

## Details of the new scoring system and report format:

### Major Changes

- **A new method of treating outliers;**

instead of being eliminated these are now **truncated** using a robust statistical method (Algorithm A ISO/DIS 13528:2002)

- **A new method of assessing relative performance:**

the variance index score will be abandoned. It will be replaced by the **z-score**. The SD used in the z-score calculation for a test will be derived from a running average of the last 10 valid cv's for that test

#### Interpretation of z-score:

z-score of between 2.0 and 2.99 will be given a **warning alert flag**

z-score of 3.0 or more will be given an **action alert flag** (printed on the report next to the z-score)

- **Tables and graphs** for long term performance and **summary reports** which do not rely on the variance index score

**IEQAS CVs**

Test	IEQAS_CV	LQ_CV	IEQAS_CCV	LQ_TCV
Albumin	4.5	4.2	7.7	1.8
AlkPhos	14.5	13.6	15.5	4
ALT	6.01	9.4	17.3	4
AST	5.59	8.4	12.5	4
Chol	4.97	4.6	7.6	3
CK	7.46	6.8	18.5	4
Creat	6.19	7.5	8.9	2.8
Ca	3.47	3.8	4	1.3
Cl	2.35	3.6	2.2	0.7
GGT	9.05	9	15.7	4
Gluc	3.44	6.6	7.7	2.1
HDL_C	11.29	9.8	12	3
Iron	4.66	7	15	2.4
LDH1	6.95	8.3	13.2	4
LDH2	8.73	9.9	13.2	4
Li	5.01	16	11	x
Mg	3.76	7	10	2.6
Osmol	1.28	2.1	2.9	0.7
K	2.44	3.4	2.9	1.1
Phos	5.18	6.4	7.8	2
Na	1.94	2.5	1.6	0.7
Tbili	9.09	14.3	19.2	3.4
TP	3.9	4.4	3.9	1.6
Trig	5.77	6.4	10	3
Urate	5.76	10.1	7.7	2
UREA	3.45	4.7	5.7	3

**The most representative method group was chosen for the labquality CV**

**In most cases the average CV used to calculate the z-score will be less than the old CCV**

**Participants performance will appear to be worse than it used to be!!**

**Some examples of z-score versus variance index score for CK:**

VIS based on CCV of 18.5%

Z-score based on average CV of 7.46 over last 10 distributions

Formulae:

$$V = 100(x - X) / X$$

$$VIS = \text{Abs value of } (v) 100 / CCV$$

$$z\text{-score} = (x - X) / s$$

$$D\% = 100(x - X) / X$$

Example using data from CK survey results

n = 41

As mean = 155.43,

And average CV for CK over 10 distributions = 7.46%

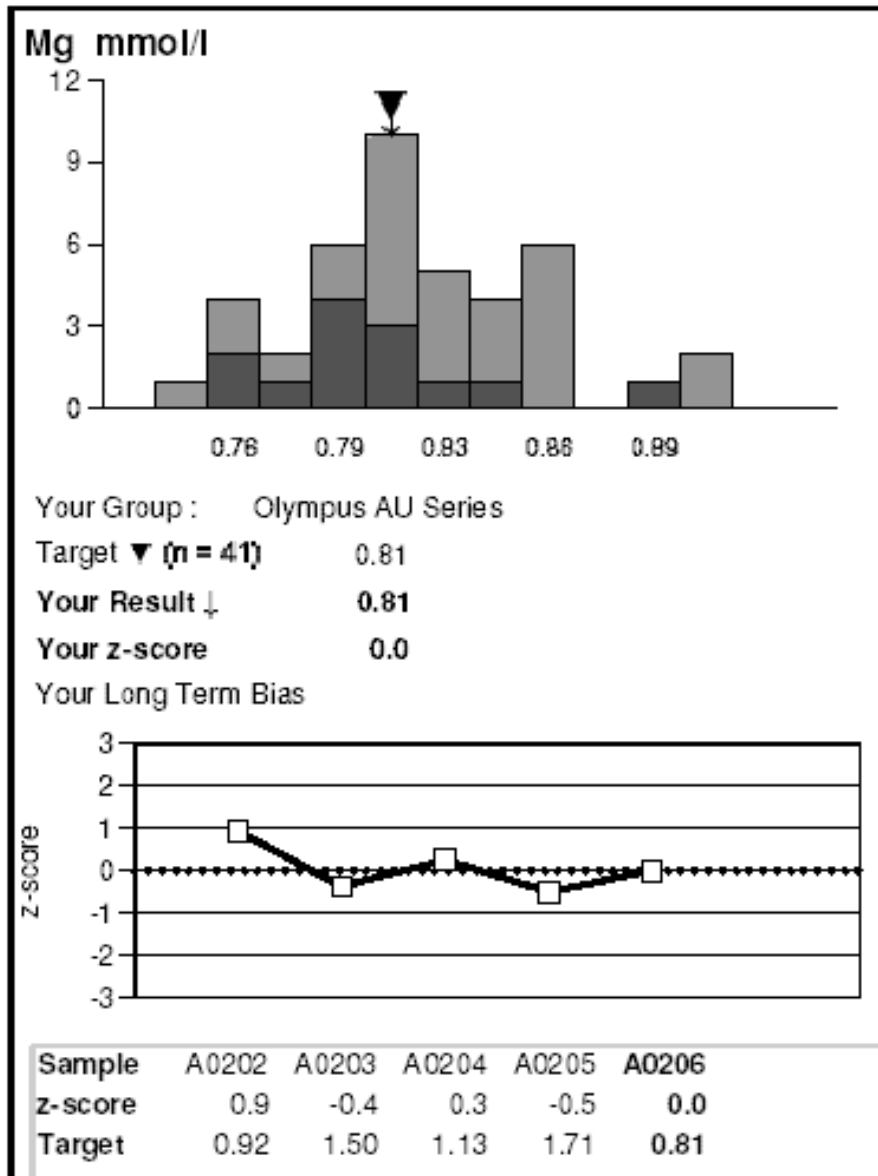
Then s = 11.59

CCV = 18.5

<b>CK=185</b>	<b>VIS</b>	<b>102</b>
	<b>z-score</b>	<b>2.55 &gt;&gt;warning flag</b>
	<b>D%</b>	<b>19.0%</b>

<b>CK=165</b>	<b>VIS</b>	<b>33.5</b>
	<b>z-score</b>	<b>0.826</b>
	<b>%D</b>	<b>6.2%</b>

<b>CK=157</b>	<b>VIS</b>	<b>5.46</b>
	<b>z-score</b>	<b>0.135</b>
	<b>%D</b>	<b>1.0%</b>



**Table 1:**

**Summary table single instrument**

Summary of current details of instrument and notes on methods which differ from group goes here

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Single instrument report		Clinical Chemistry		EQA survey A0006		Member ####
Test	Result	Mean	D%	z-score	CV%	Comment
Albumin	45.2	44.1	5	0.66	3.9	
Alk Phos	230	238	6	- 0.73	8.6	
ALT	82	79	7	0.89	6.2	
AST	244	239	7	0.91	6.0	
Chol	4.5	4.7	8	- 1.11	5.4	
CK	510	501	4	0.55	7.5	
Creat	210	201	9	1.44	6.4	
<b>Ca</b>	<b>2.78</b>	<b>2.38</b>	<b>22</b>	<b>2.55</b>	<b>3.4</b>	<b>OUT of CONTROL!!</b>
Cl	90.5	86.2	9	0.88	3.6	
GGT	100	94	11	1.21	6.6	
Gluc	6.55	6.63	8	- 0.99	4.9	
HDL-C	1.44	1.33	11	1.22	11.3	
K	5.55	5.50	7	0.88	2.6	
LDH	555	548	13	1.44	6.6	
Na	145.2	147	6	- 0.77	1.9	
Phos	1.66	1.51	14	1.55	4.6	
Bili	39	37	6	0.66	8.7	
TP	66	69	15	- 1.77	3.8	
Trig	1.65	1.57	9	1.11	6.0	
Urate	666	654	12	1.31	19.9	
Urea	12.6	12.1	8	1.02	5.2	
Comments						

**Table 2:****Summary table two instruments**

Instrument A: Cobas Integra 700

Instrument B: Cobas Integra 400

All methods Roche – Integra - as per original specifications

Two instrument report		Clinical Chemistry			EQA survey A0006			Member ####	
Test	Mean	Result A	z- score A	% D	Result B	z- score B	% D	CV%	Comment
Albumin	44.1	45.2	0.66	5	46.2	0.86	7	3.9	
Alk Phos	238	230	0.73	6	240	0.87	7	8.6	
ALT	79	82	0.89	7	88	0.99	8	6.2	
AST	239	244	0.91	7	244	0.91	7	6.0	
Chol	4.7	4.5	1.11	8	4.5	1.11	8	5.4	
CK	501	510	0.55	4	510	0.55	4	7.5	
Creat	201	210	1.44	9	210	1.44	9	6.4	
Ca	<b>2.38</b>	<b>2.78</b>	<b>2.55</b>	<b>22</b>	<b>2.38</b>	<b>0.55</b>	<b>2</b>	<b>3.4</b>	
Cl	86.2	90.5	0.88	9	90.5	0.88	9	3.6	
GGT	94	100	1.21	11	100	1.21	11	6.6	
Gluc	6.63	6.55	0.99	8	6.55	0.99	8	4.9	
HDL-C	1.33	1.44	1.22	11	1.44	1.22	11	11.3	
K	5.50	5.55	0.88	7	5.55	0.88	7	2.6	
LDH	548	555	1.44	13	555	1.44	13	6.6	
Na	147	145.2	0.77	6	145.2	0.77	6	1.9	
Phos	1.51	1.66	1.55	14	1.66	1.55	14	4.6	
Bili	37	39	0.66	6	39	0.66	6	8.7	
TP	69	66	1.77	15	66	1.77	15	3.8	
Trig	1.57	1.65	1.11	9	1.65	1.11	9	6.0	
Urate	654	666	1.31	12	666	1.31	12	19.9	
Urea	12.1	12.6	1.02	8	12.6	1.02	8	5.2	
Coments:									

**Table 3:****Summary table two samples or duplicate samples distributed on separate dates**

Not shown: Same layout as table 2 - but for Sample A, Sample B.

**ISO/DIS 13528:2002 (E)**

**Annex C (normative) Robust analysis**

**C.1 Robust analysis: Algorithm A**

This algorithm yields robust values of the average and standard deviation of the data to which it is applied.

Denote the  $p$  items of **data, sorted into increasing order**, by:

$$x_1, x_2, \dots, x_i, \dots, x_p$$

Denote the robust average and robust standard deviation of these data by  $x^*$  and  $s^*$ .

Calculate initial values for  $x^*$  and  $s^*$  as:

$$x^* = \text{median of } x_i \quad (i = 1, 2, \dots, p)$$

$$s^* = 1,483 \text{ median of } [x_i - x^*] \quad (i = 1, 2, \dots, p)$$

Update the values of  $x^*$  and  $s^*$  as follows. Calculate:

$$\varphi = 1,5 s^* .$$

For each  $x_i$  ( $i = 1, 2, \dots, p$ ),

calculate:

$$x_i^* = \begin{cases} x^* - \varphi . & \text{if } x_i < x^* - \varphi . \\ x^* + \varphi . & \text{if } x_i > x^* + \varphi \\ x_i & \text{otherwise} \end{cases}$$

Calculate the new values of  $x^*$  and  $s^*$  from:

$$x^* = \sum x_i^* / p$$

$$s^* = 1,134 \sqrt{\sum (x_i^* - x^*)^2 / (p - 1)}$$

where the summation is over  $i$ .

The robust estimates  $x^*$  and  $s^*$  may be derived by an iterative calculation, i.e. by updating the values of  $x^*$  and  $s^*$  several times, until the process converges. Convergence may be assumed when there is no change from one iteration to the next in the third significant figure of the robust standard deviation and of the equivalent figure in the robust average. This is a simple method to program on a computer.

**ISO/DIS 13528:2002 (E)**Table 3— Concentrations of three allergen specific IgE antibodies:  
calculation of the robust average and standard deviation for antibody d1.

Iteration	0	1	2	3	4	5
d = 1,5 s*	---	5,30	4,79	4,62	4,58	4,56
x* - d	---	5,56	6,24	6,41	6,45	6,47
x* + d	---	16,15	15,82	15,65	15,61	15,59
P	<b>2,18</b>	<b>5,56</b>	<b>6,24</b>	<b>6,41</b>	<b>6,45</b>	<b>6,47</b>
R	6,95	6,95	6,95	6,95	6,95	6,95
N	7,00	7,00	7,00	7,00	7,00	7,00
K	8,10	8,10	8,10	8,10	8,10	8,10
B	8,29	8,29	8,29	8,29	8,29	8,29
Q	8,39	8,39	8,39	8,39	8,39	8,39
a	8,47	8,47	8,47	8,47	8,47	8,47
H	9,38	9,38	9,38	9,38	9,38	9,38
V	9,71	9,71	9,71	9,71	9,71	9,71
Y	10,10	10,10	10,10	10,10	10,10	10,10
G	10,40	10,40	10,40	10,40	10,40	10,40
W	10,50	10,50	10,50	10,50	10,50	10,50
L	10,80	10,80	10,80	10,80	10,80	10,80
O	10,85	10,85	10,85	10,85	10,85	10,85
T	10,90	10,90	10,90	10,90	10,90	10,90
A	11,30	11,30	11,30	11,30	11,30	11,30
S	11,80	11,80	11,80	11,80	11,80	11,80
C	11,90	11,90	11,90	11,90	11,90	11,90
J	12,10	12,10	12,10	12,10	12,10	12,10
F	12,50	12,50	12,50	12,50	12,50	12,50
E	13,40	13,40	13,40	13,40	13,40	13,40
X	13,60	13,60	13,60	13,60	13,60	13,60
M	13,80	13,80	13,80	13,80	13,80	13,80
I	14,20	14,20	14,20	14,20	14,20	14,20
D	<b>15,60</b>	<b>15,60</b>	<b>15,60</b>	<b>15,60</b>	<b>15,60</b>	<b>15,59</b>
Z	<b>16,07</b>	<b>16,07</b>	<b>15,82</b>	<b>15,65</b>	<b>15,61</b>	<b>15,59</b>
U	<b>16,30</b>	<b>16,15</b>	<b>15,82</b>	<b>15,65</b>	<b>15,61</b>	<b>15,59</b>
Average	10,91	11,03	11,03	11,03	11,03	11,03
St dev	3,13	2,81	2,72	2,69	2,68	2,68
New x*	10,85	11,03	11,03	11,03	11,03	11,03
New s*	3,53	3,19	3,08	3,05	3,04	3,04

NOTE: The data are numbers of units (U) in thousands (k) per litre (L) of sample, where a unit is defined by the concentration of an international reference material.