LGC Standards

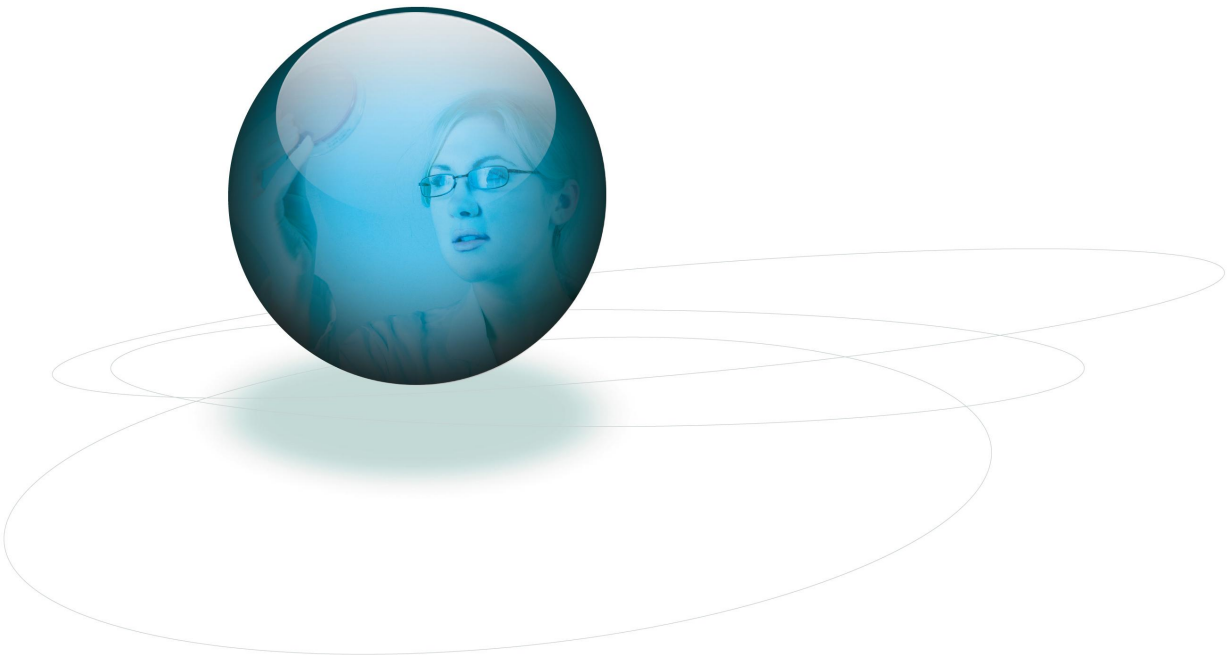
Excellence through measurement

TOYTEST - Toy Safety Analytes Proficiency Scheme Report

Round: 51 Group: Flux testing

Issue Number 1

Issued 01 October 2012



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Scheme Information

Aims of Scheme
The primary aim of the toy proficiency testing scheme (TOYTEST) is to enable laboratories undertaking the analysis and assessment of toy products by various regulations to monitor and improve the quality of their measurements for a range of analytes. TOYTEST will also enable laboratories and regulatory bodies concerned with the analysis and assessment of toys to gain information on the efficacy of methods and assist in the development of new methods.

Further information on the scheme organisation, the test materials, and the statistical analysis of data are available in the TOYTEST Scheme Description and the LGC PT General Protocol.

Performance Assessment
Once a PT round has closed, the results will be analysed and the assigned value determined, according to the criteria given in the Scheme Description.
For quantitative data, the participant's result, x, (or $\log_{10}$ x for microbiological data) is converted into a z score using the following formula;

$$z = \frac{(x - X)}{SDPA}$$

X = Assigned value
SDPA = Standard deviation for proficiency assessment

For quantitative data, the uncertainty of the assigned value is calculated to ensure that it would have a negligible effect on participants' performance scores. If the uncertainty of the assigned value is greater than 0.3 x SDPA, then this is not considered negligible. In this situation, a z' (z prime) performance score is automatically calculated rather than a z score, in order to take account of the measurement uncertainty of the assigned value. The z' score is calculated using the following formula;

$$z' = \frac{(x - X)}{\sqrt{(SDPA^2 + Ux^2)}}$$

X = Assigned value
SDPA = Standard deviation for proficiency assessment
Ux = Uncertainty of the assigned value

Trend graphs will use a mixture of z and z' scores, i.e. the 'performance score' for the round.

For quantitative data, gross errors or blunders are removed from the data by removal of any results that are greater than the assigned value ± 5 x SDPA. These results are not used in the final calculation of the assigned value and other summary statistics and will be included in the number of 'Excluded Results'. All results, including excluded results, will be given a performance score.

For the purposes of performance assessment for a single round, z and z' scores are interpreted as follows:

z/z' score	Interpretation	Colour coding
$\lvert z \rvert \leq 2.00$	Satisfactory result	Green
$2.00 < \lvert z \rvert$ and < 3.00	Questionable result	Amber
$\lvert z \rvert \geq 3.00$	Unsatisfactory result	Red
No score given	See below	No colour coding

Performance scores will not be given for the following:

- For qualitative results, where satisfactory performance is based on the participants reporting the same result as the assigned result. e.g. detected, not detected. For these results, colour coding of

green (satisfactory) or red (unsatisfactory) will apply.

- For results of zero; such a result is not normally appropriate and should not be reported, the result should be reported as less than the detection limit rather than zero.
  Note: for a very small number of analytes it may be appropriate to report a result of zero, depending on the type of measurement scale being used.

- For quantitative results where the analyte under test is present in the test material but participants report non-numerical results e.g. 0, <1, >300. In these cases, it is not possible to allocate a performance score and participants should assess their performance based on the assigned value and satisfactory range given.

- For quantitative results, for microbiological test materials, where the analyte under test is not present in the test material, the assigned value will be classified as 'Absent'. Results reported as 'less than' at or below the detection level for our method of confirmation will be assessed as satisfactory (green colour code). Results reported at a higher detection level will not be assessed and participants will need to use their own judgement to determine whether their result is fit for its intended use. Results reporting a positive count will be assessed as unsatisfactory (red colour code).

In some cases, performance scores may not be provided or may be provided but with colour coding suspended (indicating that scores need to be interpreted with caution). For example:

- For small data sets where less than 8 results have been submitted and the assigned value is derived using a consensus value from the participants' results. In these circumstances, there may be increased uncertainty of the assigned value, given the low number of participants, and performance scores will be given for information only.

- In cases where the distribution of the results gives cause for concern e.g. bi-modal data sets. These circumstances will be dependent on the statistical design that is in place.

- If the assigned value falls below a concentration threshold (only applies to some schemes).

In these or similar circumstances, further explanation as to the reasons for suspension of performance scoring or colour coding, and on the interpretation of results, will be given in the report.

Note: Data displayed in the report will have been rounded to the required number of decimal places. However statistical calculations will have been performed on unrounded data. For this reason, there may appear to be differences between displayed data and calculated data, but this does not affect results in any way.

Determination of the Assigned Values for the EN71-1 and ASTM F963 Paper Exercises
The results returned are reviewed and the assigned value for each clause listed is based on the general consensus of participant results.

If the consensus of the participants is below 75% the identified clauses are each reviewed by the TOYTEST advisory group to ascertain their overall opinion of the appropriate assigned value with regards to the toy provided. If the overall consensus of the TOYTEST advisory group disagrees with the general participant consensus then the assigned value is amended.

Where applicable the reasoning behind the assigned values provided for such clauses will be provided in the main reports.

Where both the 'relevant' and 'not relevant' options are both deemed to be valid options the assigned value(s) will be removed and instead the participant results and comments will be provided along with additional detailed comments on the applicability of the two reporting options

Confidentiality

A unique laboratory reference code is used to report results in order to ensure confidentiality.

Contact Details

The technical scheme coordinator is Wayne Gaunt.

Please contact **toytest@lgcpt.com** if you have any questions or comments regarding the scheme.

Authorisation

This report was authorised by Matthew Whetton, Head of Chemistry on the 01 October 2012

Sample Details

Samples were despatched on 28 August 2012.
Reporting deadline was 17 September 2012.

The following samples were despatched in TOYTEST Round 51:

14: Magnet

Further information regarding assigned values, performance assessment and technical comments can be found under the individual sample and analyte results.

Quality Control

All homogeneity assessments have been conducted in accordance with the principles stipulated in ISO 13528 [1] and the IUPAC [2] Harmonized PT Protocol. Further details regarding the assessment of homogeneity can be found in the LGC Standards Proficiency Testing General Protocol.

Sample	Analyte/Test	Method	Result
14	Flux	-	Pass

For quantitative testing, one-way ANOVA is used to estimate the analytical and sampling variance. For the sample to be considered sufficiently homogeneous for use in the PT scheme, the calculated sampling variance must be less than a critical value calculated according to the procedure described in the IUPAC [2] Harmonized PT Protocol.

Analyses were performed by Eurofins on randomly selected test materials.

For qualitative testing, the target analyte must be detected in 100% of test materials analysed.

For any analyte which has not been proven to be sufficiently homogeneous, and any closely related analytes, the value set for the SDPA may be suspended in order to take account of any potential inhomogeneity. The actual value used for the standard deviation for proficiency assessment is shown at the foot of the results and z-score tables in this report.

Often a particular test material does not require homogeneity assessment prior to distribution. Such sample types include standard solutions and aqueous solutions.

[1] ISO 13528 (2005), ‘Statistical methods for use in proficiency testing by inter-laboratory comparisons’.

[2] M Thompson, S L R Ellison, R Wood, ‘International Harmonised Protocol for the Proficiency Testing of Analytical Chemistry Laboratories’, *Pure Appl. Chem*., 2006, 78, 145-196.

Sample: 14 - Flux testing

Analyte: Magnetic flux index

Lab ID	Method	Result (kG2mm2)	z score
TY0004	ASTM F963-11, 8.24.3	183	0.97
TY0004	EN71-1: 2011, 8.35.4	183	0.97
TY0007	EN71-1: 2011, 8.35.4	167	0.37
TY0009	EN71-1: 2011, 8.35.4	167	0.37
TY0019	ASTM F963-11, 8.24.3	104	-1.99
TY0021	EN71-1: 2011, 8.35.4	164	0.26
TY0022	EN71-1: 2011, 8.35.4	153	-0.15
TY0026	ASTM F963-11, 8.24.3	127	-1.12
TY0027	EN71-1: 2011, 8.35.4	120	-1.39
TY0030	EN71-1: 2011, 8.35.4	144	-0.49
TY0034	ASTM F963-11, 8.24.3	140	-0.64
TY0034	EN71-1: 2011, 8.35.4	140	-0.64
TY0037	EN71-1: 2011, 8.35.4	153	-0.15
TY0038	EN71-1: 2011, 8.35.4	152	-0.19
TY0039	EN71-1: 2011, 8.35.4	93	-2.40
TY0040	ASTM F963-11, 8.24.3	185	1.05
TY0040	EN71-1: 2011, 8.35.4	199	1.57
TY0045	EN71-1: 2011, 8.35.4	174	0.64
TY0048	ASTM F963-11, 8.24.3	197	1.50
TY0048	EN71-1: 2011, 8.35.4	197	1.50
TY0049	EN71-1: 2011, 8.35.4	200	1.61
TY0051	EN71-1: 2011, 8.35.4	143	-0.52
TY0054	ASTM F963-11, 8.24.3	159	0.07
TY0054	EN71-1: 2011, 8.35.4	159	0.07
TY0057	ASTM F963-11, 8.24.3	157	0.00
TY0057	EN71-1: 2011, 8.35.4	157	0.00
TY0066	EN71-1: 2011, 8.35.4	220	2.36
TY0067	ASTM F963-11, 8.24.3	186	1.09
TY0067	EN71-1: 2011, 8.35.4	175	0.67
TY0068	EN71-1: 2011, 8.35.4	149	-0.30
TY0069	EN71-1: 2011, 8.35.4	175	0.67
TY0069	ASTM F963-11, 8.24.3	175	0.67
TY0084	EN71-1: 2011, 8.35.4	160	0.11
TY0086	EN71-1: 2011, 8.35.4	185	1.05
TY0090	EN71-1: 2011, 8.35.4	80	-2.88
TY0093	ASTM F963-11, 8.24.3	185	1.05
TY0094	EN71-1: 2011, 8.35.4	210	1.99
TY0095	EN71-1: 2011, 8.35.4	93	-2.40
TY0096	EN71-1: 2011, 8.35.4	158	0.04
TY0097	EN71-1: 2011, 8.35.4	150	-0.26
TY0104	EN71-1: 2011, 8.35.4	158	0.04
TY0123	EN71-1: 2011, 8.35.4	113	-1.65
TY0124	ASTM F963-11, 8.24.3	175	0.67
TY0124	EN71-1: 2011, 8.35.4	175	0.67
TY0126	EN71-1: 2011, 8.35.4	141	-0.60
TY0133	EN71-1: 2011, 8.35.4	171	0.52

Sample: 14 - Flux testing

Analyte: Magnetic flux index

Lab ID	Method	Result (kG2mm2)	z score
TY0138	ASTM F963-11, 8.24.3	141	-0.60
TY0138	EN71-1: 2011, 8.35.4	141	-0.60
TY0140	ASTM F963-11, 8.24.3	145	-0.45
TY0140	EN71-1: 2011, 8.35.4	145	-0.45
TY0141	ASTM F963-11, 8.24.3	85	-2.70
TY0141	EN71-1: 2011, 8.35.4	85	-2.70
TY0156	EN71-1: 2011, 8.35.4	129	-1.05
TY0174	ASTM F963-11, 8.24.3	140	-0.64
TY0174	EN71-1: 2011, 8.35.4	140	-0.64
TY0176	EN71-1: 2011, 8.35.4	161	0.15
TY0186	ASTM F963-11, 8.24.3	152	-0.19
TY0186	EN71-1: 2011, 8.35.4	152	-0.19
TY0242	EN71-1: 2011, 8.35.4	115	-1.57
TY0247	ASTM F963-11, 8.24.3	25	-4.94
TY0247	EN71-1: 2011, 8.35.4	25	-4.94
TY0256	EN71-1: 2011, 8.35.4	194	1.39
TY0258	EN71-1: 2011, 8.35.4	68	-3.33
TY0275	ASTM F963-11, 8.24.3	169	0.45
TY0275	EN71-1: 2011, 8.35.4	169	0.45
TY0279	ASTM F963-11, 8.24.3	111	-1.72
TY0291	ASTM F963-11, 8.24.3	195	1.42
TY0314	ASTM F963-11, 8.24.3	187	1.12
TY0321	EN71-1: 2011, 8.35.4	147	-0.37
TY0336	ASTM F963-11, 8.24.3	197	1.50
TY0341	EN71-1: 2011, 8.35.4	159	0.07
TY0345	ASTM F963-11, 8.24.3	114	-1.61
TY0345	EN71-1: 2011, 8.35.4	114	-1.61
TY0395	EN71-1: 2011, 8.35.4	161	0.15

Data Statistics

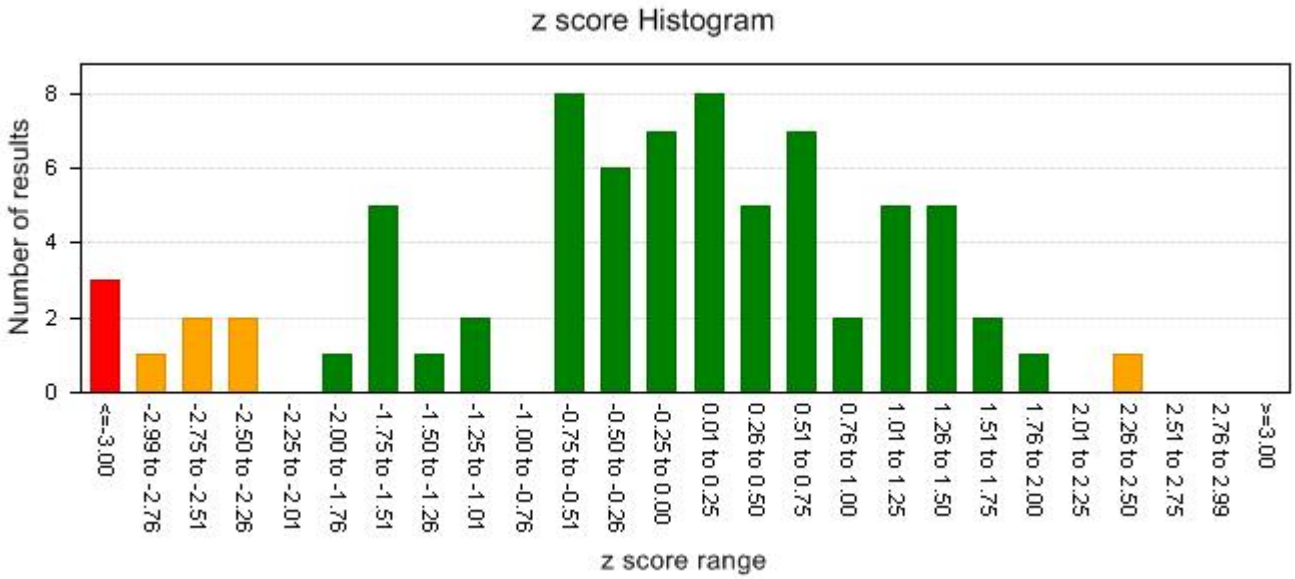
	Value
Number of Results	74
Number of Excluded Results	0
Mean	150 kG2mm2
Median	157 kG2mm2
Standard Deviation	38.5 kG2mm2
Robust Standard Deviation	26.7 kG2mm2
Result Range	25 to 220 kG2mm2

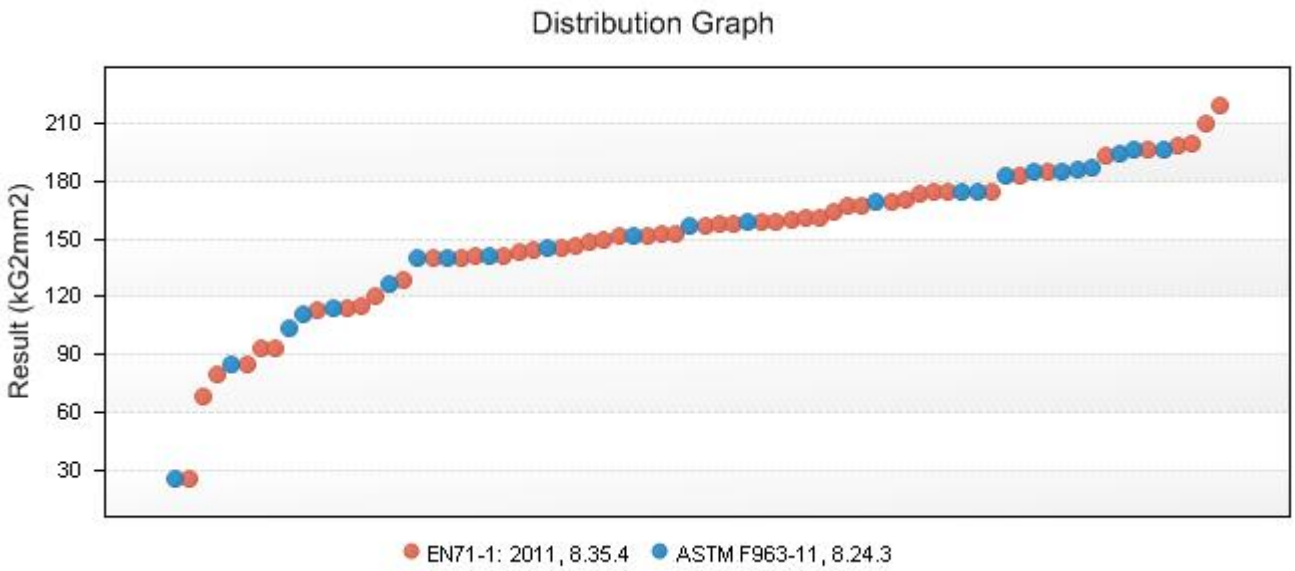
Sample: 14 - Flux testing

Analyte: Magnetic flux index

Performance Statistics

	Value
Assigned Value	157 kG2mm2
Uncertainty of Assigned Value	4 kG2mm2
SDPA	26.7 kG2mm2
Satisfactory Range	104 to 210 kG2mm2
Satisfactory z scores	87.8%
Questionable z scores	8.1%
Unsatisfactory z scores	4.1%





Sample: 14 - Flux testing

Analyte: Magnetic flux index

Methodology Summary

Method	Number of Results	Excluded Results	% of Total	Median	Robust SD	Range	Sat.
				kG2mm2			%
EN71-1: 2011, 8.35.4	50	0	67.57	155	22.2	25 to 220	86.0
ASTM F963-11, 8.24.3	24	0	32.43	158	40.0	25 to 197	91.7
All	74	0	100	157	26.7	25 to 220	87.8

Comments

Overall the satisfactory pass rate of the participants for this trial magnetic flux proficiency test material was high at 84.9%. However participants should consider that the range of results returned in this round was quite widespread with values being returned from just 25 kG2mm2 to 219.58 kG2mm2.

Participants are also advised to consider that as the assigned value and SDPA were based on the median and robust standard deviation of the participant data respectively and that the SDPA used to determine performance scores was set at 25.671 kG2mm2 which is approximately 16% of the assigned value.