

# Proficiency testing for in-house and external measuring stations - results and evaluation

## Proficiency testing scheme: Inorganic acids

March 2018

### Part 1: Volatile inorganic acids

## Summary of laboratory test results

Measurand hydrochloric acid

Laboratory	Sample 1	Z score	Sample 2	Z score	Sample 3	Z score
Unit	mg/m <sup>3</sup>		mg/m <sup>3</sup>		mg/m <sup>3</sup>	
10	0.453	-1.49	4.280	-0.92	2.900	-0.99
27	0.610	1.46	4.670	-0.09	3.960	2.31 E
68	0.545	0.24	4.506	-0.44	2.914	-0.94
73	0.525	-0.14	4.654	-0.12	3.285	0.21
74	0.538	0.11	4.623	-0.19	3.428	0.65
78	0.540	0.14	4.770	0.12	3.261	0.13
83	0.476	-1.07	4.590	-0.26	2.959	-0.80
110	0.550	0.33	4.610	-0.22	3.170	-0.15
114	0.560	0.52	4.688	-0.05	3.150	-0.21
151	0.530	-0.04	4.700	-0.03	3.340	0.38
174	0.538	0.11	4.888	0.37	3.304	0.27
177	0.572	0.74	4.799	0.18	3.428	0.65
178	0.470	-1.17	5.110	0.84	2.860	-1.11
195	0.630	1.83	4.910	0.42	4.040	2.55 E
208	0.570	0.71	3.520	-2.53 BE	3.070	-0.46
224	0.426	-2.00	4.333	-0.81	2.685	-1.66
248	0.518	-0.27	5.272	1.19	2.952	-0.83
-	-	--	-	--	-	--
Method	ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	Z <=2.00		Z <=2.00		Z <=2.00	
No. of laboratories that submitted results	17		17		17	
Mean	0.532		4.713		3.218	
Reproducibility s.d.	0.053		0.254		0.364	
Rel. reproducibility s.d.	9.95 %		5.38 %		11.30 %	
Reference value	0.560		4.980		3.440	
Target s.d.	0.053		0.471		0.322	

<b>Laboratory</b>	<b>Sample 1 Z score</b>	<b>Sample 2 Z score</b>	<b>Sample 3 Z score</b>
Rel. target s.d.	10.00 %	10.00 %	10.00 %
Lower limit of tolerance	0.426	3.770	2.574
Upper limit of tolerance	0.639	5.655	3.862
Type B outliers		1	
No. of measurement values outside of tolerance limits		1	2
<b>Explanation of outlier types</b>			
A: Single outlier	Grubbs		
B: Differing laboratory mean	Grubbs		
C: Excessive laboratory s.d.	Cochran		
E: mean outside tolerance limits			
F:  Z-Score >3.5			
L: Differing laboratory mean (Grubbs II)	Grubbs für 2		

## Summary of laboratory test results

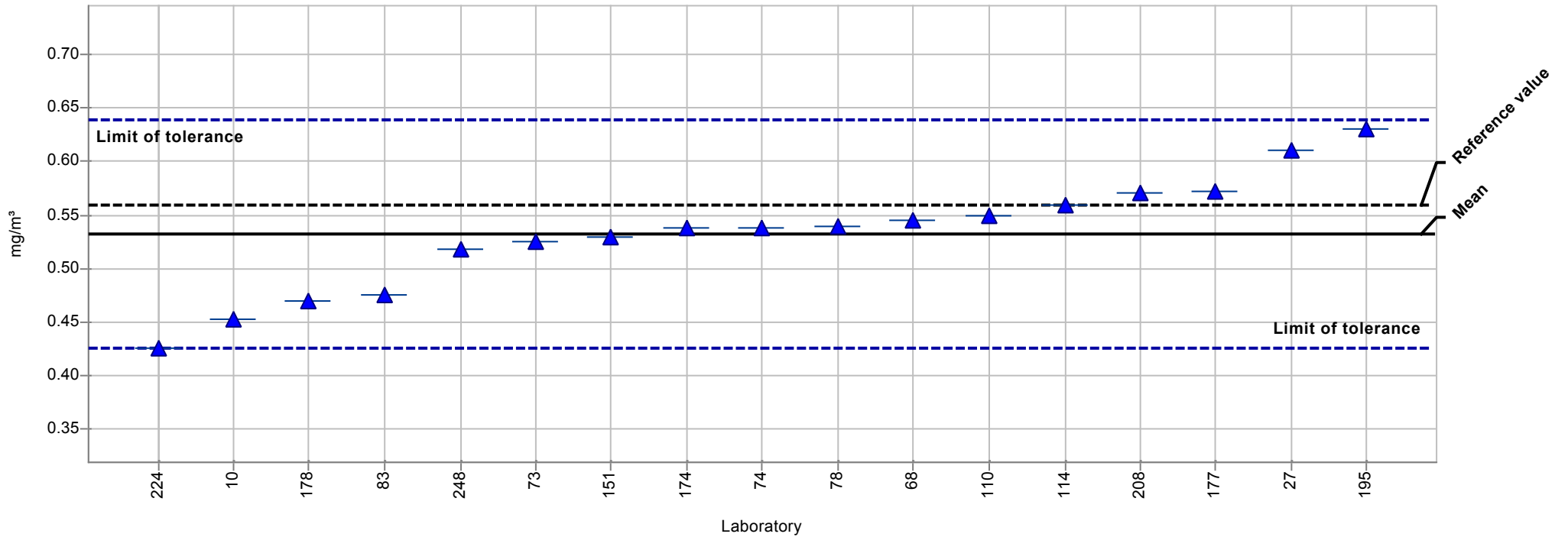
Measurand nitric acid

Laboratory	Sample 1	Z score	Sample 2	Z score	Sample 3	Z score
Unit	mg/m <sup>3</sup>		mg/m <sup>3</sup>		mg/m <sup>3</sup>	
10	1.610	-1.08	2.300	-0.37	2.220	-0.58
68	1.657	-0.82	2.204	-0.77	1.941	-1.77
73	1.841	0.20	2.397	0.04	2.543	0.79
74	1.942	0.75	2.695	1.28	5.526	13.44 BE
78	1.794	-0.07	2.374	-0.06	2.372	0.06
83	0.350	-8.06 BE	0.502	-7.90 BE	0.542	-7.70 BE
95	1.803	-0.02	2.235	-0.64	2.487	0.55
110	1.560	-1.36	2.190	-0.83	3.320	4.09 FE
114	1.698	-0.60	2.286	-0.43	2.265	-0.39
151	1.870	0.36	2.480	0.38	2.640	1.20
174	1.889	0.46	2.455	0.28	2.468	0.47
177	2.060	1.41	2.428	0.17	2.902	2.31 E
178	1.900	0.52	2.430	0.17	2.270	-0.37
195	2.060	1.41	2.740	1.47	2.470	0.48
208	1.760	-0.25	1.520	-3.64 BE	2.120	-1.01
224	1.481	-1.80	2.015	-1.56	1.615	-3.15 E
248	1.968	0.90	2.599	0.88	2.686	1.40
-	-	--	-	--	-	--
Method	ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	Z <=2.00		Z <=2.00		Z <=2.00	
No. of laboratories that submitted results	17		17		17	
Mean	1.806		2.389		2.357	
Reproducibility s.d.	0.170		0.195		0.325	
Rel. reproducibility s.d.	9.43 %		8.17 %		13.81 %	
Reference value	1.930		2.460		2.830	
Target s.d.	0.181		0.239		0.236	

<b>Laboratory</b>	<b>Sample 1 Z score</b>	<b>Sample 2 Z score</b>	<b>Sample 3 Z score</b>
Rel. target s.d.	10.00 %	10.00 %	10.00 %
Lower limit of tolerance	1.445	1.911	1.886
Upper limit of tolerance	2.167	2.866	2.829
Type B outliers	1	2	2
Type F outliers			1
No. of measurement values outside of tolerance limits	1	2	5
Explanation of outlier types			
A: Single outlier	Grubbs		
B: Differing laboratory mean	Grubbs		
C: Excessive laboratory s.d.	Cochran		
E: mean outside tolerance limits			
F:  Z-Score >3.5			
L: Differing laboratory mean (Grubbs II)	Grubbs für 2		

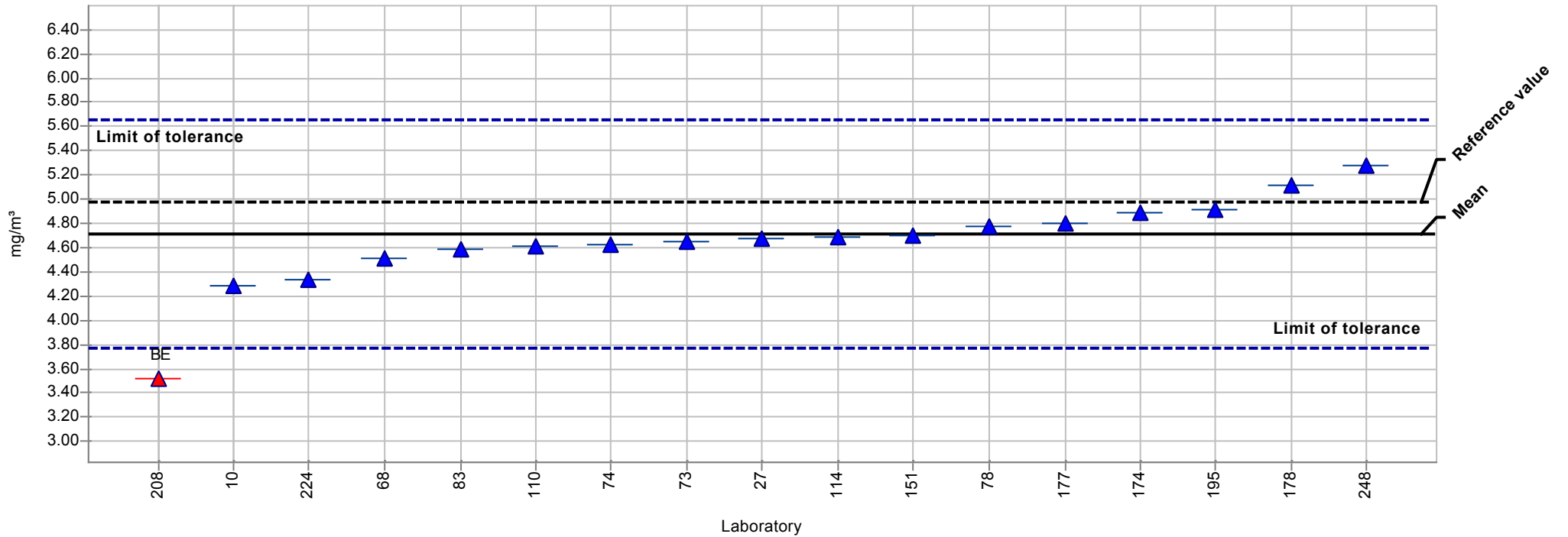
## Summary results

Sample:	Sample 1	Mean:	0.532 mg/m <sup>3</sup>
Measurand:	hydrochloric acid	Reproducibility s.d.:	0.053 mg/m <sup>3</sup>
Method:	ISO 5725-2	Rel. reproducibility s.d.:	9.95%
Rel. target s.d.:	10.00% (Limited)	Reference value:	0.560 mg/m <sup>3</sup>
No. of laboratories:	17	Range of tolerance:	0.426 - 0.639 mg/m <sup>3</sup> ( Z-Score  <= 2.00)



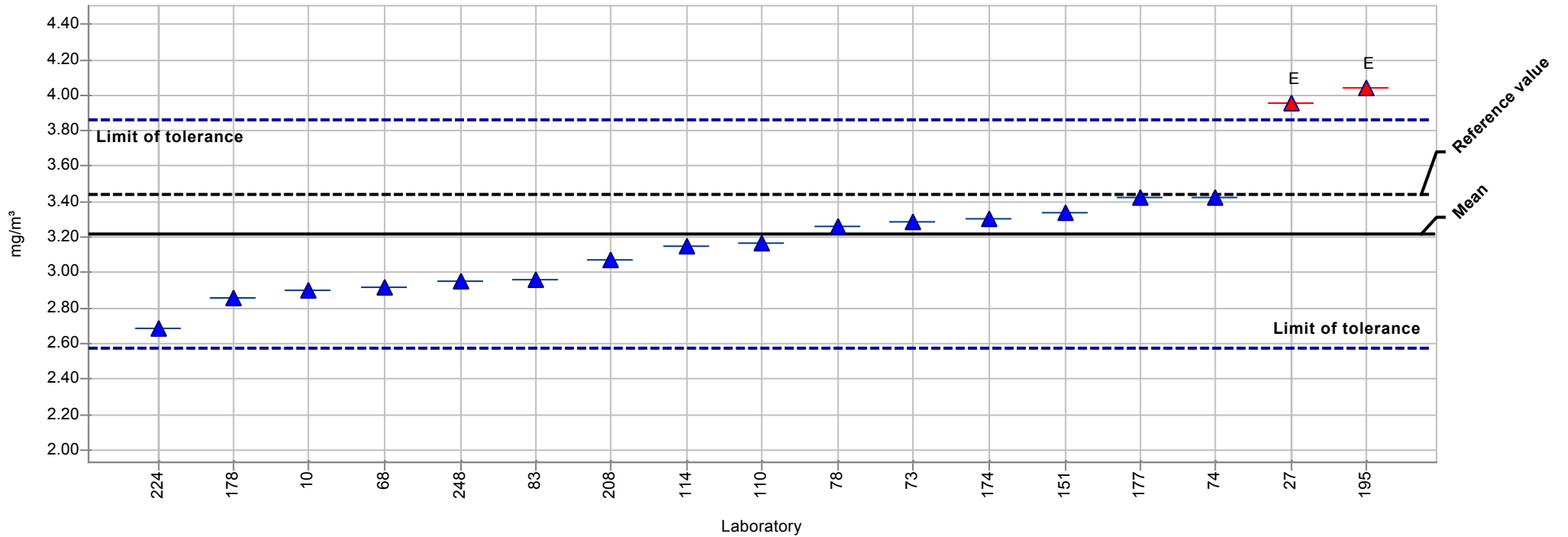
## Summary results

Sample:	Sample 2	Mean:	4.713 mg/m <sup>3</sup>
Measurand:	hydrochloric acid	Reproducibility s.d.:	0.254 mg/m <sup>3</sup>
Method:	ISO 5725-2	Rel. reproducibility s.d.:	5.38%
Rel. target s.d.:	10.00% (Limited)	Reference value:	4.980 mg/m <sup>3</sup>
No. of laboratories:	16	Range of tolerance:	3.770 - 5.655 mg/m <sup>3</sup> ( Z-Score  ≤ 2.00)



## Summary results

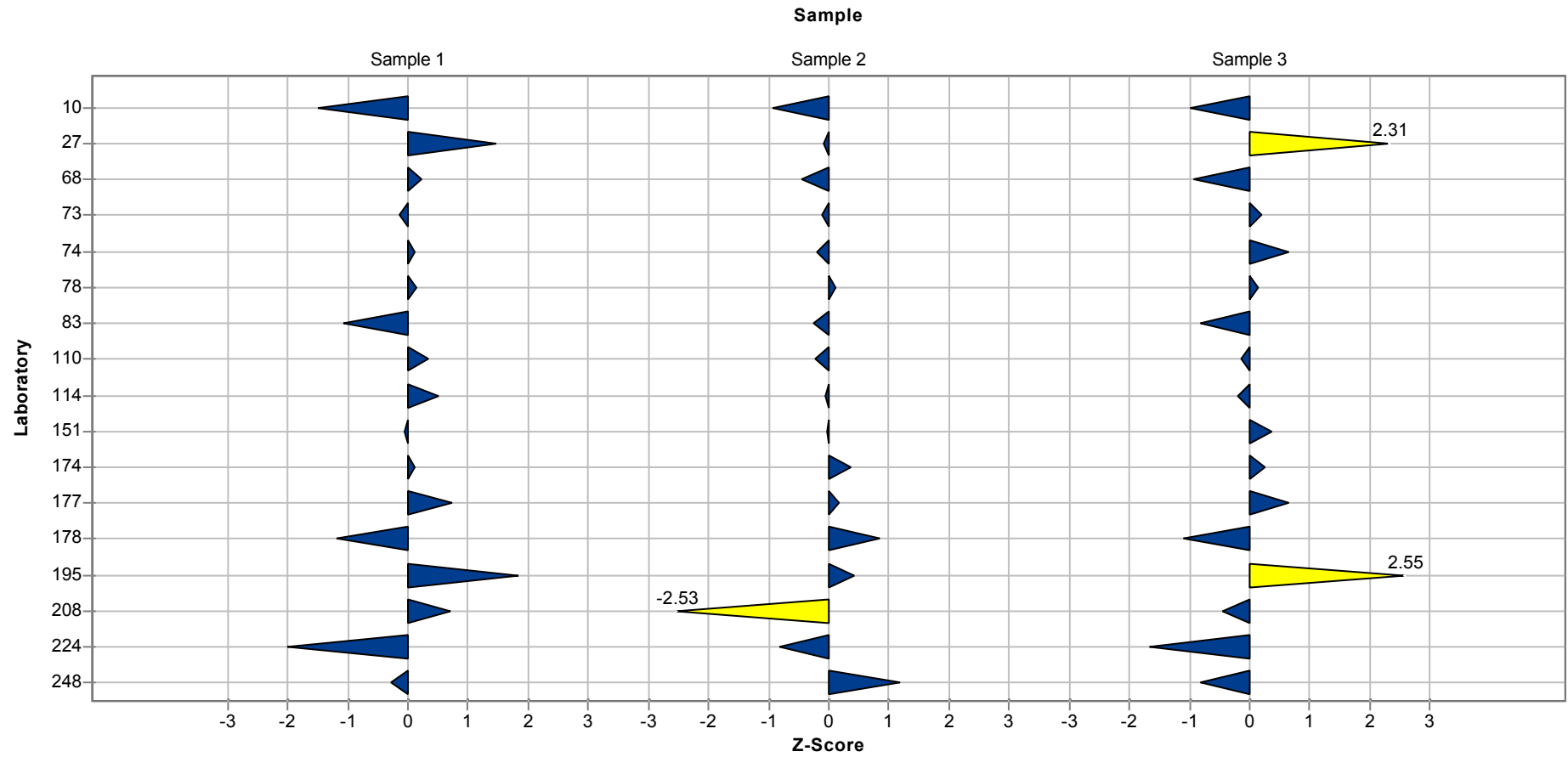
Sample:	Sample 3	Mean:	3.218 mg/m <sup>3</sup>
Measurand:	hydrochloric acid	Reproducibility s.d.:	0.364 mg/m <sup>3</sup>
Method:	ISO 5725-2	Rel. reproducibility s.d.:	11.30%
Rel. target s.d.:	10.00% (Limited)	Reference value:	3.440 mg/m <sup>3</sup>
No. of laboratories:	17	Range of tolerance:	2.574 - 3.862 mg/m <sup>3</sup> ( Z-Score  <= 2.00)





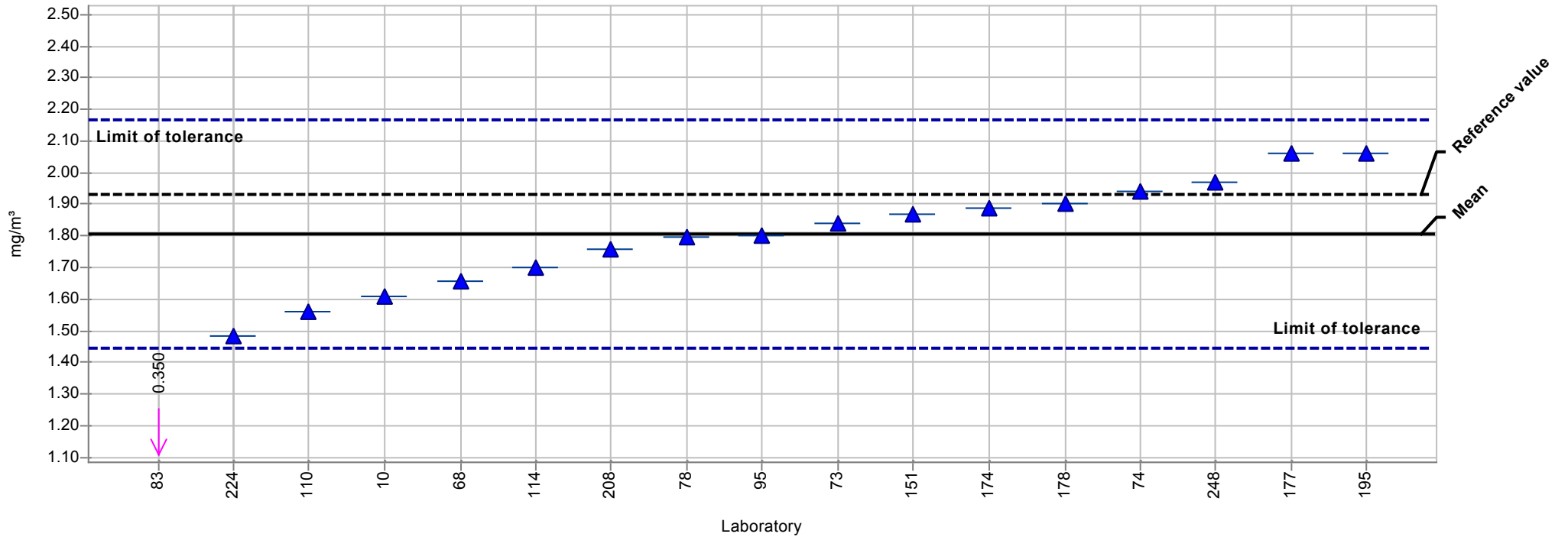
# Analyte chart of Z-Scores

Measurand: hydrochloric acid



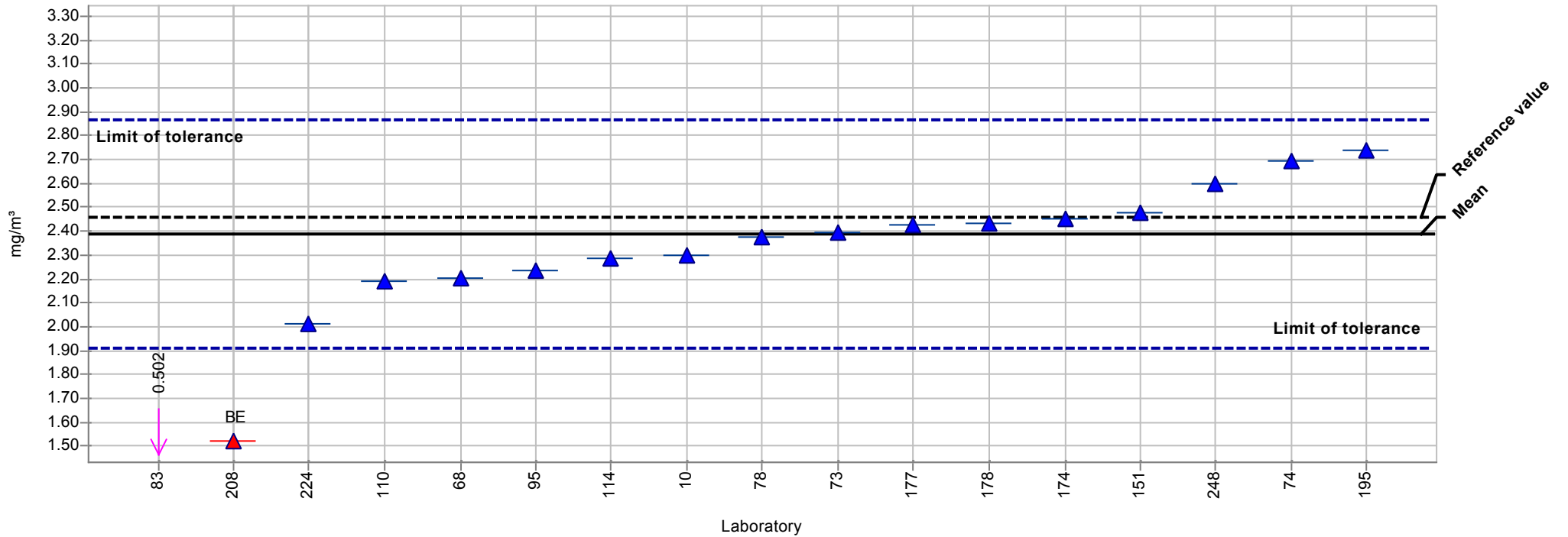
## Summary results

<b>Sample:</b>	Sample 1	<b>Mean:</b>	1.806 mg/m <sup>3</sup>
<b>Measurand:</b>	nitric acid	<b>Reproducibility s.d.:</b>	0.170 mg/m <sup>3</sup>
<b>Method:</b>	ISO 5725-2	<b>Rel. reproducibility s.d.:</b>	9.43%
<b>Rel. target s.d.:</b>	10.00% (Limited)	<b>Reference value:</b>	1.930 mg/m <sup>3</sup>
<b>No. of laboratories:</b>	16	<b>Range of tolerance:</b>	1.445 - 2.167 mg/m <sup>3</sup> ( Z-Score  <= 2.00)



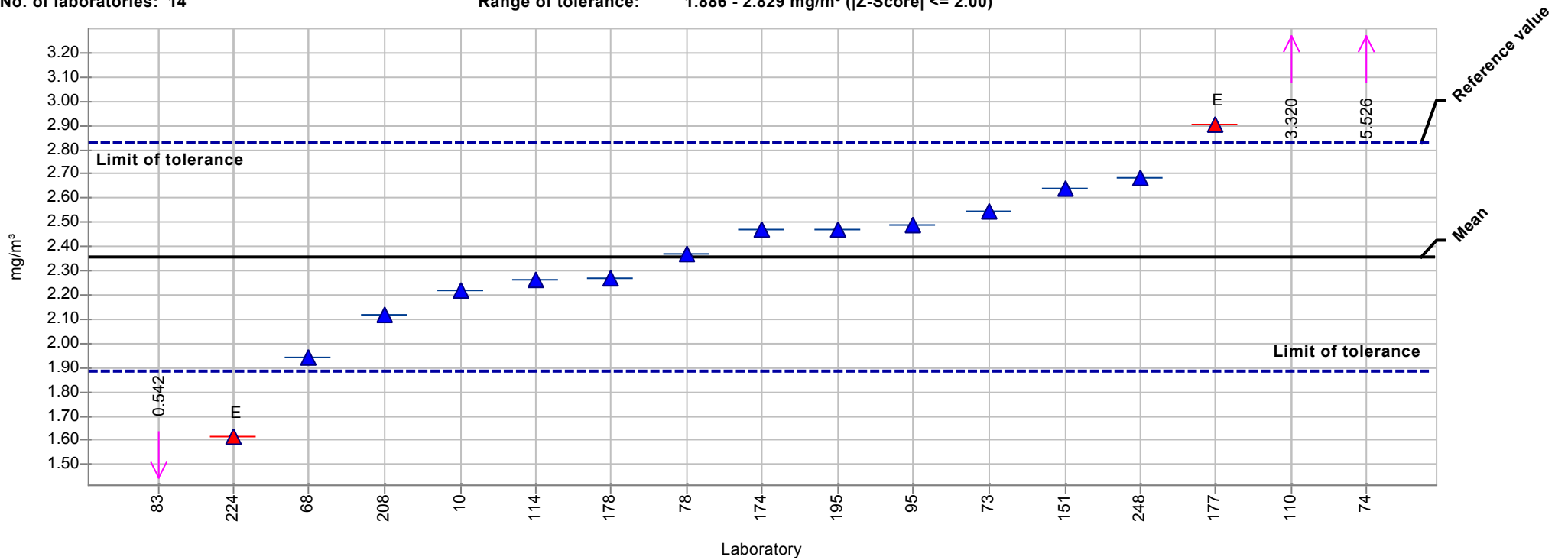
## Summary results

<b>Sample:</b>	Sample 2	<b>Mean:</b>	2.389 mg/m <sup>3</sup>
<b>Measurand:</b>	nitric acid	<b>Reproducibility s.d.:</b>	0.195 mg/m <sup>3</sup>
<b>Method:</b>	ISO 5725-2	<b>Rel. reproducibility s.d.:</b>	8.17%
<b>Rel. target s.d.:</b>	10.00% (Limited)	<b>Reference value:</b>	2.460 mg/m <sup>3</sup>
<b>No. of laboratories:</b>	15	<b>Range of tolerance:</b>	1.911 - 2.866 mg/m <sup>3</sup> ( Z-Score  <= 2.00)



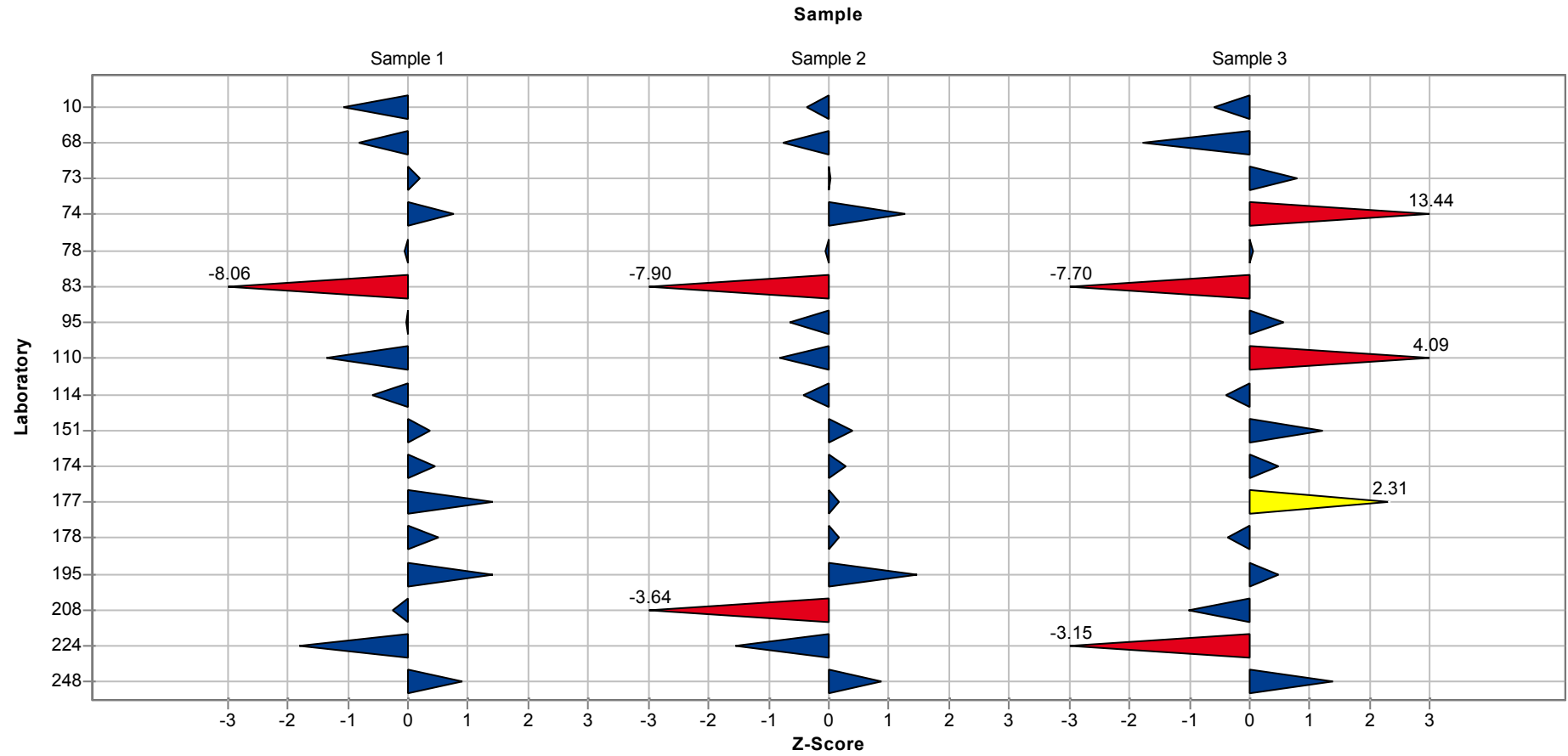
## Summary results

<b>Sample:</b>	Sample 3	<b>Mean:</b>	2.357 mg/m <sup>3</sup>
<b>Measurand:</b>	nitric acid	<b>Reproducibility s.d.:</b>	0.325 mg/m <sup>3</sup>
<b>Method:</b>	ISO 5725-2	<b>Rel. reproducibility s.d.:</b>	13.81%
<b>Rel. target s.d.:</b>	10.00% (Limited)	<b>Reference value:</b>	2.830 mg/m <sup>3</sup>
<b>No. of laboratories:</b>	14	<b>Range of tolerance:</b>	1.886 - 2.829 mg/m <sup>3</sup> ( Z-Score  <= 2.00)



# Analyte chart of Z-Scores

Measurand: nitric acid



## Questions and Answers

Participant	Analytical method
10	Ionic Chromatography
68	IFA-Arbeitsmappe
72	H2SO4/H3PO4: AA.EZM/I.45.02
73	IFA Arbeitsmappe 6172 (Salzsäure und Salpetersäure) 6173 (Schwefelsäure und Phosphorsäure)
74	HNO3 / HCl: IFA 6172; H2SO4 / H3PO4: IFA 6173
78	
83	Ionic chromatography
95	IFA 6173
110	nach IFA Arbeitsmappe
114	Ionic chromatography based on NF ISO 21438-1, NF ISO 21438-2, MetroPol_53
151	Ion chromatography
174	MétroPol Anions
177	IFA
178	MTA/MA-60/A05
195	MTA/MA-019/A90
208	In-house method, based on SFS-EN ISO 10304-1, ISO 21438-1/2/3, NIOSH, OSHA and DFG methods.
224	ion chromatography after aqueous extraction
248	IFA 6172 (HCl, HNO3), IFA 6173 (H2SO4, H3PO4)
266	IC-UV

Participant	Desorption solution	Volume of desorption solution
10	water	20
68	Impr. QFF: Wasser / Desorb. QFF: 3.6 mM Natriumcarbonat-Lsg.	Impr. QFF: 10 ml / Desorb. QFF: Verdünnung von 2.5 ml Desorptionslg./10 ml
72	H2SO4/H3PO4: AA.EZM/I.45.02	2,9 ml
73	6172: Reinstwasser; 6173: wie angeliefert	6172: 10 ml; 6173: wie angeliefert (4ml)
74	lt. Vorgabe IFA 6172 / 6173	HNO3 / HCl: 15ml; H2SO4 / H3PO4: 14ml
78	Eluent	10 mL

## Volatile inorganic acids 1/2018

Participant	Desorption solution	Volume of desorption solution
83	Water	20 ml
95	bidest. Wasser	10
110	entionisiertes Wasser	50ml
114	DI w ater	10
151	w ater	10
174	H2O	H3PO4 - H2SO4 10mL ; HCl - HNO3 4mL+2mL H2O
177	Reinstw assen	50 ml bzw . 20 ml
178	H2O	10 ml
195	1mMNaHCO3: 3.5 mM Na2CO3	5 mL
208	Ultrapure w ater for impregnated filters.	10 ml for impregnated filters.
224	w ater	25
248	Bidest.	10 ml
266	NaHCO3 0.3mM	10mL

Participant	Desorption time
10	10 min
68	15 Min. Ultraschallbad, anschl. mind. 30 Min. stehen lassen
73	6172: 15 Minuten Ultraschallbad + 30 Min. Wartezeit; 6173: w urde in Desorptionslösung angeliefert. Zur Aufarbeitung 15 Minuten Ultraschallbad + 30 Min. Wartezeit
74	15 min. im Ultraschallbad + 30 min. Standzeit
78	30 Minuten Ultraschall
83	20 min
95	45 Min. Ultraschall, 1 h stehen lassen
110	15min, ja
114	15 min w ith ultrasonic bath
151	2 hours, no
174	15min US
177	30 Minuten Ultraschallbad
178	15 min ultrasonic bath
195	1 h orbital shaker
208	45 min, ultrasonic bath.

## Volatile inorganic acids 1/2018

Participant	Desorption time
224	1h
248	15 Minuten Ultraschallbad danach 30 Minuten stehen gelassen
266	15 minutes

Participant	Ion Chromatographic System	Analytical column
10	conductimetry	Anion metrosep A Supp 5 - 250mm
68	930 Compact IC Flex von Metrohm	Metrosep C 6 - 250/4.0 von Metrohm
72	Dionex ICS 2000, Leitfähigkeitsdetektor	Dionex Ionpac AS11-HC 2x 250 mm
73	6172 und 6173: Isokratische Pumpe; Leitfähigkeitsdetektor; Autosampler	6172 und 6173: AS4A
74	Metrohm IC 881 Compact pro: UV / VIS 887 und LF 881	A Supp 7
78	Handeinspritzung	Metrosep A Supp5 250mm
95	Dionex ICS1100, Leitf.-Detektor, AS Waters 717plus	AS9-SC + AG9-SC
110	Thermo Scientific (Dionex) Integrion / AS/AP Autosampler	AG18 / AS18
114	Thermo Scientific ICS5000, Conductivity	AS15
151	Thermo ICS5000+	Dionex AS22 2mm * 250 mm
174	Dionex DX600,ED50,AS40 and ICS3000 (Problem with DX600)	AS12 and AS15
177	Dionex ICS 2000	AS 15
178	Conductivity Detector	MetrosepA Supp 5-150/4.0
195	DIONEX ICS-3000	IONPACK AS14 250 X 4 mm
208	Dionex/Thermo Fisher ICS5000, AS-AP, conductivity.	AS19-4µm, + guard
224	ICS 3000 single pump, conductivity detector	AG11-HC, AS11-HC Dionex Ionpac
248	isokratisch, Leitfähigkeitsdetektor DS 6, AS-AP	AG 14, AS 14
266	Dionex ICS-2000, Suppressor ASRS-300, 4mm from Dionex	IonPac AS14A

Participant	Mobile phase	Flow rate	Recovery rate
10	Na <sub>2</sub> CO <sub>3</sub> - NaHCO <sub>3</sub> .	0.7 ml/min	No
68	3.6 mM Natriumcarbonat-Lsg.	0.7 ml/min	Nein
72	29 mmol KOH	0,38 ml/min	



## Volatile inorganic acids 1/2018

Participant	Mobile phase	Flow rate	Recovery rate
73	6172 und 6173: NaCO <sub>3</sub> / NaHCO <sub>3</sub>	6172 und 6173: 2,0 ml / Min.	6172 und 6173: nein
74	4.0 mmol/l Na <sub>2</sub> CO <sub>3</sub> + 2.5% Acetonitril	0,8	Nein
78	3,2 mmol/L Na <sub>2</sub> CO <sub>3</sub> & 1,0 mmol/L NaHCO <sub>3</sub>	0,7 mL/min	
95	2 mmol Na <sub>2</sub> CO <sub>3</sub> / 0,75 mmol NaHCO <sub>3</sub>	2	--
110	23mmol KOH	0,25 ml/min	
114	KOH 8-65 mM gradient	1.4 mL/min	No
151	4.5 mM NaCo <sub>3</sub> , 1.4 mM NaHCO <sub>3</sub>	0.3	No
174	2.7mMNa <sub>2</sub> CO <sub>3</sub> +0.31mMNaHCO <sub>3</sub> ; KOH for ICS300	1.5mL/min	MétoPol Anions M-53 - données de validation
177	KOH 12-48 mmol/l	0,3 ml/min	nein
178	Sodium Carbonate 3,2mM+Sodium Bicarbonate 1mM	0,8 ml/min	
195	1mMNaHCO <sub>3</sub> : 3.5 mM Na <sub>2</sub> CO <sub>3</sub>	1.2	no
208	KOH 5-58 mM gradient	0,010	No
224	30mMol KOH	0.38	no
248	14 mmol NasCO <sub>3</sub> , 2,75 mmol NaHCO <sub>3</sub>	1,30	nein
266	Carbonate/Bicarbonate (mM) 2.7/0.3	1.5	n/a

Participant	Date of analysis
10	22/03/2018
68	26./27.3.2018
72	26.03.2018
73	6172: 28.03.2018; 6173: 27.03.2018
74	21.03.2018 - 23.03.2018
78	20.03-29.03.2018
83	03-04-18
95	09.04.2018 - 11.04.2018
110	17.4.18 und 20.4.18
114	10/04/2018
151	0.3/04/2018
174	28-29/03/2018
177	26./27.04.2018

## Volatile inorganic acids 1/2018

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Participant	Date of analysis
178	10/04/2018
195	3 and 5 April 2018
208	17.-20.3.2018
224	24/04/2018
248	11.04.18
266	03 apr 2018

# Proficiency testing for in-house and external measuring stations - results and evaluation

## Proficiency testing scheme: Inorganic acids

March 2018

## Part 2: Non-volatile inorganic acids

## Summary of laboratory test results

Measurand phosphoric acid

Laboratory	Sample 1	Z score	Sample 2	Z score	Sample 3	Z score
Unit	mg/m <sup>3</sup>		mg/m <sup>3</sup>		mg/m <sup>3</sup>	
3	0.296	-0.20	0.840	0.12	0.398	-0.24
5	0.319	0.56	0.867	0.44	0.429	0.51
6	0.310	0.26	0.867	0.45	0.471	1.55
10	0.288	-0.47	0.762	-0.82	0.357	-1.25
27	0.280	-0.73	0.610	-2.65 BE	0.350	-1.42
64	0.300	-0.07	0.800	-0.36	0.500	2.26 E
66	0.340	1.25	0.850	0.24	0.470	1.52
68	0.294	-0.27	0.885	0.66	0.458	1.23
72	0.312	0.33	0.850	0.24	0.422	0.35
73	0.305	0.11	0.805	-0.30	0.405	-0.08
74	0.290	-0.40	0.827	-0.03	0.384	-0.59
78	0.305	0.10	0.828	-0.02	0.410	0.05
83	0.282	-0.66	0.866	0.43	0.396	-0.28
95	0.327	0.82	0.860	0.36	0.430	0.54
110	0.310	0.26	0.820	-0.12	0.400	-0.19
111	0.312	0.33	0.834	0.05	0.415	0.17
114	0.321	0.63	0.826	-0.05	0.406	-0.05
130	0.300	-0.07	0.812	-0.22	0.407	-0.02
151	0.313	0.36	0.835	0.06	0.413	0.13
174	0.331	0.96	0.855	0.30	0.372	-0.88
177	0.301	-0.04	0.868	0.46	0.422	0.35
178	0.270	-1.06	0.800	-0.36	0.380	-0.68
195	0.200	-3.38 BE	0.750	-0.96	0.360	-1.17
208	0.313	0.36	0.806	-0.29	0.401	-0.17
224	0.285	-0.57	0.779	-0.61	0.372	-0.87
243	0.300	-0.07	0.845	0.18	0.436	0.69

Laboratory	Sample 1	Z score	Sample 2	Z score	Sample 3	Z score
248	0.309	0.23	0.859	0.35	0.426	0.44
259	0.290	-0.40	0.820	-0.12	0.390	-0.44
263	0.261	-1.37	0.702	-1.54 B	0.343	-1.58
266	0.297	-0.17	0.821	-0.11	0.413	0.13
–	–	–	–	–	–	–
Method	ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	Z ≤2.00		Z ≤2.00		Z ≤2.00	
No. of laboratories that submitted results	30		30		30	
Mean	0.302		0.830		0.408	
Reproducibility s.d.	0.018		0.033		0.036	
Rel. reproducibility s.d.	5.84 %		3.96 %		8.92 %	
Reference value	0.312		0.841		0.425	
Target s.d.	0.030		0.083		0.041	
Rel. target s.d.	10.00 %		10.00 %		10.00 %	
Lower limit of tolerance	0.242		0.664		0.326	
Upper limit of tolerance	0.363		0.996		0.489	
Type B outliers	1		2			
No. of measurement values outside of tolerance limits	1		1		1	
Explanation of outlier types						
A: Single outlier	Grubbs					
B: Differing laboratory mean	Grubbs					
C: Excessive laboratory s.d.	Cochran					
E: mean outside tolerance limits						
F:  Z-Score >3.5						
L: Differing laboratory mean (Grubbs II)	Grubbs für 2					

## Summary of laboratory test results

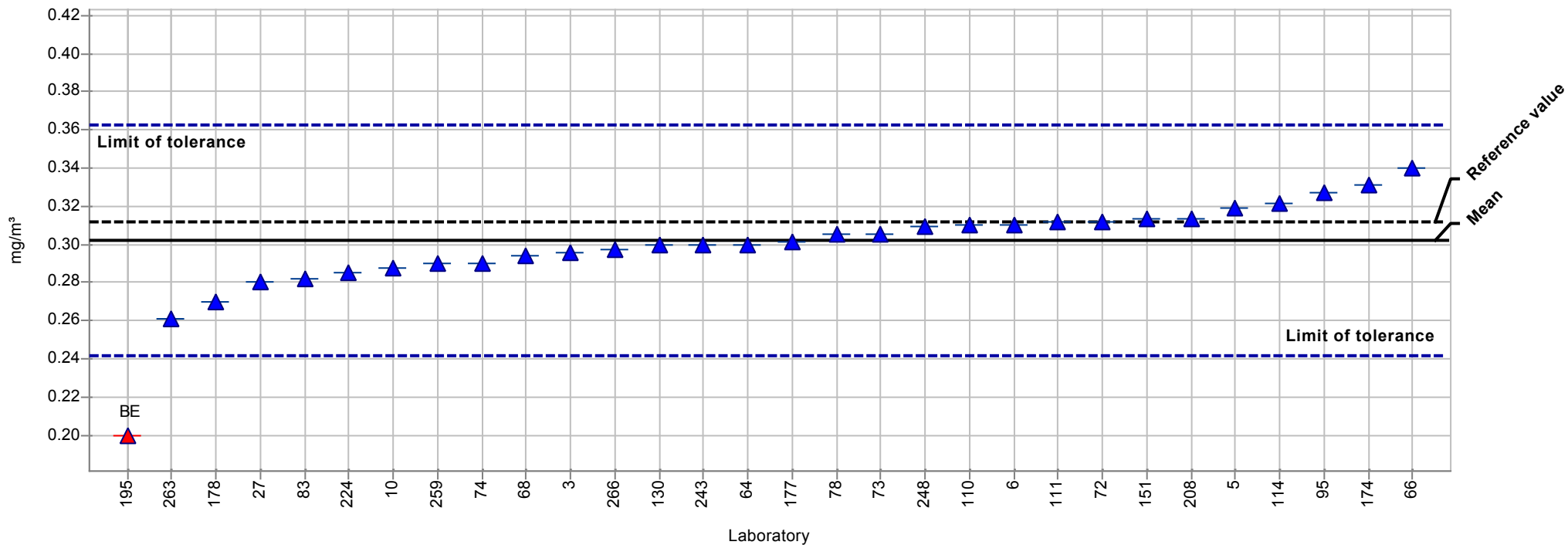
Measurand sulphuric acid

Laboratory	Sample 1	Z score	Sample 2	Z score	Sample 3	Z score
Unit	mg/m <sup>3</sup>		mg/m <sup>3</sup>		mg/m <sup>3</sup>	
3	0.1290	-0.11	0.0630	-0.14	0.0900	-0.24
5	0.1361	0.43	0.0647	0.12	0.0956	0.36
6	0.1510	1.57	0.0830	2.99 E	0.1170	2.68 E
10	0.1250	-0.42	0.0600	-0.61	0.0838	-0.92
27	0.1300	-0.04	0.0800	2.52 E	0.1000	0.84
64	0.1400	0.73	0.0700	0.95	0.0900	-0.24
66	0.1300	-0.04	0.0690	0.80	0.0950	0.30
68	0.1160	-1.11	0.0630	-0.14	0.0860	-0.68
72	0.1420	0.88	0.0650	0.17	0.0980	0.62
73	0.1308	0.02	0.0643	0.06	0.0940	0.19
74	0.1430	0.96	0.0690	0.80	0.0980	0.62
78	0.1280	-0.19	0.0576	-0.99	0.0870	-0.57
83	0.0324	-7.52 BE	0.0161	-7.48 BE	0.0230	-7.51 BE
95	0.1310	0.04	0.0590	-0.77	0.0870	-0.57
110	0.1500	1.49	0.0900	4.08 FE	0.1100	1.93
111	0.1360	0.42	0.0680	0.64	0.0970	0.52
114	0.1359	0.41	0.0591	-0.75	0.0901	-0.23
130	0.1270	-0.27	0.0620	-0.30	0.0890	-0.35
151	0.1350	0.34	0.0630	-0.14	0.0920	-0.03
174	0.1360	0.42	0.0590	-0.77	0.0870	-0.57
177	0.1430	0.96	0.0690	0.80	0.1000	0.84
178	0.1000	-2.34 E	0.0500	-2.18 E	0.0800	-1.33
195	0.1000	-2.34 E	0.0600	-0.61	0.0800	-1.33
208	0.1270	-0.27	0.0619	-0.31	0.0880	-0.46
224	0.0941	-2.79 E	0.0426	-3.34 E	0.0656	-2.89 E
243	0.1310	0.04	0.0620	-0.30	0.0950	0.30

Laboratory	Sample 1	Z score	Sample 2	Z score	Sample 3	Z score
248	0.1360	0.42	0.0640	0.01	0.0980	0.62
259	0.1600	2.26 E	0.0800	2.52 E	0.1100	1.93
263	0.1176	-0.99	0.0601	-0.60	0.0822	-1.09
266	0.1240	-0.50	0.0612	-0.42	0.0897	-0.28
–	–	–	–	–	–	–
Method	ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	Z <=2.00		Z <=2.00		Z <=2.00	
No. of laboratories that submitted results	30		30		30	
Mean	0.1305		0.0639		0.0922	
Reproducibility s.d.	0.0147		0.0083		0.0101	
Rel. reproducibility s.d.	11.26 %		12.92 %		10.97 %	
Reference value	0.1340		0.0634		0.0937	
Target s.d.	0.0130		0.0064		0.0092	
Rel. target s.d.	10.00 %		10.00 %		10.00 %	
Lower limit of tolerance	0.1044		0.0511		0.0738	
Upper limit of tolerance	0.1566		0.0767		0.1107	
Type B outliers	1		1		1	
Type F outliers			1			
No. of measurement values outside of tolerance limits	5		7		3	
Explanation of outlier types						
A: Single outlier	Grubbs					
B: Differing laboratory mean	Grubbs					
C: Excessive laboratory s.d.	Cochran					
E: mean outside tolerance limits						
F:  Z-Score >3.5						
L: Differing laboratory mean (Grubbs II)	Grubbs für 2					

## Summary results

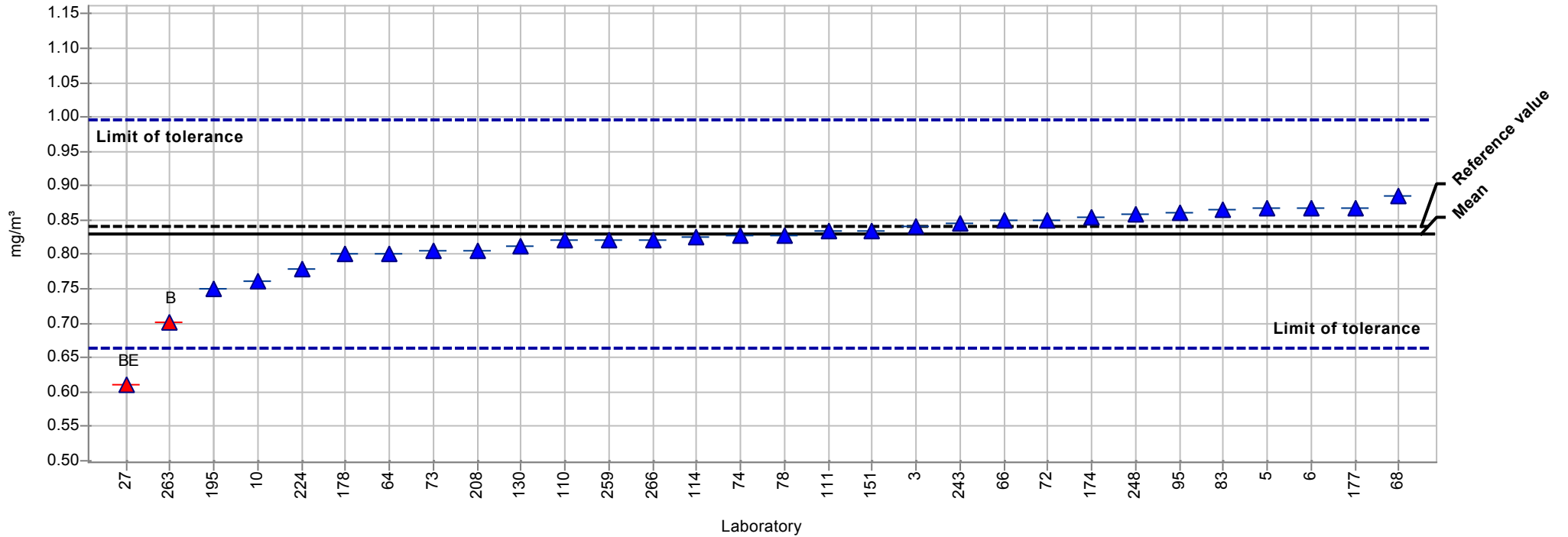
<b>Sample:</b>	Sample 1	<b>Mean:</b>	0.302 mg/m <sup>3</sup>
<b>Measurand:</b>	phosphoric acid	<b>Reproducibility s.d.:</b>	0.018 mg/m <sup>3</sup>
<b>Method:</b>	ISO 5725-2	<b>Rel. reproducibility s.d.:</b>	5.84%
<b>Rel. target s.d.:</b>	10.00% (Limited)	<b>Reference value:</b>	0.312 mg/m <sup>3</sup>
<b>No. of laboratories:</b>	29	<b>Range of tolerance:</b>	0.242 - 0.363 mg/m <sup>3</sup> ( Z-Score  <= 2.00)





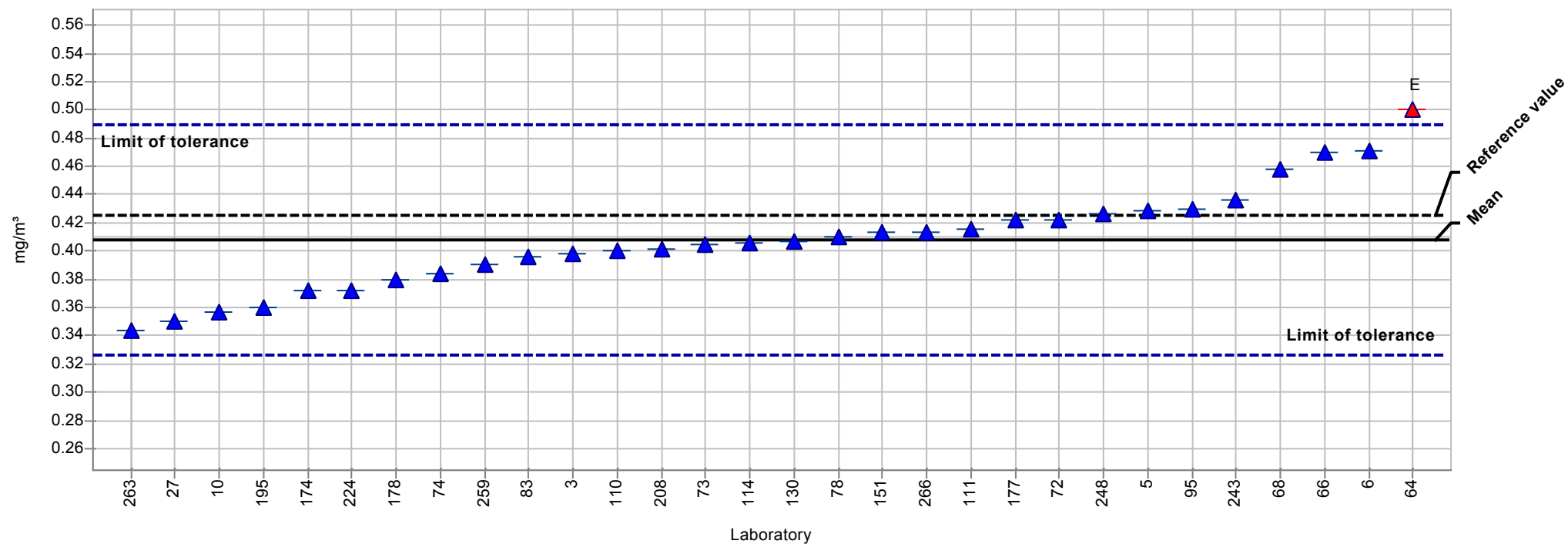
## Summary results

<b>Sample:</b>	Sample 2	<b>Mean:</b>	0.830 mg/m <sup>3</sup>
<b>Measurand:</b>	phosphoric acid	<b>Reproducibility s.d.:</b>	0.033 mg/m <sup>3</sup>
<b>Method:</b>	ISO 5725-2	<b>Rel. reproducibility s.d.:</b>	3.96%
<b>Rel. target s.d.:</b>	10.00% (Limited)	<b>Reference value:</b>	0.841 mg/m <sup>3</sup>
<b>No. of laboratories:</b>	28	<b>Range of tolerance:</b>	0.664 - 0.996 mg/m <sup>3</sup> ( Z-Score  <= 2.00)



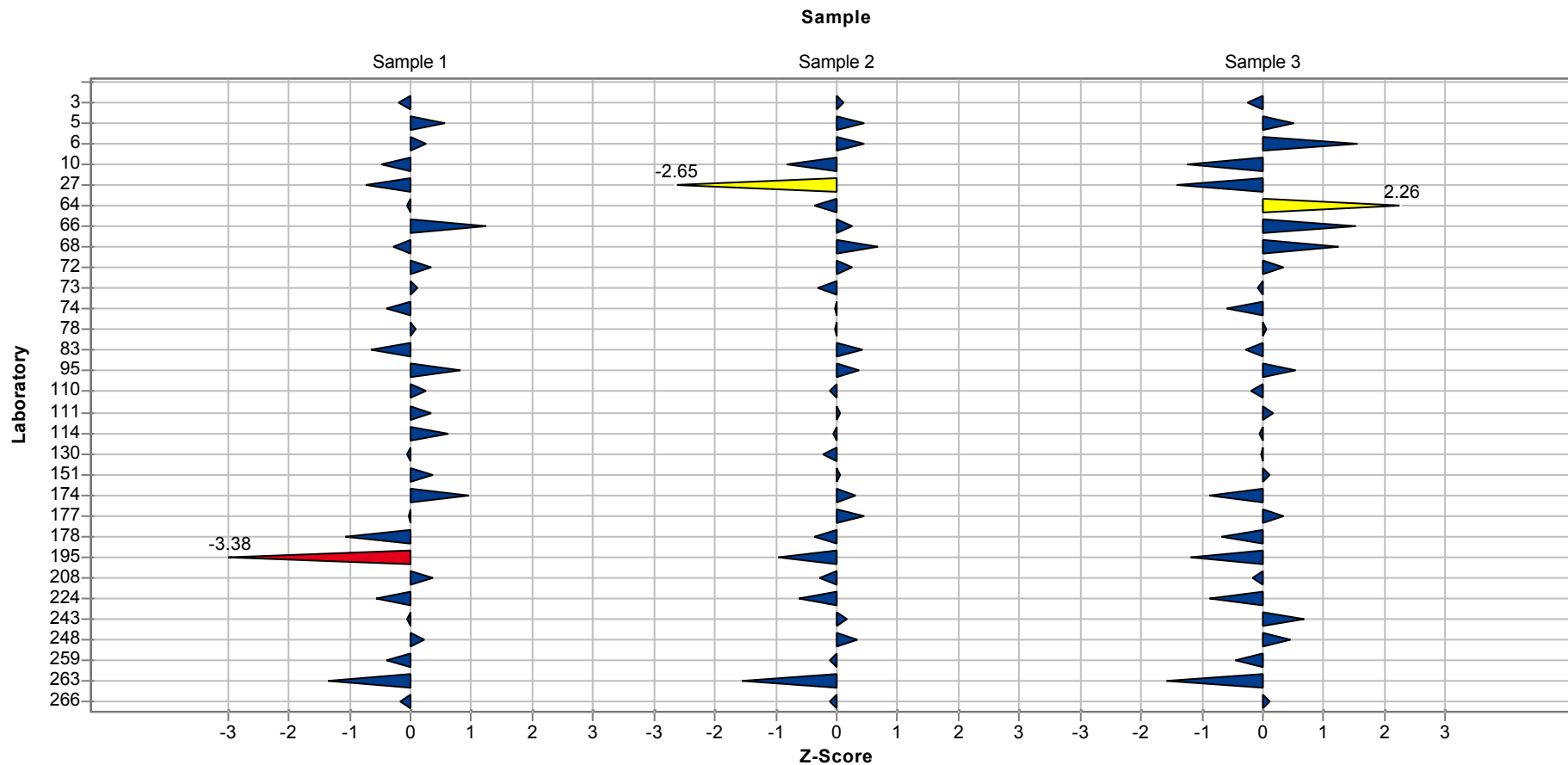
## Summary results

Sample:	Sample 3	Mean:	0.408 mg/m <sup>3</sup>
Measurand:	phosphoric acid	Reproducibility s.d.:	0.036 mg/m <sup>3</sup>
Method:	ISO 5725-2	Rel. reproducibility s.d.:	8.92%
Rel. target s.d.:	10.00% (Limited)	Reference value:	0.425 mg/m <sup>3</sup>
No. of laboratories:	30	Range of tolerance:	0.326 - 0.489 mg/m <sup>3</sup> ( Z-Score  <= 2.00)



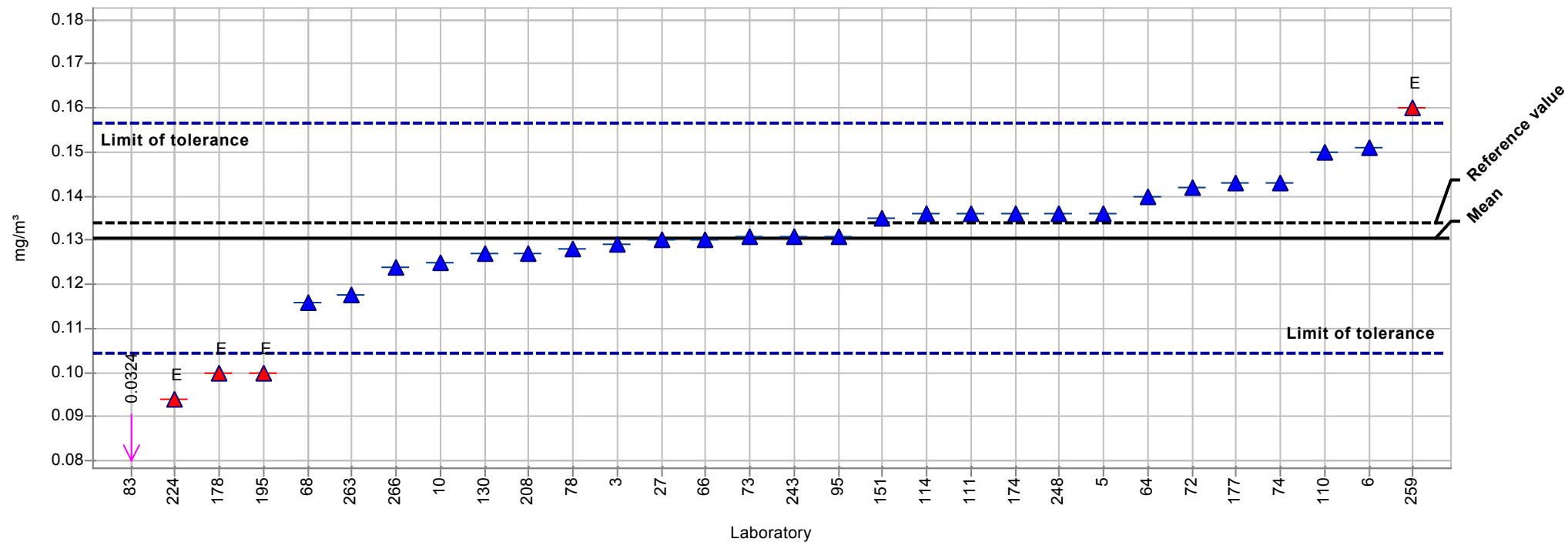
# Analyte chart of Z-Scores

Measurand: phosphoric acid



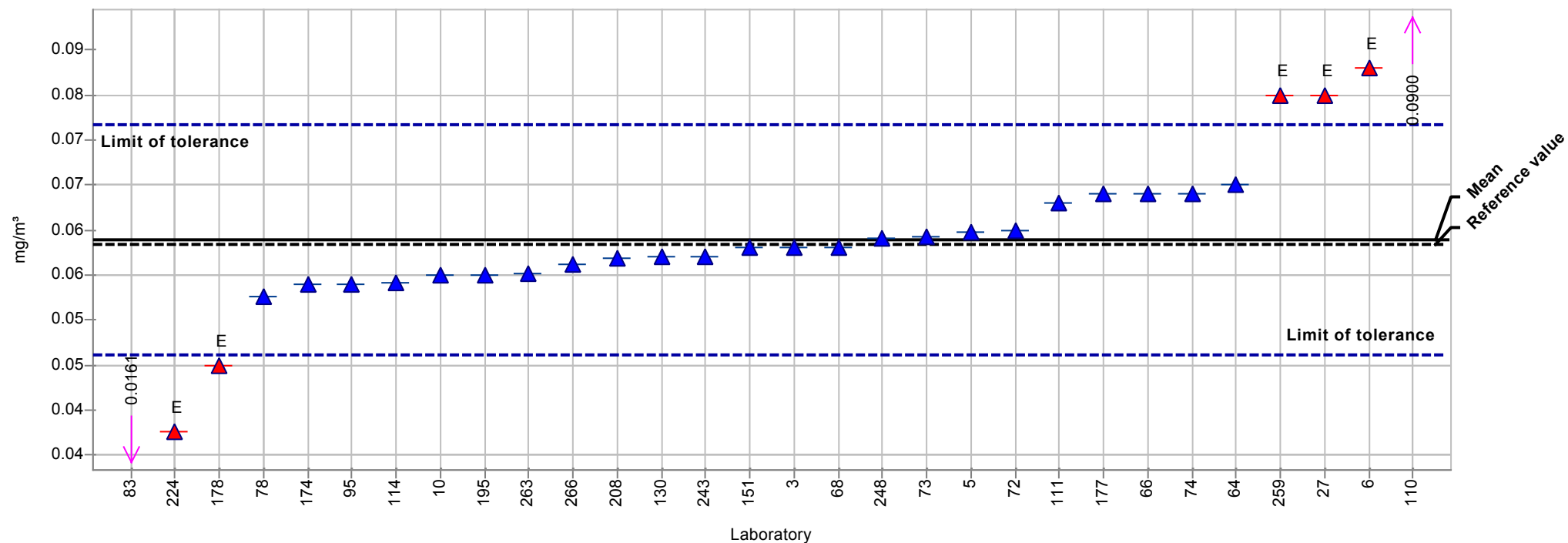
## Summary results

<b>Sample:</b>	Sample 1	<b>Mean:</b>	0.1305 mg/m <sup>3</sup>
<b>Measurand:</b>	sulphuric acid	<b>Reproducibility s.d.:</b>	0.0147 mg/m <sup>3</sup>
<b>Method:</b>	ISO 5725-2	<b>Rel. reproducibility s.d.:</b>	11.26%
<b>Rel. target s.d.:</b>	10.00% (Limited)	<b>Reference value:</b>	0.1340 mg/m <sup>3</sup>
<b>No. of laboratories:</b>	29	<b>Range of tolerance:</b>	0.1044 - 0.1566 mg/m <sup>3</sup> ( Z-Score  <= 2.00)



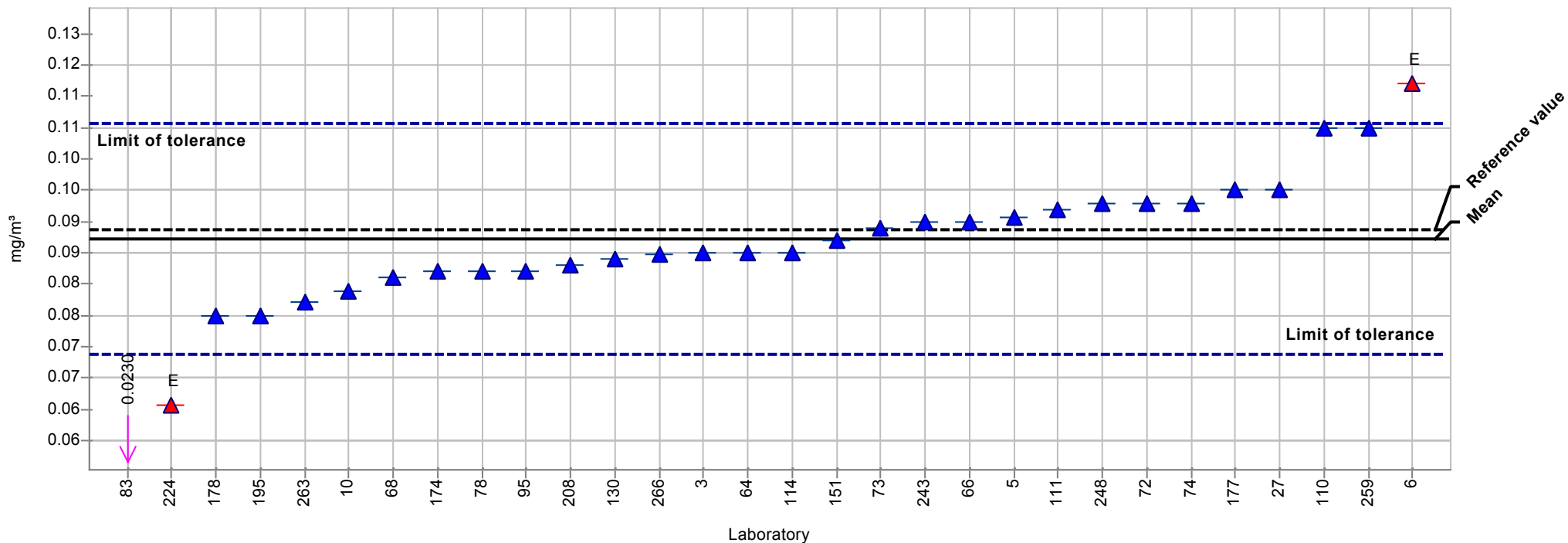
## Summary results

<b>Sample:</b>	Sample 2	<b>Mean:</b>	0.0639 mg/m <sup>3</sup>
<b>Measurand:</b>	sulphuric acid	<b>Reproducibility s.d.:</b>	0.0083 mg/m <sup>3</sup>
<b>Method:</b>	ISO 5725-2	<b>Rel. reproducibility s.d.:</b>	12.92%
<b>Rel. target s.d.:</b>	10.00% (Limited)	<b>Reference value:</b>	0.0634 mg/m <sup>3</sup>
<b>No. of laboratories:</b>	28	<b>Range of tolerance:</b>	0.0511 - 0.0767 mg/m <sup>3</sup> ( Z-Score  ≤ 2.00)



## Summary results

<b>Sample:</b>	Sample 3	<b>Mean:</b>	0.0922 mg/m <sup>3</sup>
<b>Measurand:</b>	sulphuric acid	<b>Reproducibility s.d.:</b>	0.0101 mg/m <sup>3</sup>
<b>Method:</b>	ISO 5725-2	<b>Rel. reproducibility s.d.:</b>	10.97%
<b>Rel. target s.d.:</b>	10.00% (Limited)	<b>Reference value:</b>	0.0937 mg/m <sup>3</sup>
<b>No. of laboratories:</b>	29	<b>Range of tolerance:</b>	0.0738 - 0.1107 mg/m <sup>3</sup> ( Z-Score  ≤ 2.00)



# Analyte chart of Z-Scores

Measurand: sulphuric acid

