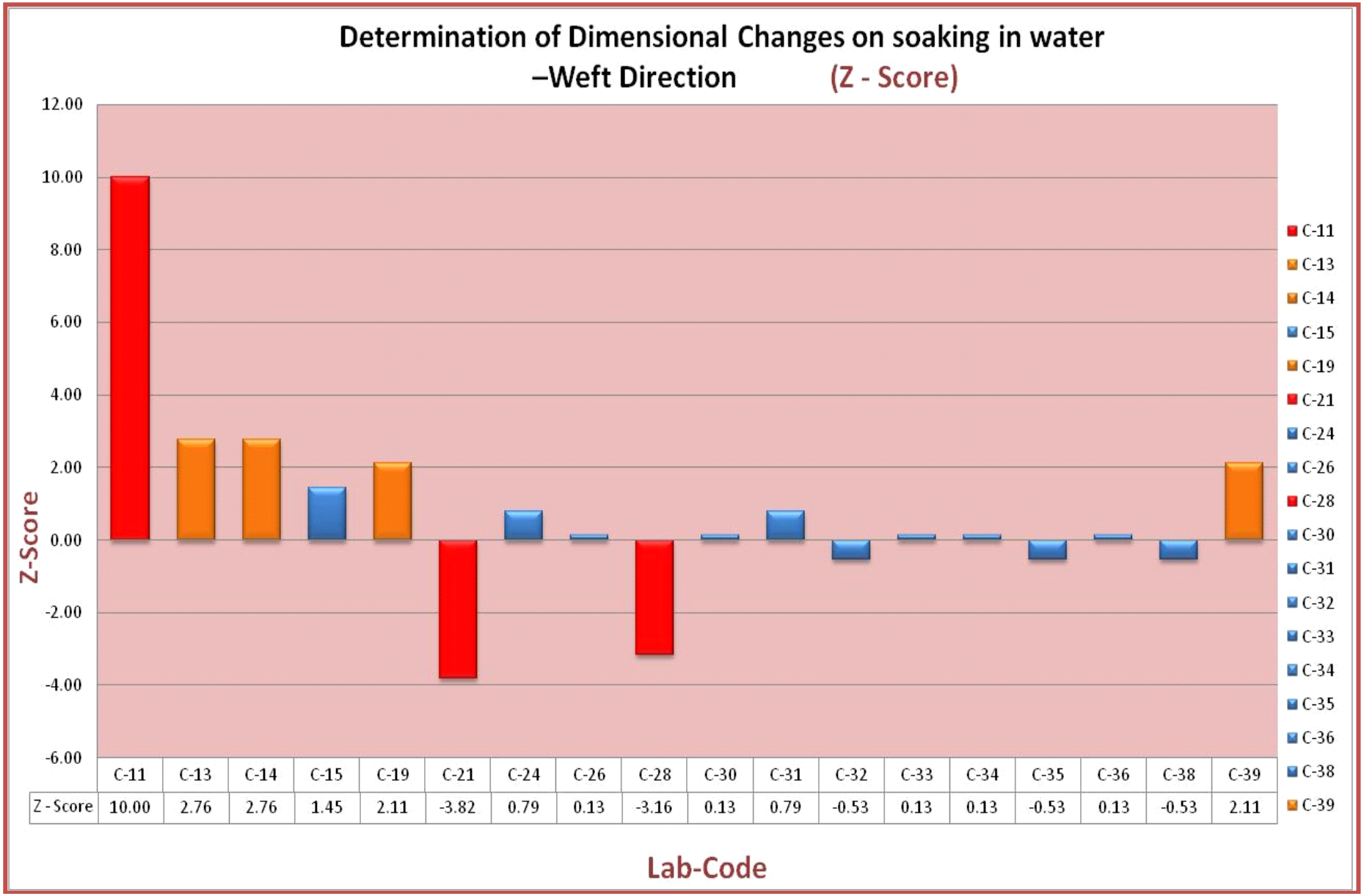


	C-11	C-13	C-14	C-15	C-19	C-21	C-24	C-26	C-28	C-30	C-31	C-32	C-33	C-34	C-35	C-36	C-38	C-39
Z - Score	2.79	-0.85	-0.85	0.06	0.97	-0.85	1.43	0.97	-4.94	0.97	-1.75	0.06	0.52	0.52	-1.30	-0.39	-0.85	-0.85

7.2 Determination of Dimensional Changes on soaking in water –Weft Direction

Lab code	Reported value (%)	Test method adopted	Z- Score	Performance Remark
C-11	1.8	-	10.00	Outlier
C-13	0.7	IS:665:1989	2.76	Straggler
C-14	0.7	IS:665:1989	2.76	Straggler
C-15	0.5	IS:665:1989	1.45	Satisfactory
C-19	0.6	IS:665:1989	2.11	Straggler
C-21	-0.3	IS:665:1989	-3.82	Outlier
C-24	0.4	IS:665:1989	0.79	Satisfactory
C-26	0.3	IS:665:1989	0.13	Satisfactory
C-28	-0.2	IS:665:1989	-3.16	Outlier
C-30	0.3	IS:665:1989	0.13	Satisfactory
C-31	0.4	IS:665:1989	0.79	Satisfactory
C-32	0.2	IS:665:1989	-0.53	Satisfactory
C-33	0.3	IS:665:1989	0.13	Satisfactory
C-34	0.3	IS:665:1989	0.13	Satisfactory
C-35	0.2	IS:665:1989	-0.53	Satisfactory
C-36	0.3	IS:665:1989	0.13	Satisfactory
C-38	0.2	IS:665:1989	-0.53	Satisfactory
C-39	0.6	IS:665:1989	2.11	Straggler
No. of participants	18			
Maximum	1.80			
Minimum	-0.30			
Mean	0.41			
Std Deviation	0.45			
Median	0.30			

SUMMARY	
Robust Average=	**0.34**
Robust SD for all valid participants (σ_1) =	**0.175**
Between sample SD of Homogeneity testing (S_S) =	**0.059**
SD for PT Scheme with allowance for the heterogeneity if any (σ) =	**0.152**
Heterogeneity accounted	
Assigned Value (X) =	**0.28**
SD of PT Scheme (σ) =	0.15


Determination of Dimensional Changes on soaking in water
–Weft Direction (Z - Score)
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
-4.00
-6.00
Z-Score
C-11
C-13
C-14
C-15
C-19
C-21
C-24
C-26
C-28
C-30
C-31
C-32
C-33
C-34
C-35
C-36
C-38
C-39
Z - Score
10.00
2.76
2.76
1.45
2.11
-3.82
0.79
0.13
-3.16
0.13
0.79
-0.53
0.13
0.13
-0.53
0.13
-0.53
2.11
Lab-Code