

CONTRACTS & SPECIFICATIONS COMMITTEE**VENICE CONGRESS**

Test Specification Group

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Chairman: Mr. W. Heath (South Africa)

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Report on Independent Laboratory Round Trial 3321 - 3426: January 2018 to December 2018

By

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SUMMARY

This ILRT Group Report covers 106 trials (3321 - 3426) for the period January 2018 to December 2018. The range of wool variables covered by this series is similar to the range covered in the previous series, and the source of sample material was similar. The ILRT Group attempts to ensure that the samples tested in the trials are representative of the wool types produced in the home nations of the participating laboratories and in proportion to the quantity of wool tested.

The data in the report includes Wool Base, VM Base, Airflow Mean Fibre Diameter, Laserscan Mean Fibre Diameter and Laserscan Standard Deviation of Fibre Diameter.

The mean and standard deviation for the parameters reported are similar to the previous 6 trials, indicating continuing consistent performance of the member laboratories. Calculations of the 95% Confidence Limits confirm that the ILRT laboratories are producing results within the Confidence Limits reported in the respective IWTO Test Methods.

In all, the Limit Values (at the 99% level of confidence) were exceeded on thirteen (13) occasions, which is eight (8) less than the theoretical expectation of 21 for the number of trials in this reporting period (assuming all events are independent of each other, $106 \text{ trials} \times 5 \text{ labs} \times 4 \text{ parameters} \times 1\% = 21$).

Four (4) outliers were due to difference in Wool Base, eight (8) to difference in VM Base, and one (1) to difference in Airflow Mean Fibre Diameter.

For one trial (3386) two laboratories were considered outliers for VM Base. Wool Base and VM Base outliers were detected for trial 3346 for a laboratory.

By reporting the results of its round trials the ILRT Group is providing commercial participants in the industry with a basis for confidence in the IWTO Certificates produced by its members. The ILRT Group is unique in reporting its technical performance and the series of trials provides a mechanism for ensuring that the member laboratories are harmonised.

INTRODUCTION

This report is prepared on behalf of the Independent Laboratories Round Trials (ILRT) Group. It covers 106 trials tested at a frequency of 2 per week over 52 weeks for the period January 2018 to December 2018.

The 5 laboratories currently participating in the first series ILRT are:

- Australian Wool Testing Authority Ltd - Fremantle Laboratory;
- Australian Wool Testing Authority Ltd - Melbourne Laboratory;
- New Zealand Wool Testing Authority Ltd, (NZWTA Ltd), Napier;
- Wool Testing Bureau S.A., (WTB), Port Elizabeth; and
- Wool Testing Authority Europe Ltd (WTAE Ltd), United Kingdom.

The ILRT Group Members comprise Members from the largest independent wool testing laboratories in the world. The objectives and aims of the Group are:

- to develop co-operation between the Members' laboratories, with a view to ensuring the most correct and uniform application of approved testing and sampling methods as may be set out in the Specifications of the International Wool Textile Organisation (IWTO) and in any associated IWTO Regulations;
- to ensure that the Members' laboratories obtain accurate test results having a high level of precision, in their application of those specific IWTO Test Methods and procedures which are relevant to the Group's agreed annual work programme;
- to collect such precision data, with respect to those IWTO specifications being utilised in the ILRT programme, as is required or desirable, but having regard to the principle ILRT functions of harmonising and monitoring the technical performance of the Members' laboratories;
- to assist Members' laboratories in resolving disputes arising from differences in test results, by ascertaining the causes of any discrepancies; and
- to the extent feasible, allow non-competing commercial laboratories to become Participating Laboratories in the inter-laboratory round trials from time to time.

The ILRT Group report is presented to every IWTO Congress.

SOURCE OF SAMPLE MATERIAL

The ILRT attempts to ensure that the samples tested in the trials are representative of the wool types produced in the home nations of the participating laboratories and in proportion to the quantity of wool tested. Table 1 summarises the countries of origin for the samples used in this series.

TABLE 1
SOURCE OF SAMPLE MATERIAL

COUNTRY OF ORIGIN	NUMBER OF SAMPLES
Australia	83
New Zealand	8
South Africa	13
United Kingdom	2
TOTAL	106

RANGE OF WOOL TESTED

Sample material covers a similar range of Wool Base, Vegetable Matter Base, Mean Fibre Diameter and Standard Deviation of Fibre Diameter to that reported at previous meetings (Table 2).

TABLE 2
RANGES OF PARAMETERS OF WOOLS TESTED
(TRIALS 3321 - 3426)

PARAMETER	MEAN	RANGE		
Wool Base (%)	58.10	43.78	to	67.99
Vegetable Matter Base (%)	1.93	0.10	to	9.20
Mean Fibre Diameter (µm) (Based on IWTO-28)	25.13	15.30	to	37.68
Mean Fibre Diameter (µm) (Based on IWTO-12)	24.96	14.78	to	37.83
Standard Deviation of Fibre Diameter (µm) (Based on IWTO-12)	5.61	2.90	to	9.40

OVERALL RESULTS**Means & Standard Deviations**

The between sub-samples within-laboratory and between-laboratory variation for Wool Base, Vegetable Matter Base are compared, by calculating the Standard Deviation for each and comparing them with data from previous ILRT Reports. Similarly, for Mean Fibre Diameter the between test specimens within-laboratory and between-laboratory variation is compared. Comparisons of the overall values for each parameter against values obtained in the 6 previous reporting periods are reported in Table 3 for yield and Table 4 for diameter.

TABLE 3
WITHIN AND BETWEEN LABORATORY STANDARD DEVIATIONS FOR YIELD PARAMETERS

TRIAL PERIOD	WOOL BASE			VEGETABLE MATTER BASE		
	MEAN	BETWEEN SUBS WITHIN LABS	BETWEEN LABS	MEAN	BETWEEN SUBS WITHIN LABS	BETWEEN LABS
2801 - 2904	58.08	0.32	0.25	1.21	0.16	0.11
2905 - 3008	57.71	0.34	0.20	1.56	0.19	0.11
3009 - 3112	58.25	0.37	0.24	1.92	0.22	0.16
3113 - 3216	58.43	0.36	0.23	1.85	0.20	0.15
3217 - 3320	59.11	0.38	0.19	1.94	0.22	0.14
3321 - 3426	58.04	0.35	0.24	1.93	0.22	0.15
OVERALL MEAN	58.27	0.35	0.22	1.73	0.20	0.14

TABLE 4

WITHIN AND BETWEEN LABORATORY STANDARD DEVIATIONS FOR DIAMETER PARAMETERS

TRIAL PERIOD	MEAN FIBRE DIAMETER AIRFLOW			MEAN FIBRE DIAMETER LASERSCAN			SD OF FIBRE DIAMETER LASERSCAN		
	TRIAL PERIOD MEAN	BETWEEN TEST SPEC WITHIN LABS	BETWEEN LABS	TRIAL PERIOD MEAN	BETWEEN TEST SPEC WITHIN LABS	BETWEEN LABS	TRIAL PERIOD MEAN	BETWEEN TEST SPEC WITHIN LABS	BETWEEN LABS
2801 - 2904	25.18	0.15	0.19	25.02	0.26	0.06	5.79	0.23	0.08
2905 - 3008	24.98	0.16	0.19	24.77	0.27	0.09	5.78	0.23	0.08
3009 - 3112	25.10	0.16	0.16	24.88	0.27	0.07	5.68	0.23	0.08
3113 - 3216	25.19	0.16	0.22	24.95	0.29	0.08	5.58	0.24	0.08
3217 - 3320	25.17	0.16	0.20	24.93	0.29	0.07	5.53	0.22	0.06
3321 - 3426	25.13	0.15	0.15	24.96	0.30	0.06	5.61	0.23	0.06
OVERALL MEAN	25.13	0.16	0.18	24.92	0.28	0.07	5.66	0.23	0.07

From the variances reported for each trial in Tables 3 and 4 above, the 95% confidence limits for a normal presale test can be calculated. For the purposes of calculation, in the case of Wool Base and VM Base a 2 sub-sample test is assumed. In the case of Mean Fibre Diameter, a 2 test specimen test (with 2 readings per test specimen) is assumed. For the Laserscan results, a 4 test specimen test is assumed. These assumptions are the minimum requirements that must be met to issue an IWTO Certificate.

The calculated 95% Confidence Limits are presented in Table 5, along with the Confidence Limits for the respective IWTO Test Method (calculated for the overall mean for each parameter). Comparing the Overall Confidence Limit to the Test Method Confidence Limit confirms that the ILRT laboratories are producing results within the limits of the respective IWTO Test Methods.

TABLE 5

95% CONFIDENCE LIMITS

TRIAL PERIOD	WOOL BASE		VM BASE		AIRFLOW		LASERSCAN		LASERSCAN	
					Mean Fibre Diameter		Mean Fibre Diameter		Fibre Diameter SD	
	Mean	Con. Limit	Mean	Con. Limit	Mean	Con. Limit	Mean	Con. Limit	Mean	Con. Limit
2801 - 2904	58.08	0.66	1.21	0.31	25.18	0.42	25.02	0.38	5.79	0.27
2905 - 3008	57.71	0.61	1.56	0.34	24.98	0.42	24.77	0.41	5.78	0.28
3009 - 3112	58.25	0.69	1.92	0.43	25.10	0.39	24.88	0.40	5.68	0.27
3113 - 3216	58.43	0.67	1.85	0.41	25.19	0.48	24.95	0.43	5.58	0.28
3217 - 3320	59.11	0.64	1.94	0.42	25.17	0.45	24.93	0.42	5.53	0.25
3321 - 3426	58.04	0.68	1.93	0.43	25.13	0.35	24.96	0.42	5.61	0.25
OVERALL MEAN	58.27	0.66	1.73	0.39	25.13	0.42	24.92	0.41	5.66	0.27
(TEST METHOD)		(1.09)		(0.40)		(0.57)		(0.47)		(0.25)

For any given parameter, the consistency of the confidence limits indicates the laboratory performance has been stable over the periods reported in the tables 3 to 5 inclusive.

Data for IWTO-19 and IWTO-28 for each trial and over all trials in the current reporting period are summarised in Table 6. Corresponding data for IWTO-12 is reported in Table 7.

TABLE 6
WITHIN AND BETWEEN LABORATORY STANDARD DEVIATION DATA FOR IWTO 19 & IWTO 28

TRIAL	WOOL BASE			VEGETABLE MATTER BASE			MEAN FIBRE DIAMETER		
	GRAND MEAN	STANDARD DEVIATION		GRAND MEAN	STANDARD DEVIATION		GRAND MEAN	STANDARD DEVIATION	
		BETWEEN SUBS WITHIN LABS	BETWEEN LABS		BETWEEN SUBS WITHIN LABS	BETWEEN LABS		BETWEEN TEST SPEC WITHIN LABS	BETWEEN LABS
3321	60.23	0.35	0.46	1.7	0.15	0.10	22.1	0.11	0.18
3322	58.31	0.24	0.48	3.2	0.25	0.20	23.2	0.23	0.32
3323	57.34	0.47	0.27	3.0	0.36	0.14	30.9	0.14	0.19
3324	56.34	0.40	0.00	5.3	0.37	0.11	20.5	0.13	0.10
3325	66.57	0.14	0.34	0.2	0.05	0.07	33.8	0.19	0.39
3326	63.61	0.19	0.28	0.4	0.07	0.13	31.2	0.26	0.00
3327	55.23	0.47	0.33	0.5	0.11	0.14	20.4	0.14	0.08
3328	51.87	0.57	0.51	7.4	0.41	0.32	21.2	0.11	0.06
3329	57.81	0.29	0.24	0.5	0.12	0.05	21.4	0.13	0.26
3330	56.87	0.32	0.33	3.3	0.31	0.08	20.2	0.10	0.16
3331	64.10	0.24	0.20	0.2	0.05	0.07	35.7	0.21	0.00
3332	58.53	0.23	0.12	0.4	0.09	0.13	23.2	0.13	0.21
3333	67.20	0.19	0.00	0.1	0.02	0.04	37.7	0.31	0.27
3334	63.04	0.15	0.09	0.3	0.07	0.04	25.0	0.19	0.25
3335	62.48	0.39	0.17	0.7	0.14	0.22	15.5	0.11	0.16
3336	48.65	0.71	0.35	8.0	0.86	0.00	17.4	0.12	0.09
3337	60.33	0.27	0.00	1.5	0.15	0.20	25.9	0.21	0.07
3338	46.85	0.78	0.65	3.7	0.62	0.74	26.5	0.17	0.14
3339	63.28	0.22	0.20	0.4	0.09	0.03	29.9	0.15	0.36
3340	58.15	0.23	0.28	2.4	0.31	0.25	28.0	0.10	0.31
3341	63.77	0.24	0.00	0.3	0.09	0.04	28.7	0.17	0.00
3342	55.72	0.49	0.38	5.2	0.40	0.33	22.0	0.14	0.12
3343	60.99	0.46	0.24	0.6	0.15	0.12	24.2	0.13	0.18
3344	67.99	0.15	0.24	0.1	0.05	0.02	36.9	0.16	0.06
3345	61.75	0.37	0.23	1.8	0.29	0.22	18.4	0.09	0.09
3346	53.75	0.46	0.69	7.0	0.43	0.88	21.1	0.11	0.25
3347	62.23	0.20	0.26	0.6	0.15	0.10	23.1	0.09	0.08
3348	59.55	0.32	0.47	2.6	0.23	0.45	23.7	0.13	0.24
3349	66.50	0.34	0.09	0.2	0.06	0.02	34.7	0.18	0.18
3350	61.55	0.38	0.00	1.6	0.20	0.13	24.7	0.24	0.03
3351	58.47	0.60	0.90	0.6	0.13	0.10	19.7	0.15	0.10
3352	64.45	0.23	0.17	0.2	0.06	0.04	31.1	0.08	0.26
3353	55.23	0.25	0.00	0.5	0.09	0.06	22.2	0.14	0.09
3354	50.85	0.39	0.60	7.4	0.49	0.50	22.2	0.15	0.14
3355	57.96	0.58	0.00	1.4	0.23	0.00	20.3	0.11	0.00
3356	57.02	0.19	0.12	0.2	0.06	0.07	32.6	0.32	0.15

TABLE 6

WITHIN AND BETWEEN LABORATORY STANDARD DEVIATION DATA FOR IWTO 19 & IWTO 28

TRIAL	WOOL BASE			VEGETABLE MATTER BASE			MEAN FIBRE DIAMETER		
	GRAND MEAN	STANDARD DEVIATION		GRAND MEAN	STANDARD DEVIATION		GRAND MEAN	STANDARD DEVIATION	
		BETWEEN SUBS WITHIN LABS	BETWEEN LABS		BETWEEN SUBS WITHIN LABS	BETWEEN LABS		BETWEEN TEST SPEC WITHIN LABS	BETWEEN LABS
3357	59.66	0.34	0.21	0.4	0.14	0.00	20.5	0.10	0.13
3358	67.45	0.35	0.34	0.1	0.04	0.08	33.9	0.18	0.18
3359	63.39	0.34	0.00	0.3	0.07	0.01	21.3	0.08	0.11
3360	65.00	0.29	0.14	0.5	0.06	0.06	30.2	0.17	0.26
3361	63.96	0.26	0.19	0.6	0.09	0.05	31.1	0.22	0.01
3362	62.60	0.29	0.20	0.1	0.05	0.01	35.6	0.26	0.22
3363	55.78	0.33	0.21	3.6	0.80	0.26	23.1	0.17	0.24
3364	59.52	0.29	0.21	1.4	0.21	0.05	22.1	0.12	0.07
3365	57.95	0.38	0.26	0.5	0.29	0.08	21.8	0.10	0.16
3366	54.54	0.31	0.22	0.4	0.11	0.10	20.0	0.12	0.03
3367	59.05	0.37	0.28	1.6	0.12	0.18	30.1	0.29	0.16
3368	47.36	0.58	0.63	1.6	0.17	0.40	22.2	0.19	0.13
3369	62.82	0.22	0.17	0.4	0.07	0.07	32.4	0.20	0.50
3370	51.79	0.49	0.20	6.5	0.48	0.30	20.4	0.09	0.04
3371	59.10	0.44	0.00	0.5	0.10	0.07	23.0	0.16	0.16
3372	53.18	0.50	0.00	4.7	0.49	0.31	21.2	0.13	0.00
3373	66.24	0.11	0.22	0.1	0.03	0.04	36.0	0.16	0.23
3374	60.80	0.28	0.00	0.4	0.07	0.06	20.4	0.14	0.09
3375	58.09	0.29	0.08	1.0	0.24	0.03	21.5	0.13	0.13
3376	57.39	0.44	0.36	1.3	0.49	0.25	21.9	0.11	0.13
3377	63.08	0.39	0.00	1.1	0.15	0.20	35.4	0.18	0.43
3378	58.59	0.70	0.00	3.5	0.37	0.00	30.4	0.15	0.25
3379	63.04	0.27	0.13	0.7	0.10	0.11	24.2	0.12	0.18
3380	54.21	0.30	0.26	3.3	0.34	0.00	19.6	0.15	0.16
3381	51.69	0.56	0.55	6.8	0.49	0.26	22.4	0.10	0.14
3382	52.66	0.28	0.12	0.4	0.07	0.14	21.9	0.12	0.27
3383	55.10	0.40	0.28	1.1	0.18	0.19	17.5	0.10	0.06
3384	50.62	0.62	0.24	6.1	0.56	0.39	25.1	0.17	0.14
3385	63.27	0.30	0.30	1.3	0.17	0.15	29.2	0.08	0.19
3386	50.27	0.75	0.73	4.2	0.51	0.64	26.1	0.18	0.16
3387	43.78	0.25	0.30	0.4	0.12	0.11	20.8	0.10	0.05
3388	60.93	0.36	0.30	0.3	0.07	0.05	33.1	0.17	0.13
3389	61.42	0.22	0.22	1.6	0.11	0.12	31.3	0.20	0.33
3390	64.54	0.21	0.00	0.5	0.10	0.08	28.0	0.15	0.13
3391	57.64	0.32	0.00	1.6	0.21	0.12	20.2	0.11	0.20
3392	47.04	0.51	0.35	7.6	0.27	0.00	22.4	0.17	0.15
3393	60.95	0.24	0.15	0.6	0.11	0.12	24.2	0.15	0.23
3394	60.90	0.61	0.09	1.4	0.24	0.00	27.3	0.18	0.17
3395	43.99	0.39	0.11	0.6	0.11	0.14	21.1	0.14	0.14
3396	56.69	0.34	0.12	2.3	0.19	0.00	18.2	0.09	0.13
3397	64.70	0.30	0.12	0.6	0.09	0.13	28.2	0.21	0.11

TABLE 6
WITHIN AND BETWEEN LABORATORY STANDARD DEVIATION DATA FOR IWTO 19 & IWTO 28

TRIAL	WOOL BASE			VEGETABLE MATTER BASE			MEAN FIBRE DIAMETER		
	GRAND MEAN	STANDARD DEVIATION		GRAND MEAN	STANDARD DEVIATION		GRAND MEAN	STANDARD DEVIATION	
		BETWEEN SUBS WITHIN LABS	BETWEEN LABS		BETWEEN SUBS WITHIN LABS	BETWEEN LABS		BETWEEN TEST SPEC WITHIN LABS	BETWEEN LABS
3398	63.30	0.48	0.33	0.4	0.07	0.07	33.6	0.16	0.20
3399	58.97	0.42	0.14	1.6	0.19	0.18	25.1	0.12	0.09
3400	66.61	0.24	0.16	0.4	0.06	0.07	29.0	0.14	0.00
3401	55.33	0.17	0.21	2.4	0.19	0.30	19.6	0.10	0.10
3402	47.55	0.39	0.28	1.0	0.16	0.11	20.2	0.10	0.09
3403	46.47	1.23	0.33	9.2	1.17	0.13	17.5	0.13	0.08
3404	61.56	0.23	0.13	0.6	0.09	0.13	32.4	0.21	0.00
3405	60.45	0.45	0.45	1.2	0.27	0.19	18.4	0.14	0.12
3406	58.88	0.46	0.27	2.0	0.24	0.36	15.9	0.11	0.18
3407	47.62	0.65	0.61	5.6	0.66	0.31	19.4	0.11	0.13
3408	60.07	0.29	0.32	1.2	0.13	0.18	30.1	0.29	0.00
3409	58.69	0.26	0.00	0.7	0.10	0.08	23.0	0.10	0.25
3410	59.44	0.30	0.16	0.6	0.12	0.08	26.1	0.17	0.12
3411	63.91	0.29	0.18	0.4	0.08	0.03	31.7	0.23	0.33
3412	55.50	0.22	0.35	0.4	0.05	0.13	24.5	0.18	0.13
3413	50.16	0.33	0.35	0.9	0.20	0.15	22.3	0.20	0.00
3414	51.30	0.62	0.31	5.1	0.73	0.19	25.4	0.16	0.13
3415	50.16	0.73	0.00	4.2	0.32	0.20	27.0	0.25	0.02
3416	64.28	0.24	0.14	0.5	0.08	0.06	28.3	0.13	0.12
3417	51.04	0.38	0.47	6.2	0.35	0.47	20.6	0.08	0.14
3418	62.94	0.36	0.00	0.6	0.13	0.11	29.2	0.12	0.10
3419	64.86	0.21	0.00	0.4	0.10	0.09	24.1	0.09	0.19
3420	54.71	0.42	0.00	2.8	0.19	0.33	30.2	0.18	0.10
3421	62.68	0.29	0.20	0.4	0.09	0.15	33.6	0.27	0.00
3422	53.58	0.31	0.00	0.3	0.10	0.04	20.5	0.13	0.00
3423	63.85	0.37	0.00	0.7	0.17	0.15	15.3	0.07	0.10
3424	50.65	0.58	0.00	4.3	0.44	0.35	25.3	0.16	0.10
3425	56.74	0.30	0.00	1.3	0.18	0.10	23.1	0.12	0.18
3426	51.51	0.35	0.00	3.7	0.29	0.00	22.2	0.09	0.24
Mean	58.10	0.37	0.22	1.93	0.22	0.15	25.13	0.15	0.15
Min	43.78	0.11	0.00	0.10	0.02	0.00	15.30	0.07	0.00
Max	67.99	1.23	0.90	9.20	1.17	0.88	37.68	0.32	0.50

TABLE 7

WITHIN AND BETWEEN LABORATORY STANDARD DEVIATION DATA FOR IWTO-12

TRIAL	LASERSCAN MFD			LASERSCAN SD		
	GRAND MEAN	STANDARD DEVIATION		GRAND MEAN	STANDARD DEVIATION	
		BETWEEN TEST SPEC WITHIN LABS	BETWEEN LABS		BETWEEN TEST SPEC WITHIN LABS	BETWEEN LABS
3321	21.8	0.17	0.05	4.4	0.15	0.00
3322	23.0	0.25	0.00	4.6	0.18	0.00
3323	31.0	0.31	0.22	7.4	0.30	0.00
3324	20.3	0.18	0.00	3.9	0.20	0.00
3325	34.1	0.48	0.22	8.3	0.25	0.00
3326	31.1	0.22	0.18	6.8	0.20	0.05
3327	20.1	0.19	0.13	4.2	0.19	0.09
3328	20.8	0.26	0.00	4.3	0.18	0.09
3329	21.1	0.25	0.00	4.4	0.18	0.07
3330	19.9	0.20	0.00	3.7	0.15	0.24
3331	35.9	0.56	0.00	8.6	0.19	0.13
3332	22.9	0.27	0.00	4.8	0.16	0.05
3333	37.8	0.55	0.00	8.6	0.24	0.10
3334	24.9	0.24	0.05	5.8	0.19	0.00
3335	15.2	0.13	0.08	3.0	0.22	0.19
3336	17.1	0.23	0.00	3.8	0.26	0.12
3337	25.8	0.35	0.16	5.9	0.24	0.14
3338	26.8	0.42	0.20	6.0	0.31	0.10
3339	29.7	0.29	0.00	6.5	0.17	0.05
3340	28.1	0.27	0.10	6.3	0.17	0.00
3341	28.6	0.34	0.10	6.3	0.22	0.12
3342	21.7	0.21	0.14	4.2	0.10	0.00
3343	24.2	0.31	0.00	5.9	0.21	0.12
3344	37.4	0.46	0.38	8.5	0.24	0.08
3345	18.1	0.16	0.08	3.6	0.21	0.15
3346	20.7	0.15	0.00	4.1	0.16	0.10
3347	22.9	0.18	0.00	4.5	0.22	0.00
3348	23.9	0.18	0.13	5.7	0.43	0.00
3349	35.1	0.36	0.25	8.7	0.29	0.00
3350	24.8	0.25	0.15	6.2	0.28	0.00
3351	19.2	0.19	0.00	4.1	0.20	0.08
3352	31.0	0.69	0.00	7.1	0.35	0.00
3353	21.9	0.23	0.00	4.8	0.23	0.10
3354	21.8	0.19	0.00	4.2	0.26	0.30
3355	19.9	0.13	0.09	4.0	0.23	0.04
3356	33.2	0.48	0.20	8.9	0.47	0.00
3357	20.2	0.11	0.00	4.2	0.11	0.12
3358	34.3	0.27	0.16	8.3	0.23	0.13
3359	21.0	0.25	0.00	4.1	0.17	0.00
3360	29.9	0.49	0.00	6.6	0.28	0.00
3361	30.6	0.49	0.00	6.7	0.27	0.15

TABLE 7

WITHIN AND BETWEEN LABORATORY STANDARD DEVIATION DATA FOR IWTO-12

TRIAL	LASERSCAN MFD			LASERSCAN SD		
	GRAND MEAN	STANDARD DEVIATION		GRAND MEAN	STANDARD DEVIATION	
		BETWEEN TEST SPEC WITHIN LABS	BETWEEN LABS		BETWEEN TEST SPEC WITHIN LABS	BETWEEN LABS
3362	36.0	0.73	0.00	9.4	0.38	0.11
3363	22.9	0.17	0.06	4.7	0.20	0.11
3364	22.0	0.18	0.04	4.4	0.16	0.09
3365	21.4	0.29	0.00	4.7	0.22	0.05
3366	19.7	0.15	0.00	4.4	0.13	0.09
3367	30.0	0.46	0.00	6.9	0.25	0.00
3368	22.1	0.22	0.14	5.2	0.18	0.14
3369	32.2	0.38	0.13	7.6	0.27	0.00
3370	20.2	0.19	0.10	4.0	0.17	0.11
3371	22.9	0.33	0.00	4.8	0.32	0.07
3372	20.9	0.24	0.00	4.0	0.23	0.00
3373	36.4	0.35	0.00	8.9	0.25	0.00
3374	19.9	0.20	0.00	4.1	0.16	0.00
3375	21.3	0.34	0.00	4.6	0.29	0.00
3376	21.8	0.19	0.15	4.8	0.24	0.00
3377	35.5	0.43	0.00	8.3	0.19	0.11
3378	30.1	0.19	0.17	6.8	0.13	0.00
3379	24.1	0.21	0.09	5.6	0.25	0.10
3380	19.3	0.26	0.02	3.8	0.22	0.12
3381	22.1	0.15	0.00	4.4	0.14	0.03
3382	21.8	0.15	0.13	4.6	0.19	0.19
3383	17.2	0.11	0.09	3.5	0.21	0.00
3384	25.1	0.46	0.00	6.0	0.26	0.13
3385	29.2	0.18	0.04	6.5	0.21	0.00
3386	25.9	0.43	0.00	6.5	0.21	0.06
3387	20.7	0.28	0.14	4.6	0.24	0.12
3388	33.1	0.58	0.03	8.6	0.42	0.00
3389	31.1	0.33	0.09	7.9	0.21	0.00
3390	28.0	0.37	0.00	6.2	0.16	0.00
3391	19.8	0.16	0.07	3.9	0.16	0.00
3392	22.1	0.18	0.05	5.1	0.18	0.00
3393	24.2	0.14	0.08	5.4	0.38	0.00
3394	27.1	0.30	0.00	6.2	0.17	0.10
3395	20.9	0.32	0.00	6.0	0.37	0.00
3396	17.9	0.13	0.00	3.5	0.14	0.00
3397	28.0	0.27	0.11	6.2	0.27	0.00
3398	33.5	1.12	0.00	7.6	0.71	0.00
3399	25.0	0.24	0.10	6.0	0.12	0.07
3400	28.9	0.27	0.18	6.4	0.21	0.00
3401	19.3	0.27	0.00	3.8	0.21	0.04
3402	20.0	0.22	0.08	4.3	0.16	0.11

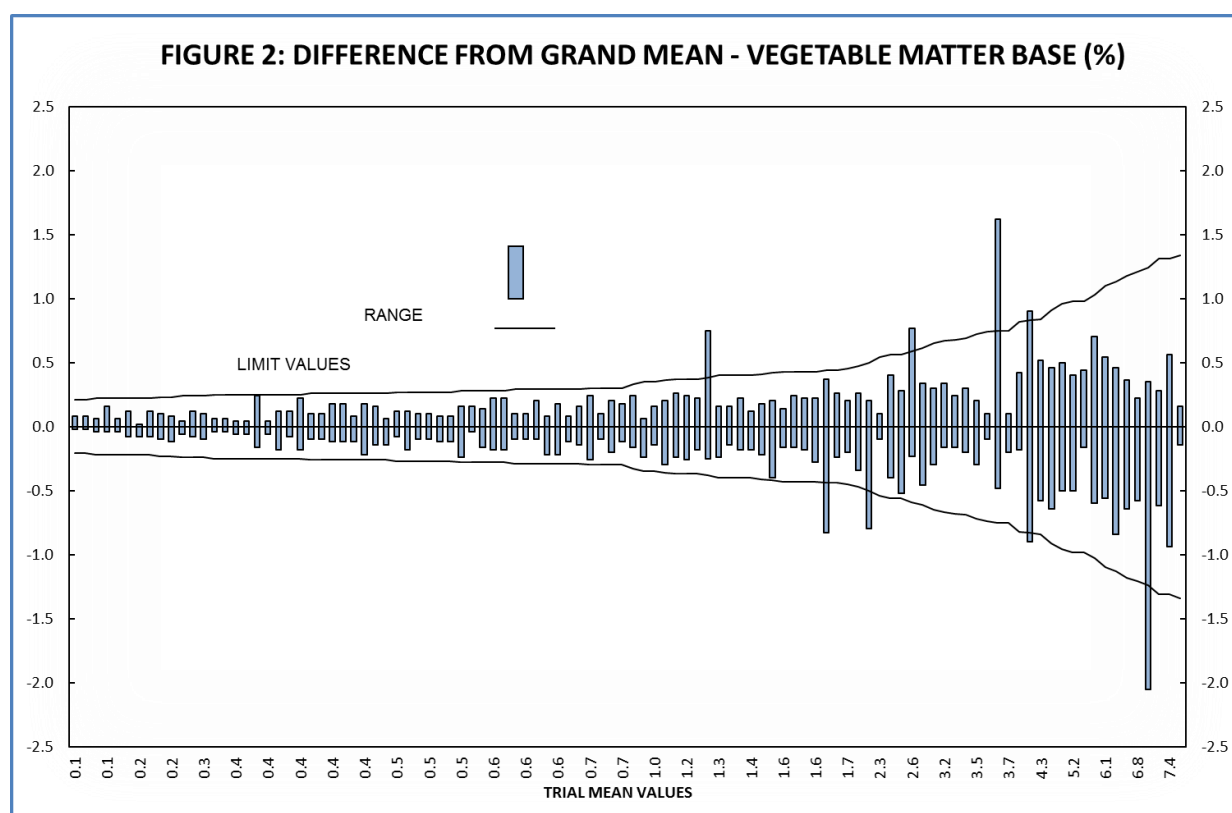
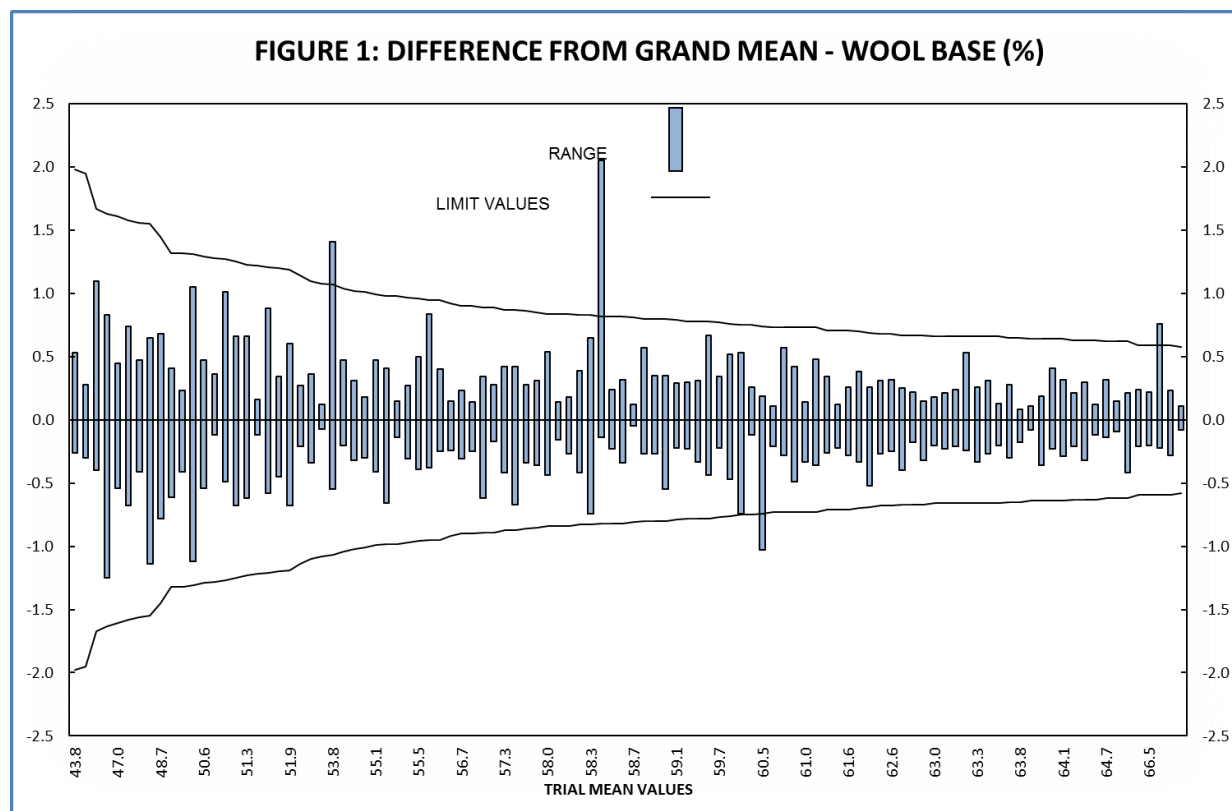
TABLE 7

WITHIN AND BETWEEN LABORATORY STANDARD DEVIATION DATA FOR IWTO-12

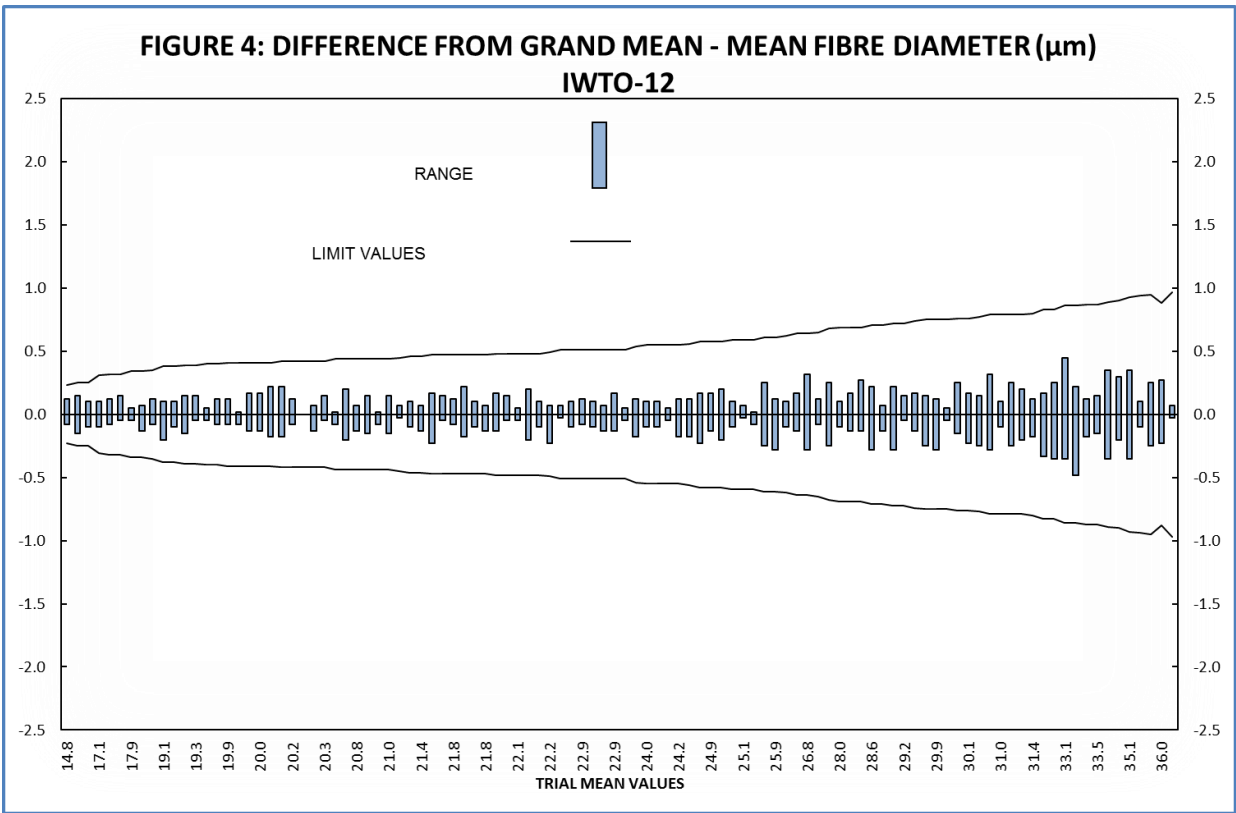
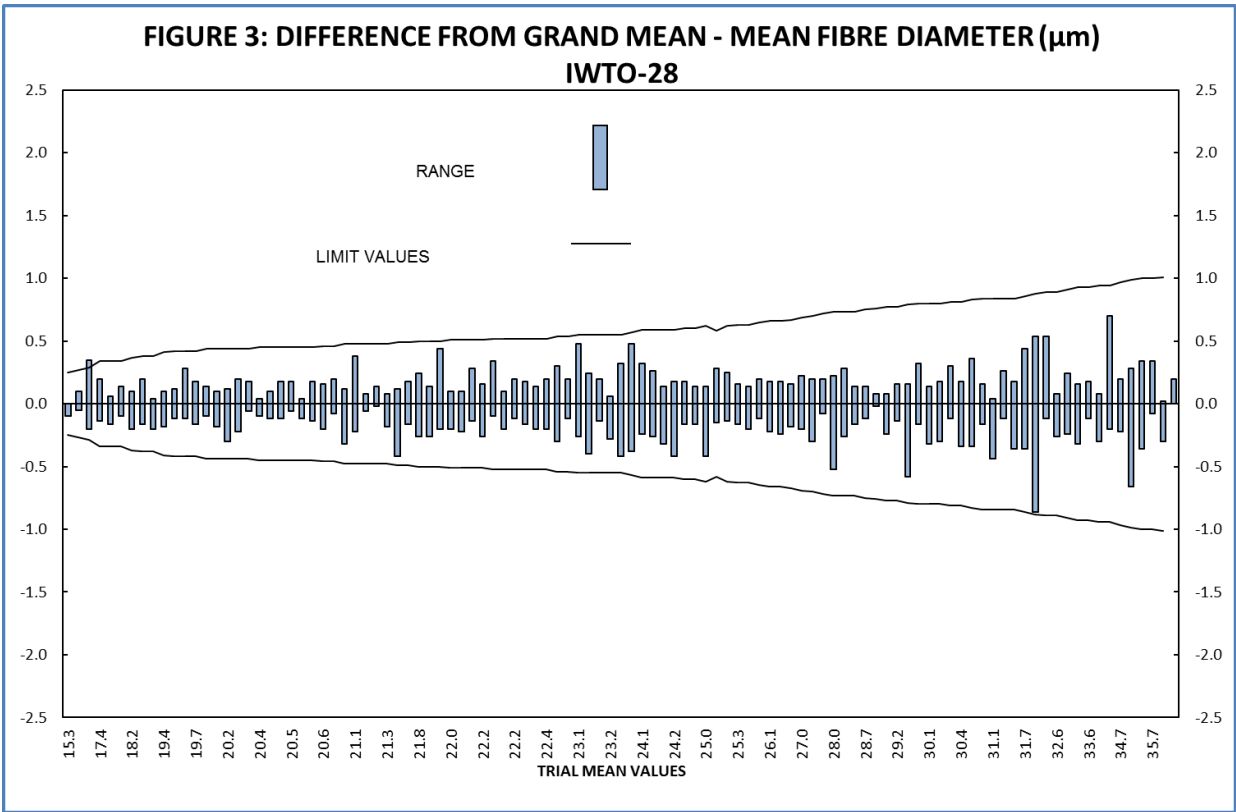
TRIAL	LASERSCAN MFD			LASERSCAN SD		
	GRAND MEAN	STANDARD DEVIATION		GRAND MEAN	STANDARD DEVIATION	
		BETWEEN TEST SPEC WITHIN LABS	BETWEEN LABS		BETWEEN TEST SPEC WITHIN LABS	BETWEEN LABS
3403	17.3	0.16	0.08	3.7	0.15	0.00
3404	32.4	1.23	0.00	7.4	0.57	0.20
3405	18.0	0.15	0.00	3.7	0.19	0.01
3406	15.3	0.12	0.06	3.2	0.21	0.00
3407	19.1	0.16	0.12	4.2	0.30	0.10
3408	29.9	0.34	0.00	6.5	0.18	0.05
3409	22.8	0.30	0.14	4.8	0.27	0.06
3410	26.0	0.20	0.00	6.1	0.25	0.14
3411	31.4	0.44	0.00	7.5	0.33	0.00
3412	24.3	0.16	0.09	5.1	0.21	0.00
3413	22.2	0.25	0.04	5.6	0.31	0.00
3414	25.1	0.25	0.00	6.1	0.20	0.13
3415	26.7	0.43	0.00	6.7	0.26	0.00
3416	28.0	0.26	0.06	6.2	0.17	0.10
3417	20.2	0.22	0.00	4.2	0.17	0.10
3418	28.8	0.29	0.00	6.6	0.15	0.21
3419	24.0	0.47	0.00	5.8	0.29	0.00
3420	30.1	0.33	0.08	8.1	0.32	0.00
3421	33.4	0.48	0.00	7.7	0.30	0.15
3422	20.2	0.22	0.00	4.3	0.14	0.10
3423	14.8	0.15	0.05	2.9	0.14	0.00
3424	25.3	0.37	0.00	6.5	0.26	0.00
3425	22.7	0.22	0.00	4.9	0.16	0.00
3426	21.8	0.17	0.03	4.3	0.13	0.04
Mean	24.96	0.30	0.06	5.61	0.23	0.06
Min	14.78	0.11	0.00	2.90	0.10	0.00
Max	37.83	1.23	0.38	9.40	0.71	0.30

Ranges of Laboratory Differences

The overall ranges of laboratory differences from the Grand Mean for four parameters are reported in Figures 1, 2, 3, and 4 together with the statistical limit values of these differences. In the case of Figure 4, which presents the ranges for LASERSCAN, the Airflow statistical limit values have been employed to enable easy comparison with the Airflow. The data are arranged in ascending order of Grand Mean for ease of interpretation, rather than on a trial-by-trial basis. Note also that to ensure easy reading of the graphs the Trial Mean Values for every third value only are printed on the horizontal axes.



NOTE: For trial 3386 two laboratories were outside the control limits.



In all, the Limit Values (at the 99% level of confidence) were exceeded on thirteen (13) occasions, which is eight (8) less than the theoretical expectation of 21 for the number of trials in this reporting period (assuming all events are independent of each other, $106 \text{ trials} \times 5 \text{ labs} \times 4 \text{ parameters} \times 1\% = 21$).

Four (4) outliers were due to difference in Wool Base, eight (8) to difference in VM Base, and one (1) to difference in Airflow Mean Fibre Diameter.

For one trial (3386) two laboratories were considered outliers for VM Base. Wool Base and VM Base outliers were detected for trial 3346 for a laboratory.

By reporting the results of its round trials the ILRT Group is providing commercial participants in the industry with a basis for confidence in the IWTO Certificates produced by its members. The ILRT Group is unique in reporting its technical performance and the series of trials provides a mechanism for ensuring that the member laboratories are harmonised.

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