IFA
Institut für Arbeitsschutz der
Deutschen Gesetzlichen Unfallversicherung

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

Proficiency testing scheme

Volatile organic compounds (VOC) with thermal desorption

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Institute for Occupationial Safety and Health of the
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Summary of laboratory means

Sample 1

Laboratory	1- Butanol	Z score	1-Methoxy-2-propanole	Z score	4-Methyl-2-pentanone	Z score	Benzene	Z score	Ethylbenzen	Z score
Unit	µg/m³		µg/m³		µg/m³		µg/m³		µg/m³	
2	88.23	-0.14	137.85	-0.02	21.59	-0.11	27.98	-0.32	39.70	-0.13
11	9.50	-5.96 BE	32.30	-5.11 FE	9.10	-3.90 BE	10.40	-4.31 FE	21.95	-3.05 BE
21	89.50	-0.04	137.50	-0.03	22.50	0.17	28.50	-0.20	40.50	0.01
24	116.48	1.95	177.24	1.88	29.14	2.18 E	46.77	3.95 FE	50.90	1.72
30	64.20	-1.91	178.85	1.96	24.10	0.65	38.05	1.97	40.25	-0.04
33	70.45	-1.45	76.05	-3.00 E	27.45	1.67	26.25	-0.71	59.75	3.18 BE
52	108.50	1.36	142.50	0.21	18.05	-1.18	22.80	-1.49	36.90	-0.59
55	89.00	-0.08	147.50	0.45	22.00	0.02	26.00	-0.77	39.50	-0.16
60							31.50	0.48	38.05	-0.40
63	65.00	-1.86	97.70	-1.95	15.40	-1.99	19.05	-2.34 E	30.35	-1.67
68	99.10	0.67	176.25	1.83	24.95	0.91	24.00	-1.22	46.10	0.93
95			141.20	0.14 C	20.61	-0.41 C	22.51	-1.56	37.72	-0.45 C
114	59.69	-2.25 CE	15.80	-5.90 FE	24.63	0.82	39.56	2.31 E	47.22	1.11
117	111.50	1.59	166.50	1.36	26.50	1.38	33.50	0.94	47.50	1.16
127	73.63	-1.22	110.73	-1.33	17.89	-1.23	55.70	5.97 FE	39.29	-0.19
135	97.75	0.57	162.50	1.17	23.70	0.53	26.85	-0.57	44.95	0.74
145	74.80	-1.13 C			24.95	0.91 C	29.95	0.13	44.80	0.71
148	85.35	-0.35	150.00	0.57	19.75	-0.67	25.30	-0.92	41.05	0.10
158	88.33	-0.13	144.13	0.29	20.66	-0.39	24.95	-1.00	39.48	-0.16
169	84.15	-0.44	144.45	0.30	21.60	-0.11	25.05	-0.98	33.90	-1.08
173	85.05	-0.37	130.70	-0.36	22.00	0.02	30.90	0.35	40.30	-0.03
186	70.20	-1.47	118.25	-0.96	21.75	-0.06	39.25	2.24 E	38.50	-0.32
192	80.30	-0.72	133.47	-0.23	20.56	-0.42	27.17	-0.50	39.98	-0.08
193	90.56	0.04	151.78	0.65	25.89	1.20	22.13	-1.65	46.20	0.94
194			42.50	-4.62 FE	12.00	-3.02 E			33.00	-1.23
196	79.48	-0.78	122.24	-0.77	24.59	0.80	28.64	-0.17	38.24	-0.37

Laboratory	1- Butanol	Z score	1-Methoxy-2-propanole	Z score	4-Methyl-2-pentanone	Z score	Benzene	Z score	Ethylbenzen	Z score
198							14.50	-3.37 E		
199	83.35	-0.50	159.70	1.04	23.80	0.56	35.85	1.47	39.80	-0.11
207	88.00	-0.15	140.00	0.09	22.50	0.17	31.50	0.48	39.00	-0.24
208	91.00	0.07	150.00	0.57	21.00	-0.29	26.50	-0.65	38.50	-0.32
213	101.50	0.85	154.50	0.79	27.50	1.69	36.00	1.50	45.50	0.83
215	100.00	0.74	132.00	-0.30	20.50	-0.44	30.00	0.14	38.50	-0.32
218	63.20	-1.99	66.75	-3.45 E	15.55	-1.94	19.75	-2.18 E	30.45	-1.65
230	122.50	2.40 E	151.00	0.62	24.00	0.62	32.00	0.60	45.50	0.83
241	103.00	0.96	150.50	0.59	21.50	-0.14	26.50	-0.65	40.00	-0.08
243							< 253.00		< 253.00	
256	101.05	0.81	131.20	-0.34	22.75	0.24	26.40	-0.68	46.40	0.98
258	121.54	2.33 E	189.40	2.47 E	26.09	1.26	43.91	3.30 E	101.08	9.99 CE
261	94.05	0.29	147.00	0.42	22.50	0.17	25.70	-0.83	41.60	0.19
265	85.00	-0.38	131.00	-0.35	19.00	-0.90	25.00	-0.99	39.00	-0.24
267							44.00	3.32 E	66.50	4.29 BE
283	91.98	0.14	127.17	-0.53	22.71	0.23	27.87	-0.34	37.37	-0.51
290	12.50	-5.74 BE	78.80	-2.87 E	16.60	-1.62	13.55	-3.59 FE	43.90	0.57
503							38.75	2.13 E	45.65	0.85
510	113.05	1.70 C			21.55	-0.12	39.30	2.25 E	34.30	-1.02
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Method	ISO 5725-2		ISO 5725-2		ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	|Z|<=2.00		|Z|<=2.00		|Z|<=2.00		|Z|<=2.00		|Z|<=2.00	
No. of laboratories that submitted results	38		38		40		44		44	
Mean	90.07		138.22		21.95		29.37		40.46	
Reproducibility s.d.	15.51		28.38		3.58		7.08		4.71	
Rel. reproducibility s.d.	17.22 %		20.53 %		16.30 %		24.09 %		11.64 %	
Reference value	89.30		141.10		25.20		31.90		38.20	
Target s.d.	13.51		20.73		3.29		4.41		6.07	
Rel. target s.d.	15.00 %		15.00 %		15.00 %		15.00 %		15.00 %	
Lower limit of tolerance	63.05		96.75		15.36		20.56		28.33	

Laboratory	1- Butanol	Z score	1-Methoxy-2-propanole	Z score	4-Methyl-2-pentanone	Z score	Benzene	Z score	Ethylbenzen	Z score
Upper limit of tolerance	117.09		179.68		28.53		38.19		52.60	
Type B outliers	2				1				3	
Type C outliers	3		1		2				2	
Type F outliers			3				4			
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	33		34		37		39		38	

Explanation of outlier types	
A: Single outlier	Grubbs
B: Differing laboratory mean	Grubbs
C: Excessive laboratory s.d.	Cochran
D: Excluded manually	
E: mean outside tolerance limits	
F: |Z-Score|>3.5	

Laboratory	n-Butyl acetate	Z score	n-Heptane	Z score	p-Xylene	Z score	Toluene	Z score
Unit	µg/m³		µg/m³		µg/m³		µg/m³	
2	81.28	0.15	48.80	-0.32	54.78	-0.02	70.00	0.15
11	22.80	-4.75 FE	37.75	-1.75	36.65	-2.22 E	29.15	-3.83 FE
21	83.00	0.30	54.50	0.42	50.00	-0.60	68.00	-0.05
24	95.79	1.37	70.27	2.48 E	65.44	1.27	78.91	1.02
30	82.00	0.21	57.10	0.76	56.00	0.13	76.85	0.82
33	99.45	1.67	53.35	0.28	78.00	2.80 E	57.65	-1.05
52	78.70	-0.07	40.85	-1.35	47.75	-0.87	62.00	-0.63
55	83.00	0.30	49.50	-0.23	56.00	0.13	68.00	-0.05
60	68.40	-0.93	50.65	-0.08	51.40	-0.43	67.90	-0.06
63	56.75	-1.91	38.25	-1.69	38.55	-1.99	48.45	-1.95
68	89.25	0.82	53.40	0.28	69.35	1.75	75.10	0.65

Laboratory	n-Butyl acetate	Z score	n-Heptane	Z score	p-Xylene	Z score	Toluene	Z score
95	70.64	-0.74 C	40.38	-1.41	49.39	-0.67 C	61.94	-0.64
114	29.19	-4.22 FE	68.39	2.23 E	75.14	2.45 E	101.59	3.22 E
117	97.00	1.47	61.00	1.27	66.50	1.40	78.00	0.93
127	85.25	0.48	365.50	40.89 BE	57.26	0.28	111.06	4.15 FE
135	94.95	1.30	49.55	-0.22	61.15	0.75	71.15	0.26
145					62.15	0.88	74.70	0.61
148	82.10	0.22	45.15	-0.79	55.80	0.10	69.85	0.13
158	80.64	0.10	47.65	-0.47	54.54	-0.05	67.25	-0.12
169	77.30	-0.18	45.05	-0.80	45.50	-1.15	61.15	-0.71
173	81.80	0.19	61.20	1.30	52.60	-0.28	68.05	-0.04
186	49.15	-2.54 E	57.10	0.76	45.90	-1.10	73.00	0.44
192	73.88	-0.47	56.45	0.68	55.45	0.06	68.49	0.00
193	87.72	0.69	48.34	-0.38	64.05	1.11		
194	38.00	-3.48 E	37.00	-1.85	45.00	-1.21	58.00	-1.02
196	83.42	0.33	47.95	-0.43	48.68	-0.76	59.84	-0.84
198					37.21	-2.15 E	44.49	-2.33 E
199	78.35	-0.09	52.35	0.15	56.10	0.14	72.55	0.40
207	81.50	0.17	48.50	-0.36	51.50	-0.42	66.50	-0.19
208	78.50	-0.08	45.50	-0.75	48.50	-0.78	63.50	-0.48
213	97.50	1.51	80.00	3.74 FE	62.50	0.92	79.00	1.03
215	75.50	-0.33	50.50	-0.10	52.00	-0.36	66.50	-0.19
218	53.45	-2.18 E	47.95	-0.43	41.10	-1.68	47.65	-2.03 E
230	94.00	1.22	79.00	3.61 E	66.50	1.40	85.00	1.61
241	84.00	0.38	52.00	0.10	55.50	0.07	73.00	0.44
243	143.50	5.37 CE			< 253.00		< 253.00	
256	90.20	0.90	53.35	0.28	57.55	0.32	67.25	-0.12
258	95.01	1.30	72.07	2.71 E	117.52	7.59 BE	79.90	1.11
261	85.15	0.48	47.85	-0.44	55.85	0.11	66.70	-0.17
265	75.00	-0.38	44.00	-0.94	49.00	-0.72	61.00	-0.73
267	213.50	11.24 CE	94.00	5.56 BE	90.50	4.32 BE	113.50	4.39 FE
283	74.68	-0.40	47.23	-0.52	52.36	-0.31	63.01	-0.53
290	55.60	-2.00 E	44.55	-0.87	59.90	0.60	73.15	0.46

Laboratory	n-Butyl acetate	Z score	n-Heptane	Z score	p-Xylene	Z score	Toluene	Z score
503	63.95	-1.30 C	48.30	-0.38	61.65	0.81	81.30	1.25
510					53.90	-0.13	63.75	-0.46
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Method	ISO 5725-2		ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	|Z|<=2.00		|Z|<=2.00		|Z|<=2.00		|Z|<=2.00	
No. of laboratories that submitted results	42		41		45		44	
Mean	79.48		51.23		54.94		68.47	
Reproducibility s.d.	14.32		9.42		9.39		10.70	
Rel. reproducibility s.d.	18.02 %		18.38 %		17.10 %		15.63 %	
Reference value	73.60		49.10		52.60		65.60	
Target s.d.	11.92		7.69		8.24		10.27	
Rel. target s.d.	15.00 %		15.00 %		15.00 %		15.00 %	
Lower limit of tolerance	55.64		35.86		38.46		47.93	
Upper limit of tolerance	103.33		66.60		71.42		89.01	
Type B outliers			2		2			
Type C outliers	4				1			
Type F outliers	2		1				3	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	36		38		41		40	

Summary of laboratory means

Sample 2

Laboratory	1- Butanol	Z score	1-Methoxy-2-propanole	Z score	4-Methyl-2-pentanone	Z score	Benzene	Z score	Ethylbenzen	Z score
Unit	µg/m³		µg/m³		µg/m³		µg/m³		µg/m³	
2	41.73	-0.45	52.14	0.03	55.71	-0.14	75.57	-0.66	103.09	0.26
11	1.55	-6.44 BE	18.30	-4.32 CE	43.00	-1.63	90.85	0.55 C	89.70	-0.64
21	42.00	-0.40	53.50	0.20	60.00	0.36	77.00	-0.55	94.50	-0.32
24	57.86	1.96	67.09	1.95	71.50	1.70	117.91	2.70 E	120.72	1.44
30	219.35	26.04 CE	66.70	1.90 C	64.45	0.88	115.45	2.50 E	102.55	0.22
33	21.85	-3.41 E	24.80	-3.48 E	62.95	0.70	69.30	-1.16	131.50	2.17 E
52	50.30	0.83	49.05	-0.37	46.30	-1.25	70.90	-1.03	90.45	-0.59
55	44.50	-0.03	56.50	0.59	56.00	-0.11	75.00	-0.71	98.00	-0.08
60							86.05	0.17	101.40	0.14
63	31.85	-1.92	38.30	-1.75	41.40	-1.82	57.25	-2.12 E	79.45	-1.33
68	46.05	0.20	66.95	1.93	62.90	0.70	80.40	-0.28	107.70	0.57
95			51.25	-0.09	47.85	-1.06	66.44	-1.39	84.03	-1.02
114	66.05	3.18 E	16.13	-4.60 CE	81.58	2.88 E	98.84	1.18	119.20	1.34
117	54.50	1.46	65.00	1.68	72.50	1.82	104.00	1.59	122.50	1.56
127	35.68	-1.35	43.64	-1.06	54.34	-0.30	157.50	5.84 BE	100.63	0.09
135	48.20	0.52	65.35	1.72	63.80	0.80	79.70	-0.34	108.00	0.59
145	42.60	-0.31			70.20	1.55	95.05	0.88	132.95	2.26 CE
148	43.10	-0.24	58.65	0.86	53.15	-0.44	76.70	-0.57	103.00	0.25
158	44.92	0.03	57.27	0.69	56.90	0.00	77.51	-0.51	101.54	0.15
169	46.95	0.33	58.00	0.78	60.80	0.45	87.10	0.25	100.80	0.10
173	41.70	-0.45	45.70	-0.80	55.65	-0.15	81.50	-0.19	101.30	0.14
186	31.15	-2.02 E	40.80	-1.43	55.95	-0.12	100.25	1.30	98.35	-0.06
192	39.04	-0.85	48.22	-0.48	56.11	-0.10	81.48	-0.19	102.10	0.19
193	53.59	1.32	63.01	1.42	63.50	0.77	67.87	-1.28	102.81	0.24
194			16.00	-4.61 BE	33.00	-2.80 E			84.00	-1.02
196	44.48	-0.04	52.88	0.12	59.28	0.27	70.89	-1.04	94.26	-0.34

Laboratory	1- Butanol	Z score	1-Methoxy-2-propanole	Z score	4-Methyl-2-pentanone	Z score	Benzene	Z score	Ethylbenzen	Z score
198							44.19	-3.16 E		
199	40.50	-0.63	61.85	1.27	65.50	1.00	107.65	1.88	100.40	0.08
207	43.00	-0.26	52.50	0.07	61.50	0.53	95.50	0.92	103.50	0.29
208	43.50	-0.18	55.00	0.40	55.50	-0.17	77.50	-0.51	97.00	-0.15
213	53.00	1.24	63.00	1.42	66.00	1.06	109.00	1.99	107.00	0.52
215	51.50	1.01	57.50	0.72	56.50	-0.05	92.50	0.68	99.50	0.02
218	45.05	0.05	42.55	-1.20	42.60	-1.68	59.00	-1.98	75.10	-1.62
230	52.00	1.09	51.00	-0.12	58.50	0.18	86.50	0.20	102.00	0.18
241	38.00	-1.00	43.00	-1.15	46.00	-1.28	77.00	-0.55	76.50	-1.53
256	51.35	0.99 C	41.85	-1.29	58.50	0.18	74.25	-0.77	104.65	0.36
258	55.38	1.59	65.84	1.79 C	66.08	1.07	101.73	1.41 C	253.20	10.34 BE
261	46.30	0.24	63.55	1.49	60.85	0.46	75.75	-0.65	104.05	0.32
265	39.00	-0.85	52.00	0.01	52.00	-0.58	75.00	-0.71	100.00	0.05
267							112.50	2.27 E	166.50	4.52 BE
283	46.87	0.32	53.91	0.25	60.02	0.36	75.95	-0.63	82.21	-1.14
290	6.85	-5.65 BE	30.80	-2.71 E	40.20	-1.96	33.95	-3.97 FE	106.85	0.51
503							110.30	2.09 E	114.55	1.03
510	45.90	0.18			48.30	-1.01	113.50	2.35 E	70.05	-1.96
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Method	ISO 5725-2		ISO 5725-2		ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	|Z|<=2.00		|Z|<=2.00		|Z|<=2.00		|Z|<=2.00		|Z|<=2.00	
No. of laboratories that submitted results	38		38		40		43		43	
Mean	44.71		51.92		56.94		83.93		99.25	
Reproducibility s.d.	8.48		10.28		9.81		17.27		12.95	
Rel. reproducibility s.d.	18.96 %		19.79 %		17.24 %		20.58 %		13.05 %	
Reference value	42.10		56.70		56.70		90.70		95.80	
Target s.d.	6.71		7.79		8.54		12.59		14.89	
Rel. target s.d.	15.00 %		15.00 %		15.00 %		15.00 %		15.00 %	
Lower limit of tolerance	31.30		36.35		39.86		58.75		69.47	
Upper limit of tolerance	58.13		67.50		74.02		109.11		129.02	

Laboratory	1- Butanol	Z score	1-Methoxy-2-propanole	Z score	4-Methyl-2-pentanone	Z score	Benzene	Z score	Ethylbenzen	Z score
Type B outliers	2		1				1		2	
Type C outliers	2		4				2		1	
Type F outliers							1			
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	34		33		40		39		40	
Explanation of outlier types										
A: Single outlier	Grubbs									
B: Differing laboratory mean	Grubbs									
C: Excessive laboratory s.d.	Cochran									
D: Excluded manually										
E: mean outside tolerance limits										
F: |Z-Score|>3.5										

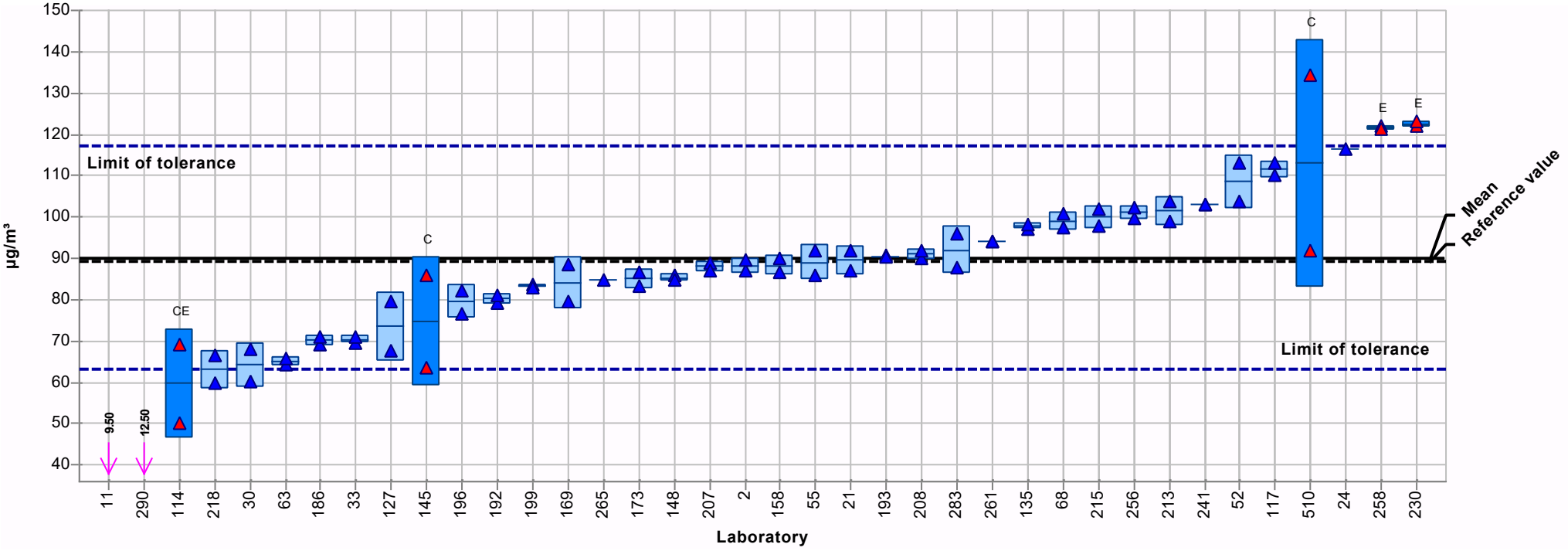
Laboratory	n-Butyl acetate	Z score	n-Heptane	Z score	p-Xylene	Z score	Toluene	Z score
Unit	µg/m³		µg/m³		µg/m³		µg/m³	
2	135.21	0.28	64.74	-0.33	87.97	0.19	19.95	0.14
11	79.10	-2.60 CE	71.55	0.34 C	102.15	1.29	12.55	-2.38 E
21	129.50	-0.01	71.50	0.34	73.50	-0.94	15.50	-1.37
24	157.22	1.41	89.01	2.05 E	101.14	1.22	23.46	1.34
30	140.20	0.53	77.65	0.94	87.70	0.17	21.60	0.71
33	169.00	2.01 E	75.00	0.68	118.00	2.53 E	25.40	2.01 E
52	127.50	-0.12	54.15	-1.36	74.35	-0.87	13.05	-2.21 E
55	141.00	0.58	64.50	-0.35	86.50	0.08	21.00	0.50
60	119.60	-0.52	71.80	0.36	85.60	0.00	20.25	0.25
63	99.85	-1.54	51.45	-1.63	62.40	-1.80	14.20	-1.82
68	145.80	0.82	69.60	0.15	102.40	1.31	21.05	0.52
95	116.44	-0.69	52.45	-1.53	70.63	-1.16	22.52	1.02

Laboratory	n-Butyl acetate	Z score	n-Heptane	Z score	p-Xylene	Z score	Toluene	Z score
114	83.22	-2.39 CE	91.06	2.25 E	117.54	2.49 E	56.48	12.62 CE
117	168.00	1.96	87.00	1.85	108.00	1.75	18.50	-0.35
127	143.38	0.70	398.80	32.39 BE	88.84	0.26	34.44	5.09 BE
135	157.00	1.40	67.10	-0.10	95.35	0.76	21.50	0.68
145					117.90	2.52 CE	27.60	2.76 E
148	135.50	0.29	61.85	-0.61	88.05	0.20	20.30	0.27
158	139.47	0.50	65.48	-0.25	87.22	0.13	19.38	-0.05
169	146.70	0.87	67.40	-0.07	81.65	-0.30	19.90	0.13
173	135.30	0.28	86.25	1.78	86.70	0.09	21.50	0.68
186	81.00	-2.51 E	76.10	0.79 C	72.60	-1.01	22.20	0.91
192	127.58	-0.11	76.81	0.86	87.06	0.12	21.13	0.55
193	137.66	0.40	58.76	-0.91	89.13	0.28		
194	65.00	-3.33 E	51.00	-1.67	71.00	-1.13	17.00	-0.86
196	142.65	0.66	64.61	-0.34	80.17	-0.42	21.34	0.62
198					60.48	-1.95	13.33	-2.11 E
199	131.05	0.06	71.90	0.37	88.70	0.25	22.05	0.86
207	142.50	0.65	65.50	-0.25	85.00	-0.04	20.50	0.33
208	130.00	0.01	58.50	-0.94	79.50	-0.47	13.00	-2.23 E
213	158.00	1.45	88.00	1.95	95.00	0.74	25.00	1.87
215	132.00	0.11	69.50	0.14	83.00	-0.20	19.00	-0.18
218	91.95	-1.94	65.55	-0.25	64.90	-1.61	15.85	-1.25
230	141.50	0.60	96.50	2.78 E	86.50	0.08	23.50	1.36
241	99.50	-1.56	52.50	-1.53	70.50	-1.17	17.00	-0.86
256	147.25	0.90	70.55	0.24	89.35	0.30	16.75	-0.95
258	172.68	2.20 E	81.37	1.30 C	189.22	8.08 BE	15.69	-1.31
261	131.60	0.09	65.80	-0.22	89.65	0.32	14.40	-1.75
265	128.00	-0.09	60.00	-0.79	81.00	-0.35	18.00	-0.52
267	352.00	11.41 BE	123.00	5.38 BE	141.50	4.36 BE	24.00	1.53
283	115.44	-0.74	62.29	-0.57	77.66	-0.61	19.88	0.12
290	89.90	-2.05 E	56.05	-1.18	90.65	0.40	22.30	0.95
503	87.05	-2.20 E	65.25	-0.28	97.25	0.91	23.95	1.51
510					72.50	-1.02	19.30	-0.08

Laboratory	n-Butyl acetate	Z score	n-Heptane	Z score	p-Xylene	Z score	Toluene	Z score
–	–	––	–	––	–	––	–	––
Method	ISO 5725-2		ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	|Z|<=2.00		|Z|<=2.00		|Z|<=2.00		|Z|<=2.00	
No. of laboratories that submitted results	41		41		44		43	
Mean	129.79		68.07		85.54		19.52	
Reproducibility s.d.	25.01		11.63		13.27		3.81	
Rel. reproducibility s.d.	19.27 %		17.09 %		15.51 %		19.53 %	
Reference value	124.70		65.60		82.10		18.60	
Target s.d.	19.47		10.21		12.83		2.93	
Rel. target s.d.	15.00 %		15.00 %		15.00 %		15.00 %	
Lower limit of tolerance	90.85		47.65		59.88		13.67	
Upper limit of tolerance	168.73		88.50		111.20		25.38	
Type B outliers	1		2		2		1	
Type C outliers	2		3		1		1	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	38		36		41		41	

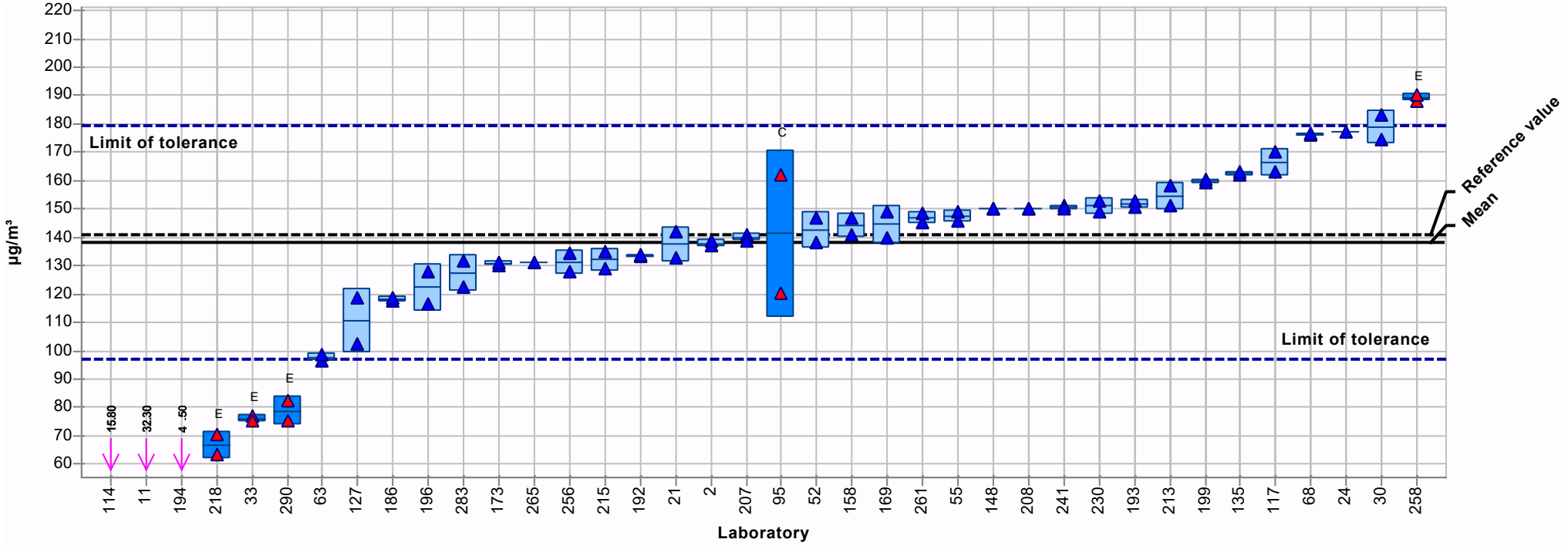
Summary results

Measurand:	**1- Butanol**	**Mean:**	**90.07 µg/m³**
Sample:	**1**	**Reproducibility s.d.:**	**15.51 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**17.22%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**89.30 µg/m³**
Number of laboratories in calculation + outliers:	**38**	**Range of tolerance:**	**63.05 - 117.09 µg/m³ (|Z-Score| <= 2.00)**



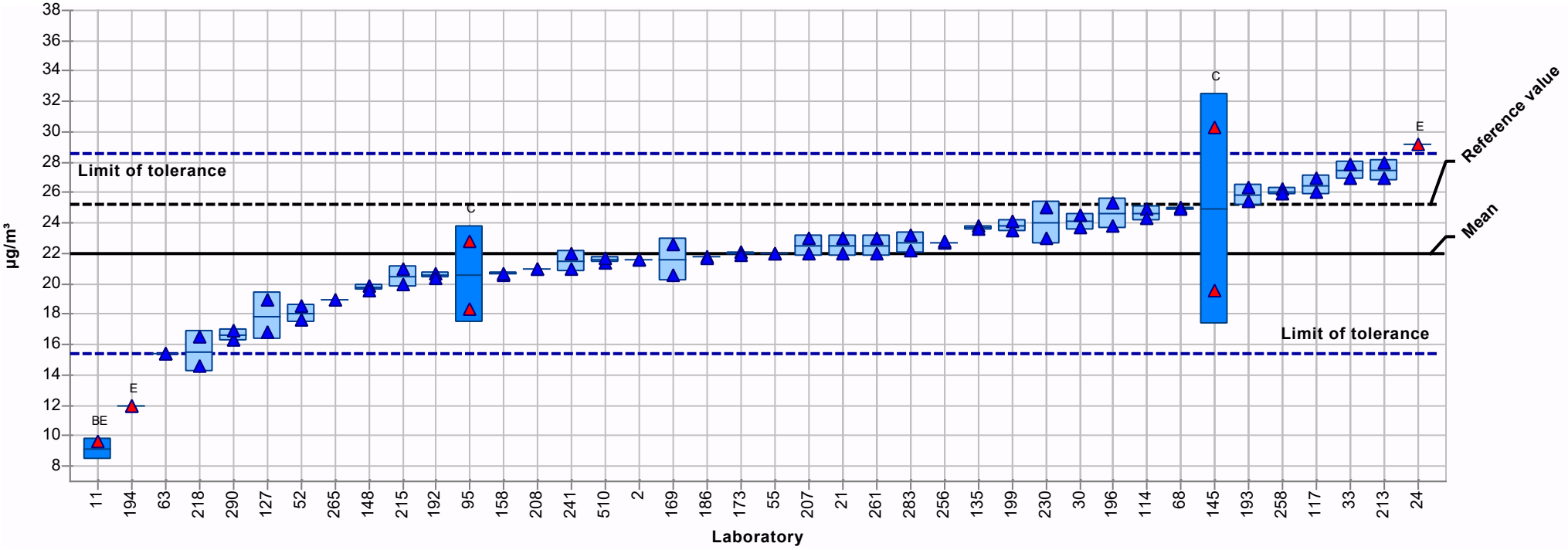
Summary results

Measurand:	**1-Methoxy-2-propanole**	**Mean:**	**138.22 µg/m³**
Sample:	**1**	**Reproducibility s.d.:**	**28.38 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**20.53%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**141.10 µg/m³**
Number of laboratories in calculation + outliers:	**35**	**Range of tolerance:**	**96.75 - 179.68 µg/m³ (|Z-Score| <= 2.00)**



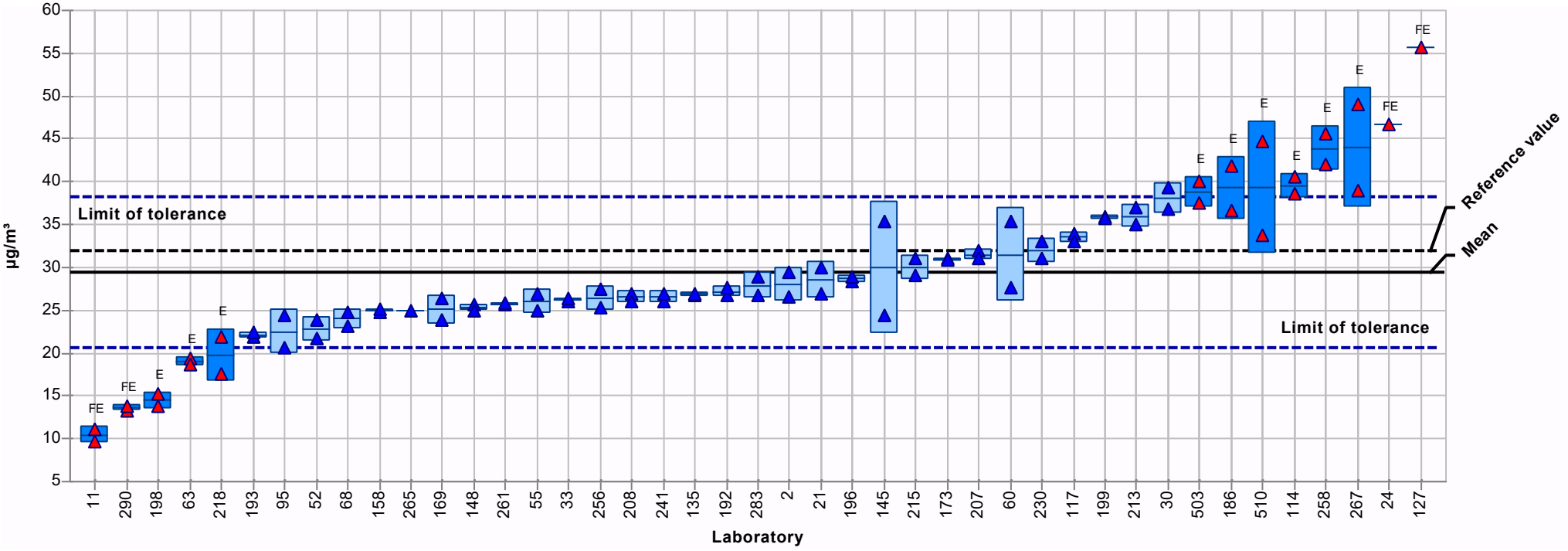
Summary results

Measurand:	**4-Methyl-2-pentanone**	**Mean:**	**21.95 µg/m³**
Sample:	**1**	**Reproducibility s.d.:**	**3.58 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**16.30%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**25.20 µg/m³**
Number of laboratories in calculation + outliers:	**40**	**Range of tolerance:**	**15.36 - 28.53 µg/m³ (|Z-Score| <= 2.00)**



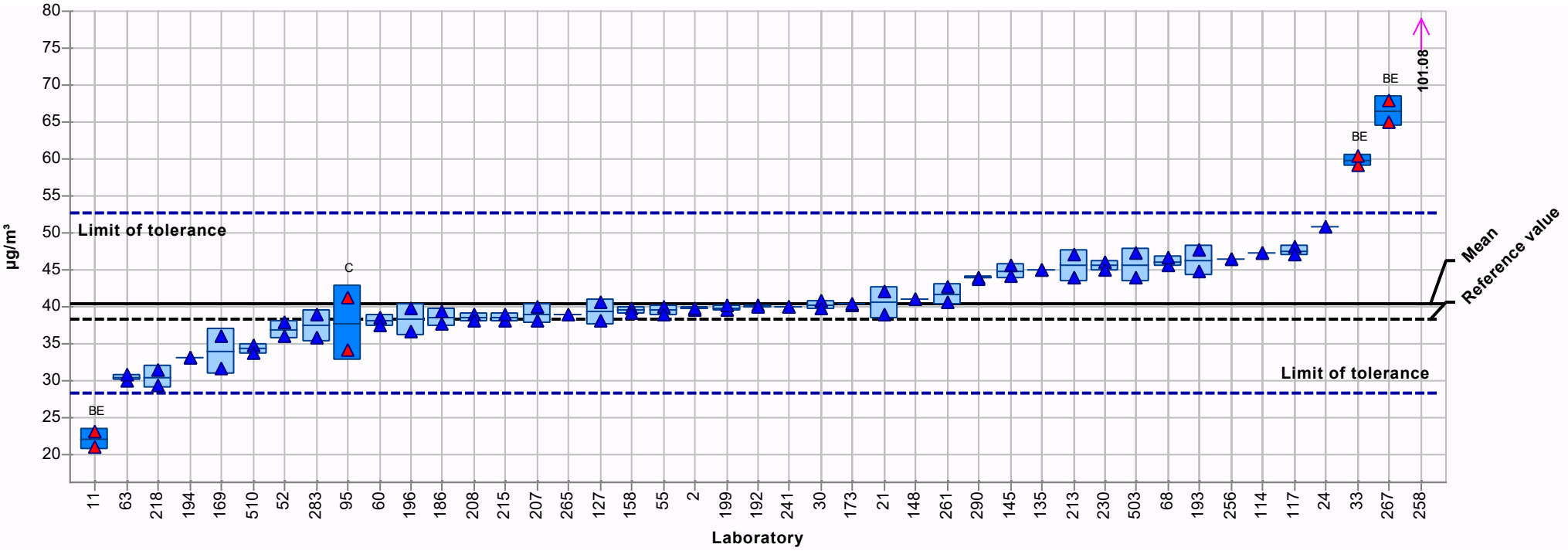
Summary results

Measurand:	**Benzene**	**Mean:**	**29.37 µg/m³**
Sample:	**1**	**Reproducibility s.d.:**	**7.08 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**24.09%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**31.90 µg/m³**
Number of laboratories in calculation:	**39**	**Range of tolerance:**	**20.56 - 38.19 µg/m³ (|Z-Score| <= 2.00)**



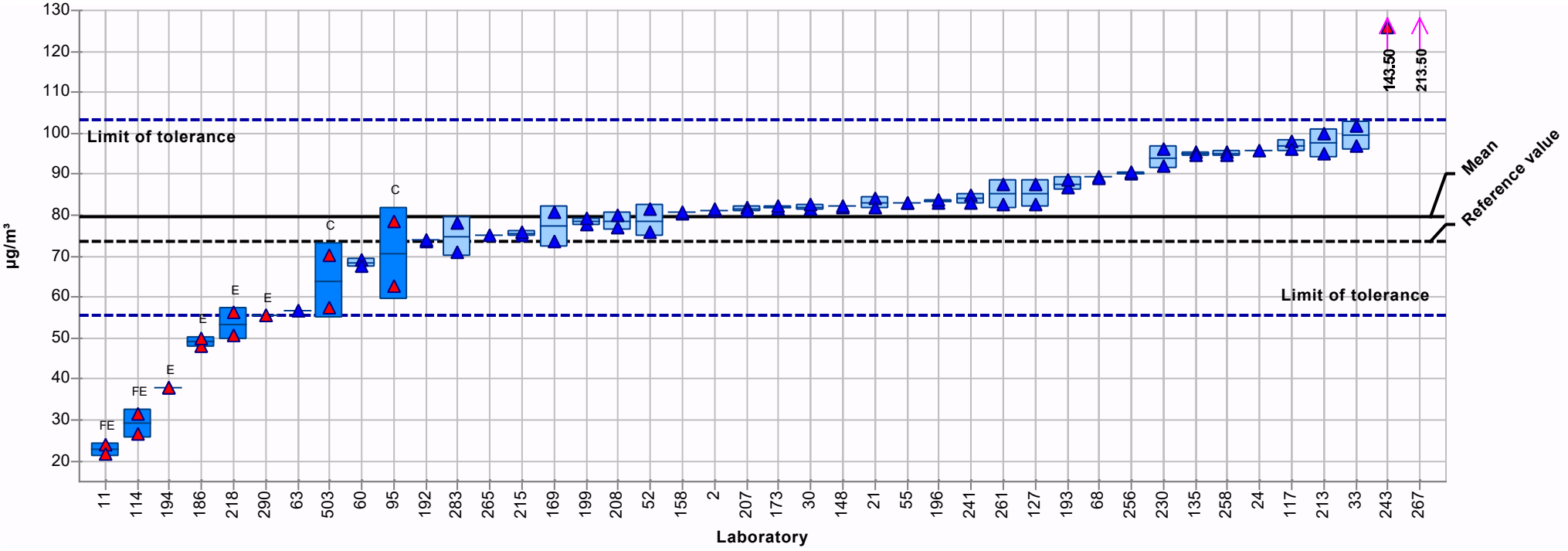
Summary results

Measurand:	**Ethylbenzene**	**Mean:**	**40.46 µg/m³**
Sample:	**1**	**Reproducibility s.d.:**	**4.71 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**11.64%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**38.20 µg/m³**
Number of laboratories in calculation + outliers:	**43**	**Range of tolerance:**	**28.33 - 52.60 µg/m³ (|Z-Score| <= 2.00)**



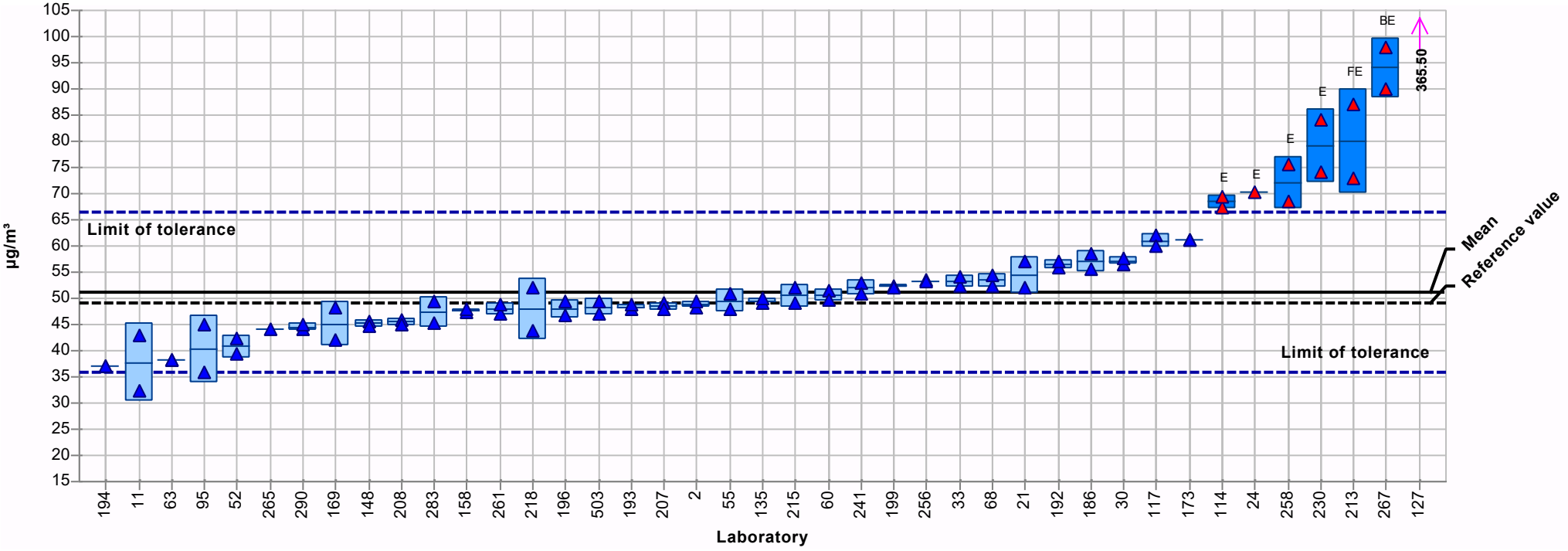
Summary results

Measurand:	**n-Butyl acetate**	**Mean:**	**79.48 µg/m³**
Sample:	**1**	**Reproducibility s.d.:**	**14.32 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**18.02%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**73.60 µg/m³**
Number of laboratories in calculation + outliers:	**40**	**Range of tolerance:**	**55.64 - 103.33 µg/m³ (|Z-Score| <= 2.00)**



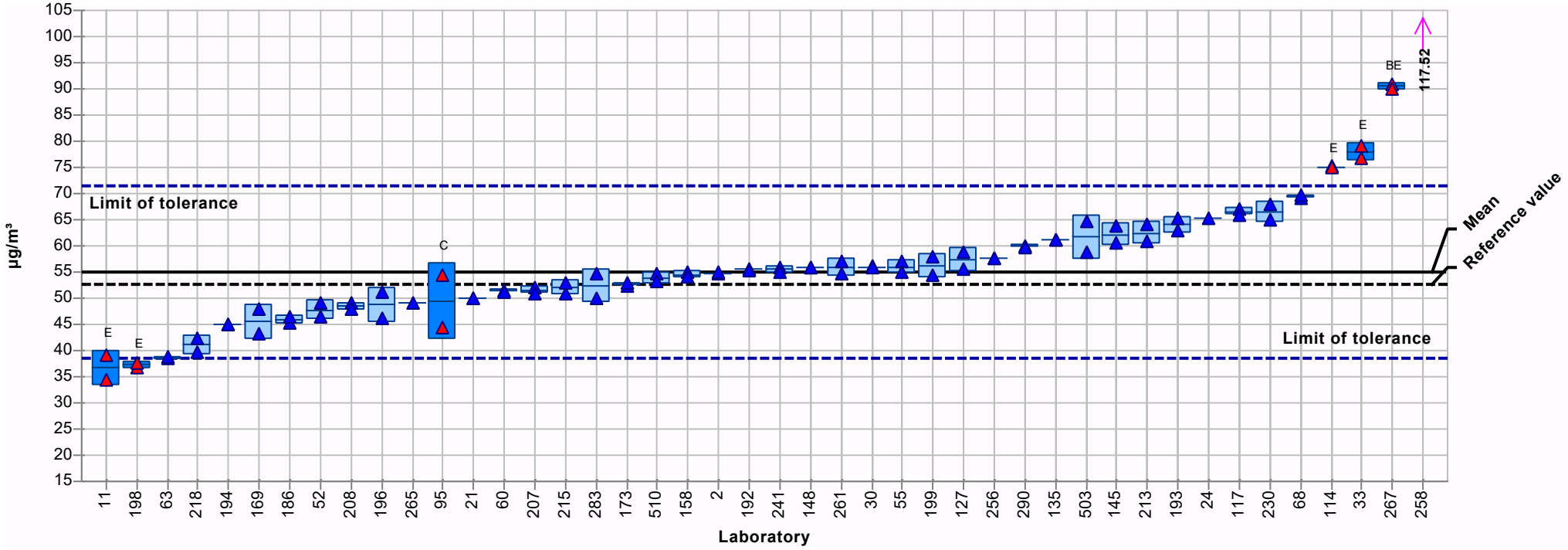
Summary results

Measurand:	**n-Heptane**	**Mean:**	**51.23 µg/m³**
Sample:	**1**	**Reproducibility s.d.:**	**9.42 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**18.38%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**49.10 µg/m³**
Number of laboratories in calculation + outliers:	**40**	**Range of tolerance:**	**35.86 - 66.60 µg/m³ (|Z-Score| <= 2.00)**



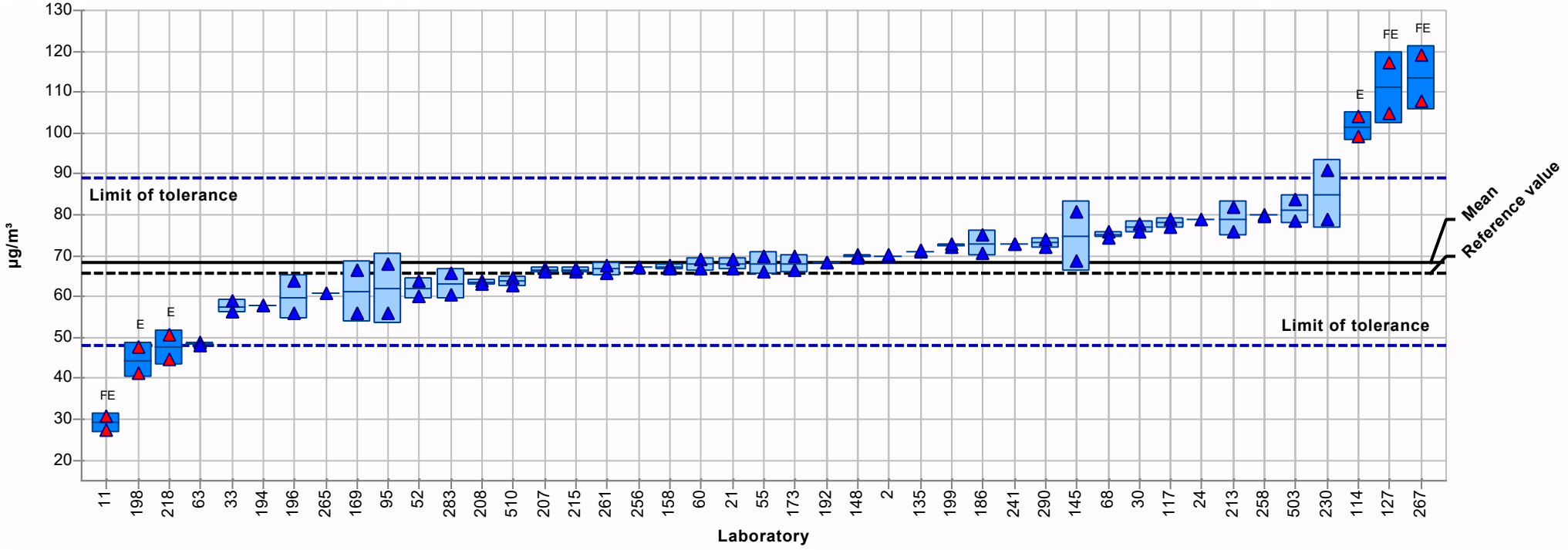
Summary results

Measurand:	**p-Xylene**	**Mean:**	**54.94 µg/m³**
Sample:	**1**	**Reproducibility s.d.:**	**9.39 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**17.10%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**52.60 µg/m³**
Number of laboratories in calculation + outliers:	**44**	**Range of tolerance:**	**38.46 - 71.42 µg/m³ (|Z-Score| <= 2.00)**



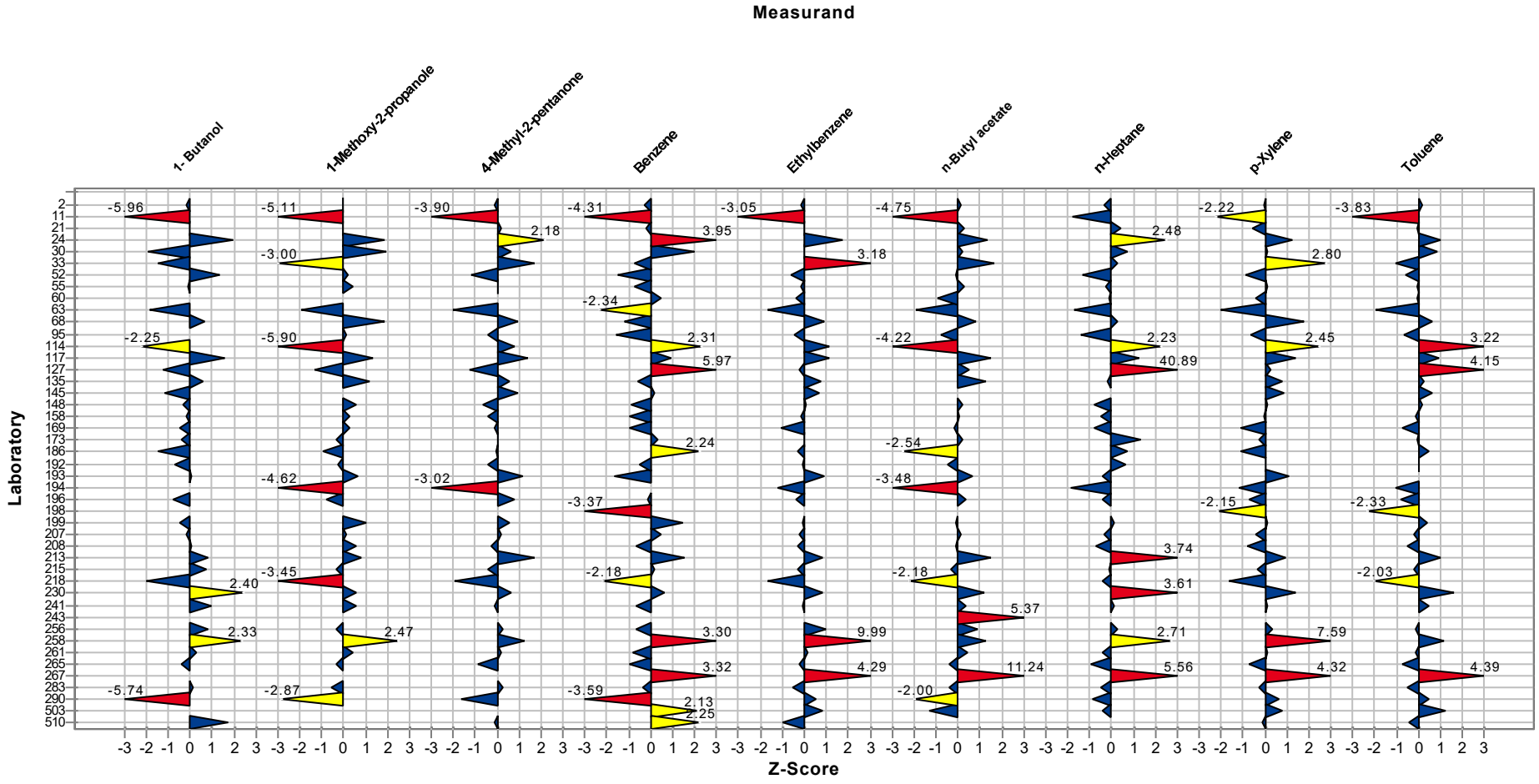
Summary results

Measurand:	**Toluene**	**Mean:**	**68.47 µg/m³**
Sample:	**1**	**Reproducibility s.d.:**	**10.70 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**15.63%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**65.60 µg/m³**
Number of laboratories in calculation:	**40**	**Range of tolerance:**	**47.93 - 89.01 µg/m³ (|Z-Score| <= 2.00)**



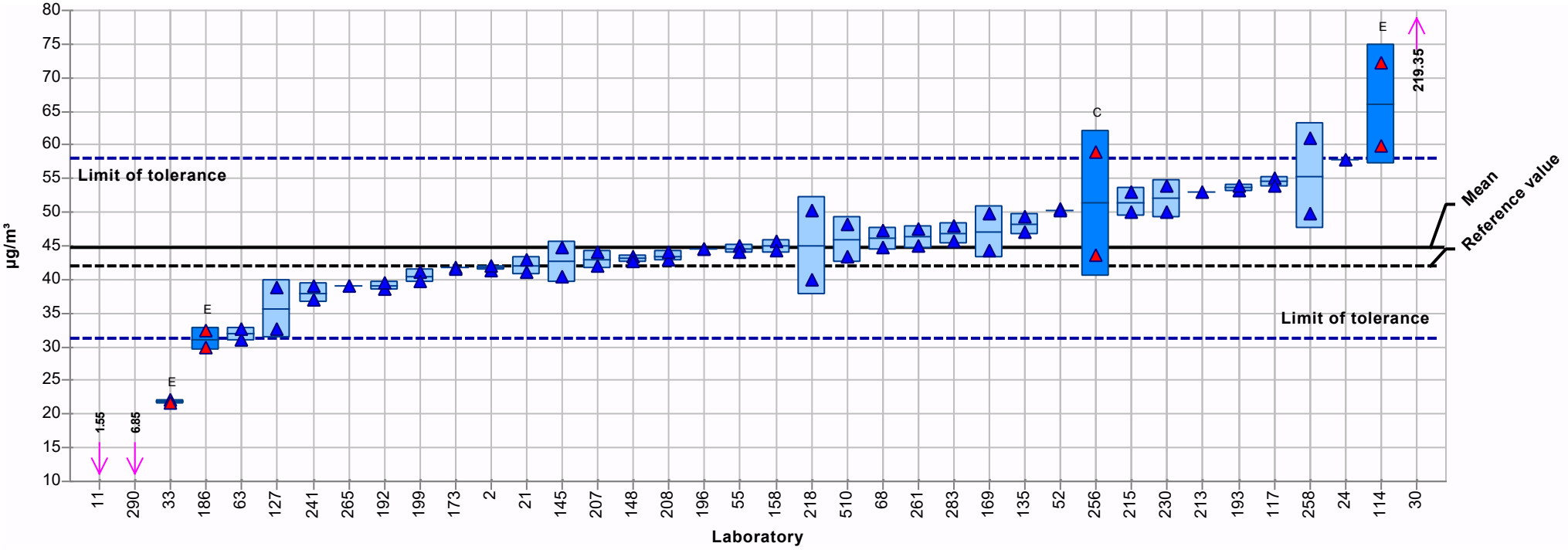
Sample chart of *Z-Scores*

Sample: 1



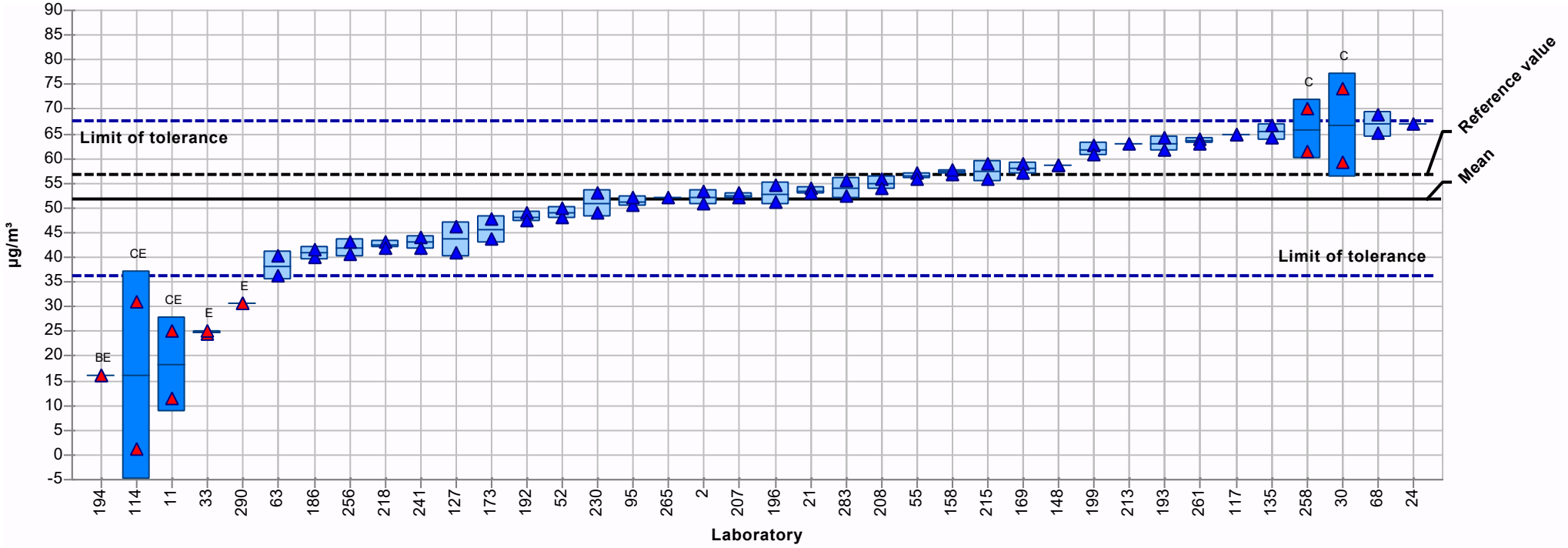
Summary results

Measurand:	**1- Butanol**	**Mean:**	**44.71 µg/m³**
Sample:	**2**	**Reproducibility s.d.:**	**8.48 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**18.96%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**42.10 µg/m³**
Number of laboratories in calculation + outliers:	**38**	**Range of tolerance:**	**31.30 - 58.13 µg/m³ (|Z-Score| <= 2.00)**



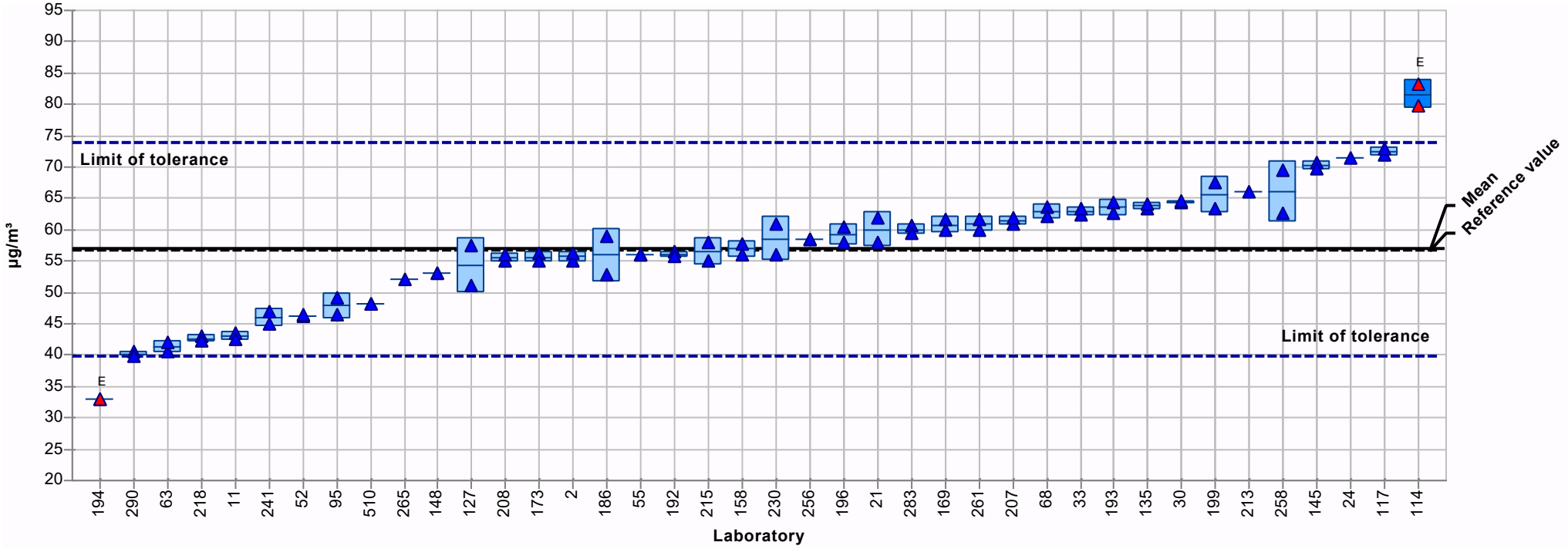
Summary results

Measurand:	**1-Methoxy-2-propanole**	**Mean:**	**51.92 µg/m³**
Sample:	**2**	**Reproducibility s.d.:**	**10.28 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**19.79%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**56.70 µg/m³**
Number of laboratories in calculation + outliers:	**38**	**Range of tolerance:**	**36.35 - 67.50 µg/m³ (|Z-Score| <= 2.00)**



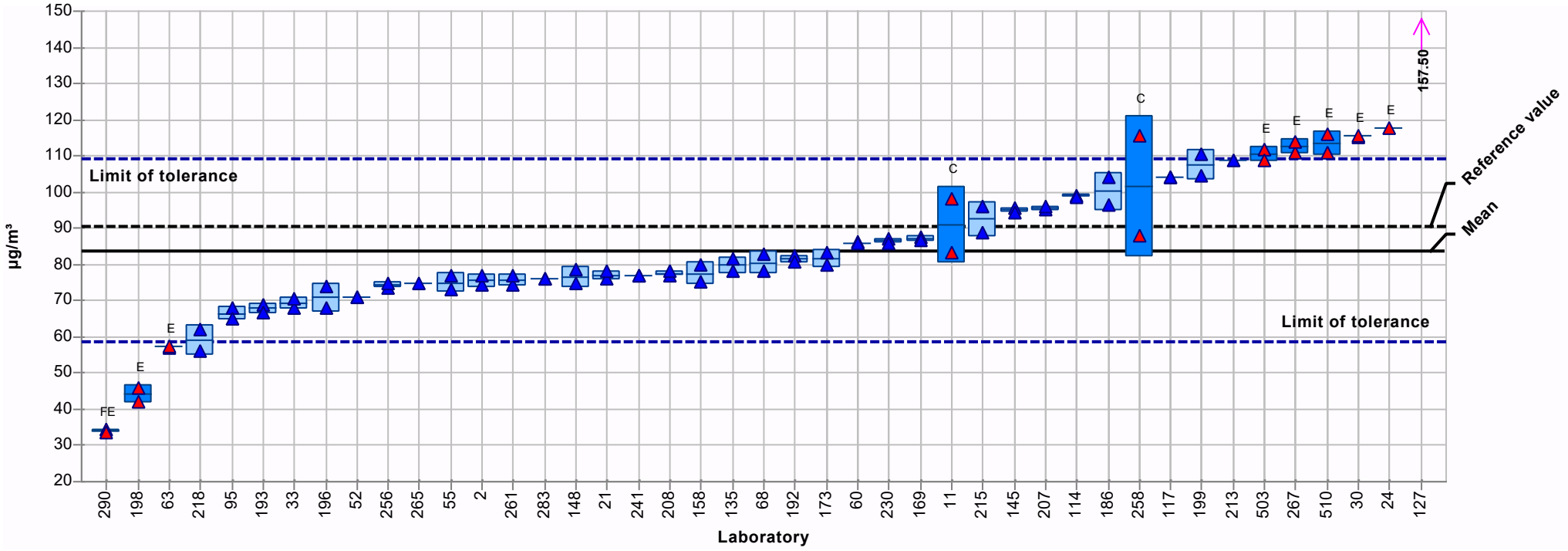
Summary results

Measurand:	**4-Methyl-2-pentanone**	**Mean:**	**56.94 µg/m³**
Sample:	**2**	**Reproducibility s.d.:**	**9.81 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**17.24%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**56.70 µg/m³**
Number of laboratories in calculation:	**40**	**Range of tolerance:**	**39.86 - 74.02 µg/m³ (|Z-Score| <= 2.00)**



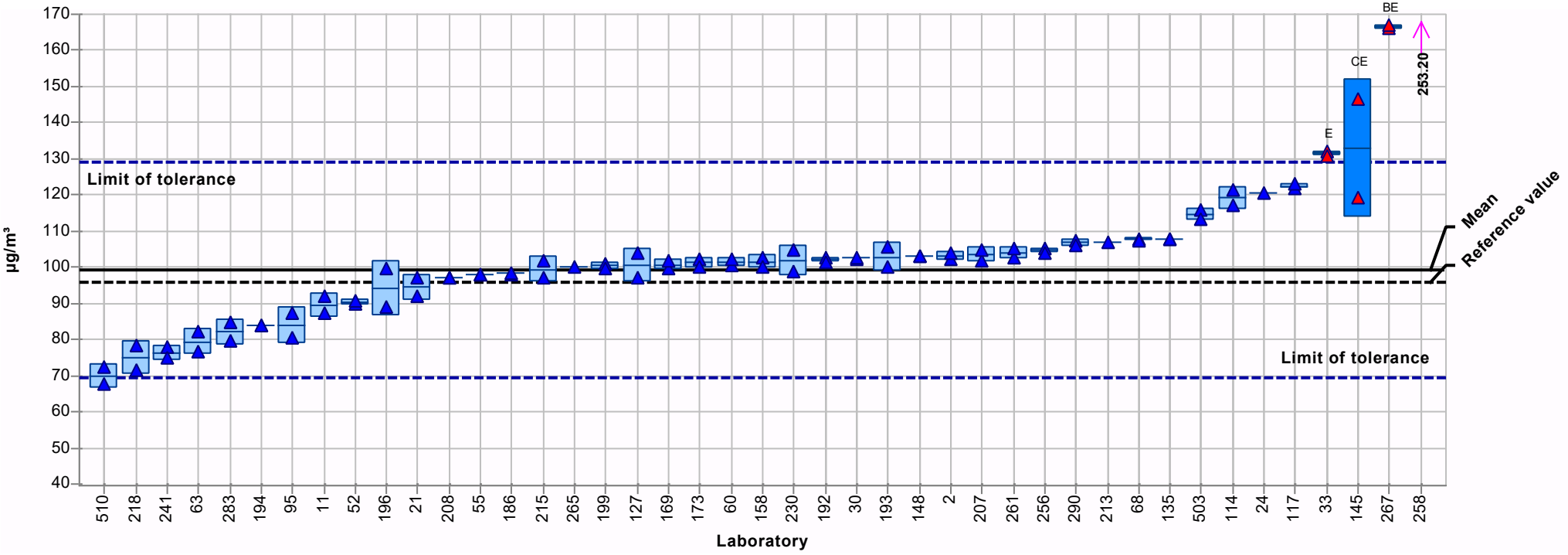
Summary results

Measurand:	**Benzene**	**Mean:**	**83.93 µg/m³**
Sample:	**2**	**Reproducibility s.d.:**	**17.27 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**20.58%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**90.70 µg/m³**
Number of laboratories in calculation + outliers:	**42**	**Range of tolerance:**	**58.75 - 109.11 µg/m³ (|Z-Score| <= 2.00)**



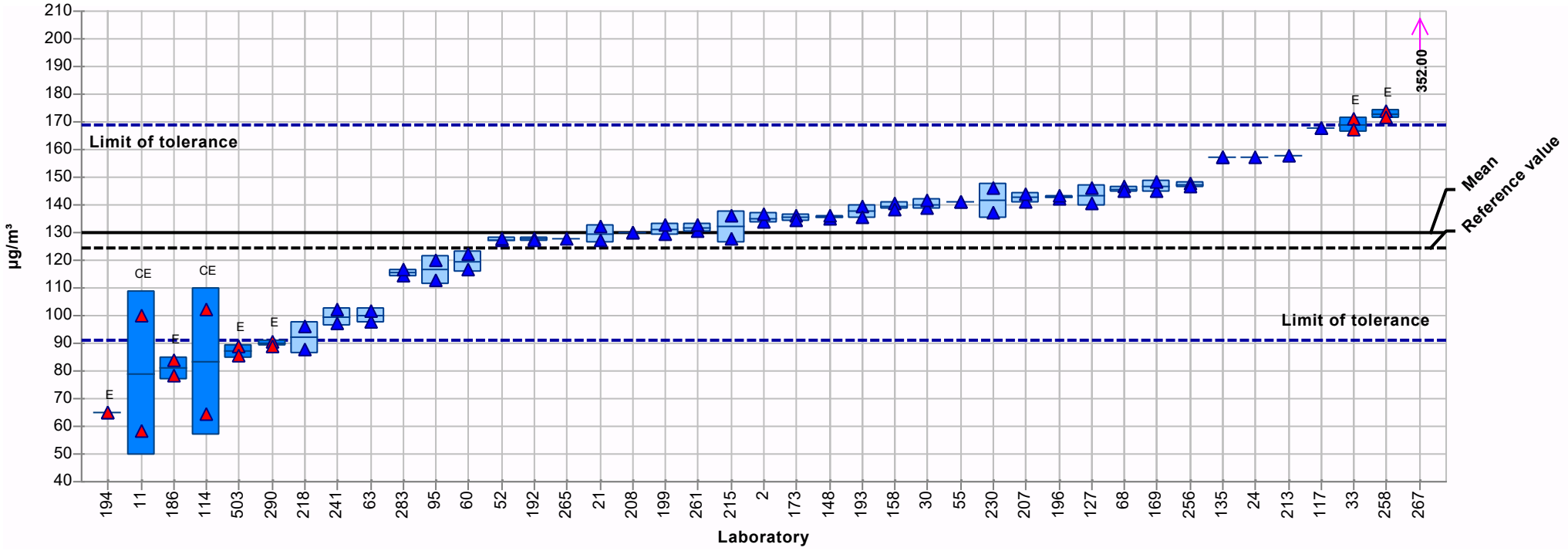
Summary results

Measurand:	**Ethylbenzene**	**Mean:**	**99.25 µg/m³**
Sample:	**2**	**Reproducibility s.d.:**	**12.95 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**13.05%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**95.80 µg/m³**
Number of laboratories in calculation + outliers:	**43**	**Range of tolerance:**	**69.47 - 129.02 µg/m³ (|Z-Score| <= 2.00)**



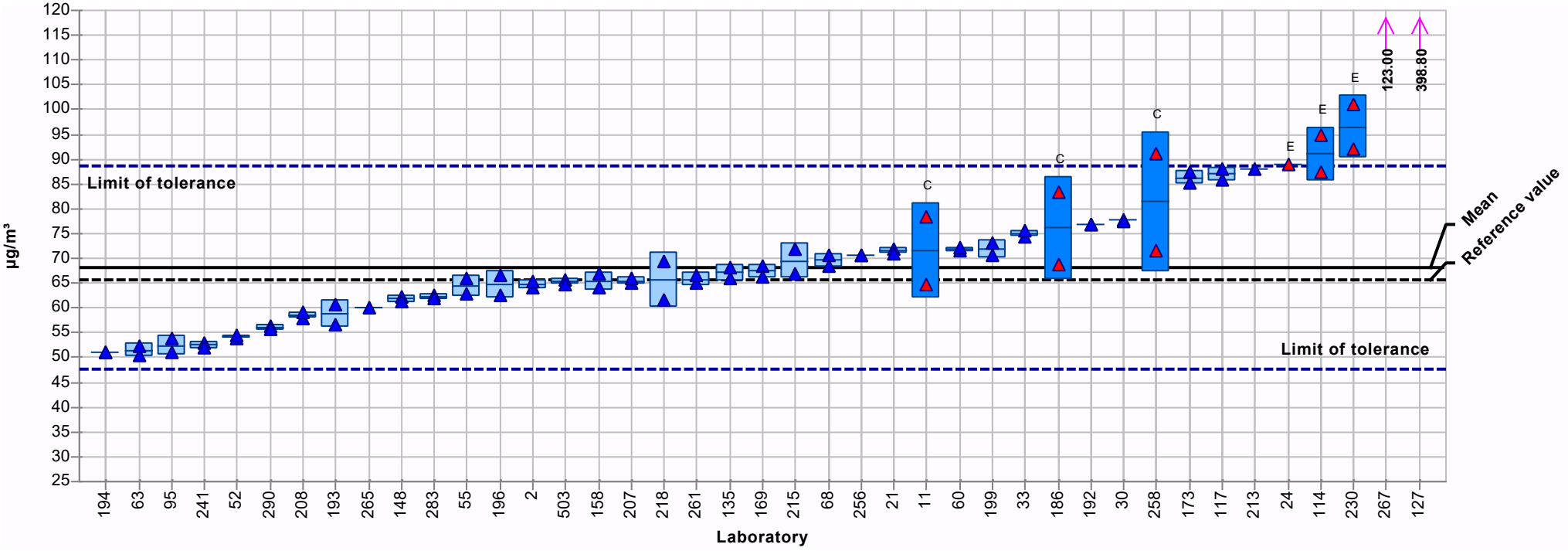
Summary results

Measurand:	**n-Butyl acetate**	**Mean:**	**129.79 µg/m³**
Sample:	**2**	**Reproducibility s.d.:**	**25.01 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**19.27%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**124.70 µg/m³**
Number of laboratories in calculation + outliers:	**41**	**Range of tolerance:**	**90.85 - 168.73 µg/m³ (|Z-Score| <= 2.00)**



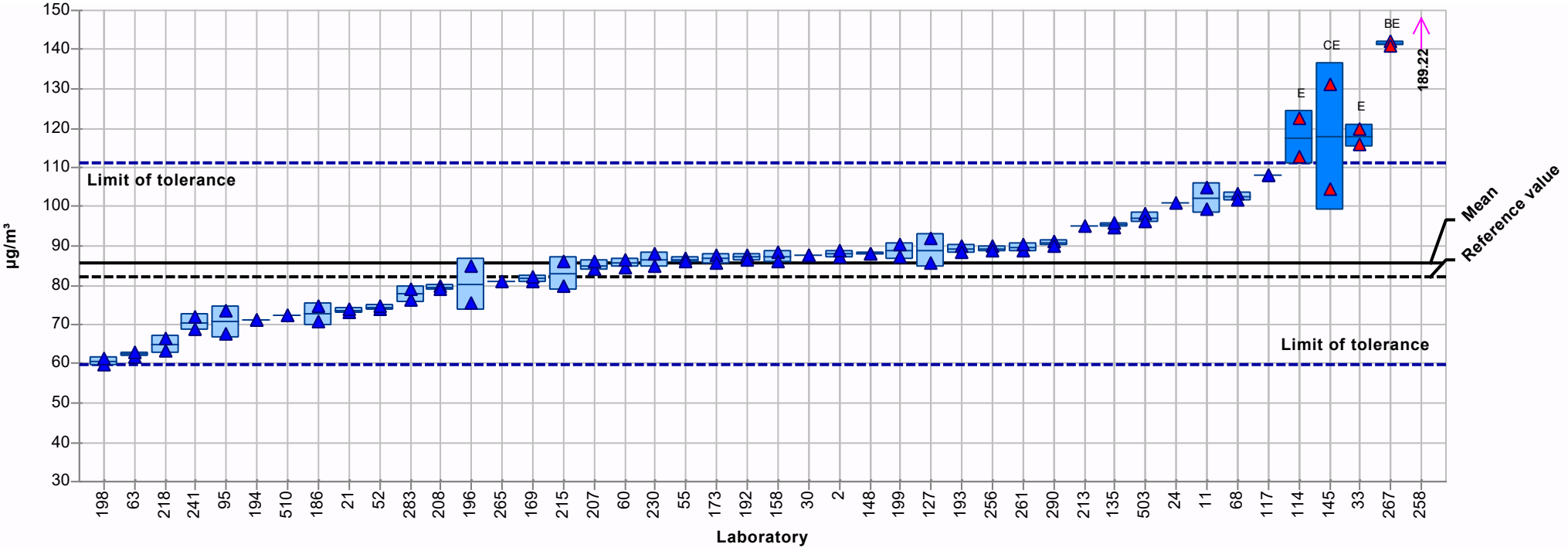
Summary results

Measurand:	**n-Heptane**	**Mean:**	**68.07 µg/m³**
Sample:	**2**	**Reproducibility s.d.:**	**11.63 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**17.09%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**65.60 µg/m³**
Number of laboratories in calculation + outliers:	**41**	**Range of tolerance:**	**47.65 - 88.50 µg/m³ (|Z-Score| <= 2.00)**



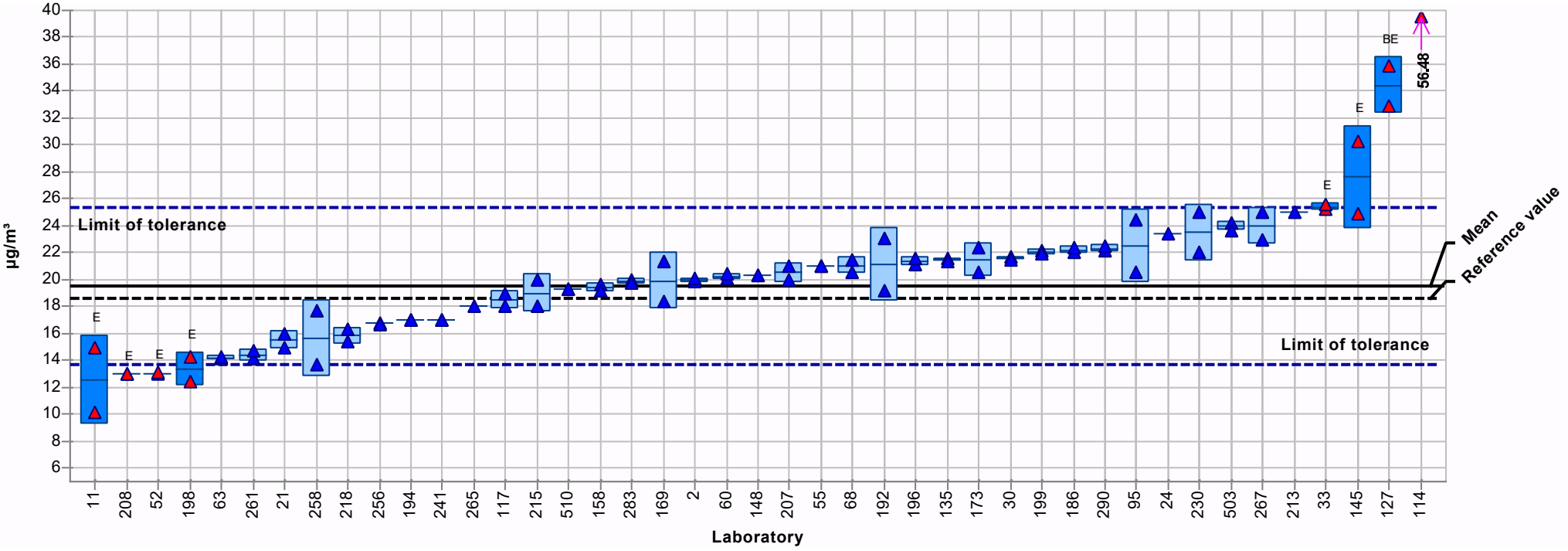
Summary results

Measurand:	**p-Xylene**	**Mean:**	**85.54 µg/m³**
Sample:	**2**	**Reproducibility s.d.:**	**13.27 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**15.51%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**82.10 µg/m³**
Number of laboratories in calculation + outliers:	**44**	**Range of tolerance:**	**59.88 - 111.20 µg/m³ (|Z-Score| <= 2.00)**



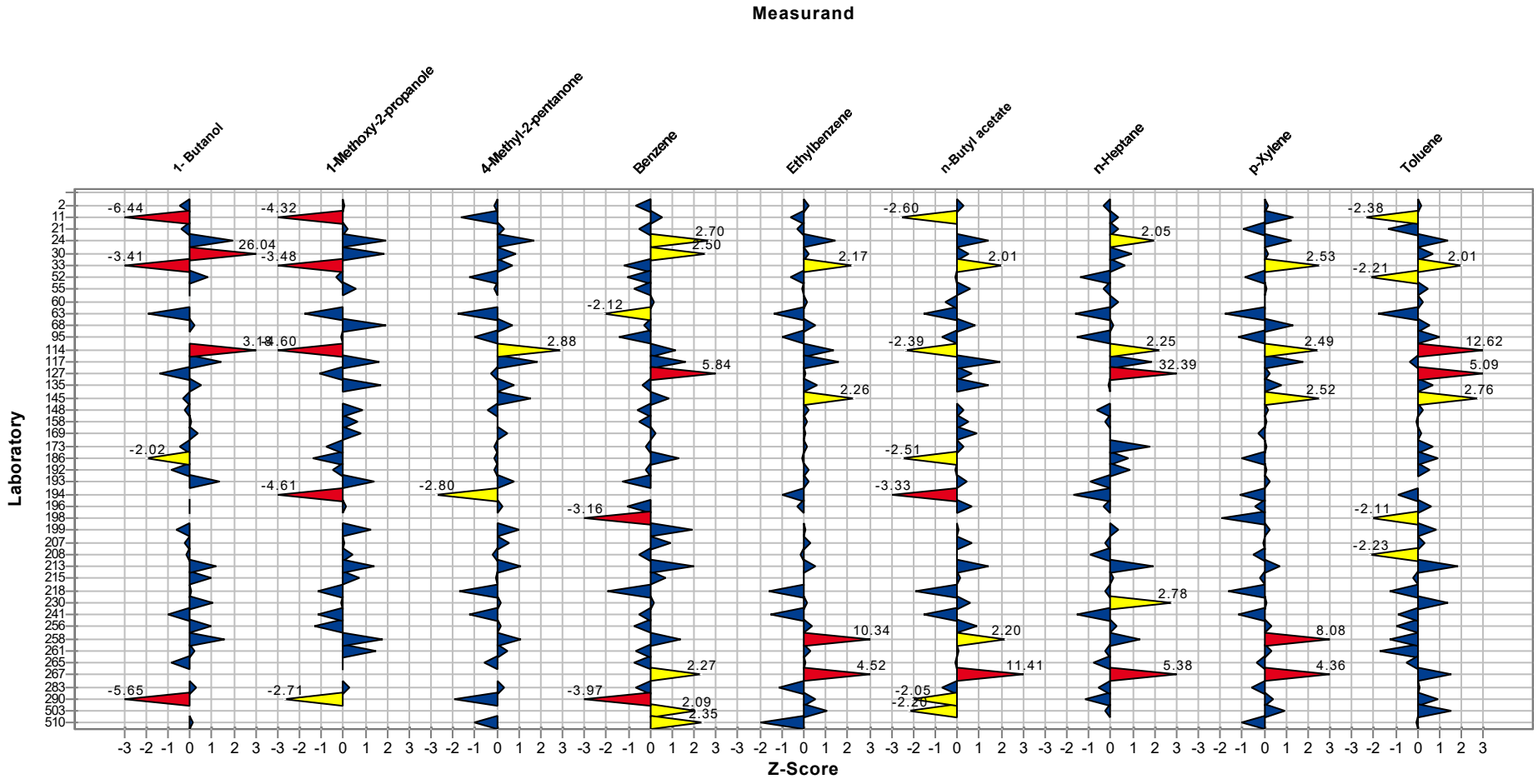
Summary results

Measurand:	**Toluene**	**Mean:**	**19.52 µg/m³**
Sample:	**2**	**Reproducibility s.d.:**	**3.81 µg/m³**
Method:	**ISO 5725-2**	**Rel. reproducibility s.d.:**	**19.53%**
Rel. target s.d.:	**15.00% (Limited)**	**Reference value:**	**18.60 µg/m³**
Number of laboratories in calculation + outliers:	**43**	**Range of tolerance:**	**13.67 - 25.38 µg/m³ (|Z-Score| <= 2.00)**



Sample chart of *Z-Scores*

Sample: 2



Summary of laboratory test results

Sample blank value 1

Laboratory	1- Butanol	1-Methoxy-2-propanole	4-Methyl-2-pentanone	Benzene	Ethylbenzene	n-Butyl acetate	n-Heptane	p-Xylene	Toluene
Unit	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
2	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00
21	< 1.00	< 1.00	< 1.00	< 1.00	2.00	< 1.00	2.00	8.00	3.00
24	3.08	1.22		4.92	0.83	1.15	0.16	4.60	2.45
52	0.20			0.60	1.00		0.30	3.80	0.40
55		7.90						5.50	5.30
60				< 2.50	< 2.50	< 2.50	< 2.50	3.10	4.60
63	0.80	< 1.00	< 1.00	1.00	0.80	0.50	0.50	3.00	3.30
68	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.70
95		0.93	0.32	3.96	3.45	1.22		7.57	7.72
114	< 2.50	< 2.50	< 2.50	7.59	2.76	< 2.50	11.41	9.52	23.46
117	2.00	1.00			1.00	1.00		5.00	3.00
127							5.05	2.12	3.47
135	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	8.90
148	1.80	< 1.00	< 1.00	1.10	1.10	< 1.00	< 1.00	4.30	3.60
158	1.54	1.61	0.54	0.67	1.28	1.19	0.75	1.39	3.26
169				2.00	4.20		2.70	4.30	16.00
173			0.08	0.78	1.00	1.30	0.46	3.60	2.80
186			1.10	8.90	1.50	0.60	1.90	2.40	8.80
192	0.48	0.33	-0.06	0.75	0.99	0.44	0.41	4.38	3.20
193	5.95	8.59	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	
194			1.00		1.00		1.00	1.00	3.00
196	0.58	0.19	0.07	0.48	0.59	0.37	0.18	2.23	1.58
198								5.24	6.67
199	1.20	0.44	0.12	0.54	1.00	0.67	0.48	4.80	3.40
207	< 1.00	< 1.00	< 1.00	1.00	< 1.00	< 1.00	< 1.00	< 1.00	5.00

Laboratory	1- Butanol	1-Methoxy-2-propanole	4-Methyl-2-pentanone	Benzene	Ethylbenzene	n-Butyl acetate	n-Heptane	p-Xylene	Toluene
208	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	4.00	3.00
213	9.20	7.80		1.60	6.10	0.60	0.60	9.50	8.10
215	4.00		1.00		1.00	1.00	1.00	3.00	3.00
218	0.50	0.20	0.80	0.90	1.40	1.00	0.60	1.60	3.20
230	< 2.00	< 2.00	< 2.00	1.00	1.00	< 2.00	< 2.00	5.00	5.00
241	2.30	0.80	< 0.60	< 1.80	1.20	< 1.00	< 0.80	5.50	4.40
243				< 253.00	< 253.00	< 10.00		< 253.00	< 253.00
256	< 0.50	0.80	< 0.50	5.20	1.40	1.50	1.20	6.10	5.20
258				4.25				7.41	2.67
261	0.70	0.30	0.10	0.80	0.80	0.40	0.30	3.20	2.50
265	5.00	2.00			1.00	1.00		1.00	4.00
267				2.00	2.00	2.00	1.00	2.00	5.00
283	1.38			1.06	0.95	0.37	0.24	5.97	3.36
290				6.30	2.70			6.70	6.10
503				< 5.00	< 5.00	< 25.00	< 5.00	< 5.00	< 5.00
–	–	–	–	–	–	–	–	–	–
No. of laboratories that submitted results	26	25	24	33	36	32	32	40	39

Summary of laboratory test results

Sample blank value 2

Laboratory	1- Butanol	1-Methoxy-2-propanole	4-Methyl-2-pentanone	Benzene	Ethylbenzene	n-Butyl acetate	n-Heptane	p-Xylene	Toluene
Unit	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
2	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00	< 10.00
21	2.00	2.00	< 1.00	3.00	3.00	3.00	3.00	8.00	6.00
24	3.70	1.17		4.90	1.05	2.23		3.21	3.85
30	< 2.00	< 2.00	< 2.00	2.80	< 2.00	2.00	< 2.00	4.00	7.00
52	0.40	2.80	0.40	3.10	1.50	1.90	0.90	3.50	2.20
55		5.20						4.90	7.20
60				< 2.51	< 2.51	< 2.51	< 2.51	2.56	5.18
63	< 1.00	< 1.00	< 1.00	1.60	1.00	1.30	1.10	2.60	3.70
68	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.30
95		1.68	0.63	4.36	3.83	2.65		6.57	8.36
114	2.75	< 2.50	< 2.50	6.11	2.64	< 2.50	6.97	7.42	16.68
117	2.00	1.00	1.00	1.00	2.00	3.00		4.00	4.00
127	1.96	4.52		14.08		1.42	87.59	3.11	15.09
135	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	2.40	< 2.00	< 2.00	5.40
148	2.20	< 1.00	< 1.00	1.70	1.50	1.60	1.40	3.60	5.20
158	1.81	1.59	0.79	1.18	1.68	2.49	1.25	1.38	4.71
169	2.60			1.30	3.90		2.20	4.10	3.70
173			0.32	2.50	1.20	2.10	1.30	2.70	0.70
186			1.00	11.00	1.60	1.20	1.60	1.60	6.90
192	0.95	0.48	0.08	1.26	1.11	1.24	0.86	2.98	4.18
193	5.60	8.73	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00	
194					2.00	1.00	2.00	1.00	4.00
196	1.52	0.17	0.28	1.32	0.99	0.28	0.61	2.41	3.29
198									4.77
199	1.80	0.59	0.41	2.00	1.70	2.10	1.30	3.20	6.00

Laboratory	1- Butanol	1-Methoxy-2-propanole	4-Methyl-2-pentanone	Benzene	Ethylbenzene	n-Butyl acetate	n-Heptane	p-Xylene	Toluene
207	< 1.00	< 1.00	< 1.00	2.00	< 1.00	< 1.00	< 1.00	< 1.00	6.00
208	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00	4.00	6.00
213	10.30	7.40	5.00	2.90	5.70	1.70	1.30	7.50	8.70
215	4.00		1.00	1.00	1.00	2.00		1.00	3.00
218	1.20	0.30	0.80	1.60	1.50	1.80	1.30	1.40	4.40
230	< 2.00	< 2.00	< 2.00	< 1.00	1.00	< 2.00	< 2.00	< 1.00	4.00
241	3.20	2.60	< 1.20	4.30	2.00	3.30	1.60	4.90	5.20
243						< 10.00			
256	< 0.50	0.50	< 0.50	7.00	1.90	2.40	1.20	4.70	6.20
258				7.57				8.81	6.36
261	2.20	0.40	0.40	1.50	1.00	1.50	0.80	2.80	3.80
265	3.00	2.00	1.00		1.00	1.00		1.00	3.00
267				2.00	2.00	5.00	2.00	2.00	8.00
283	1.60		0.13	1.14	1.24	1.56	0.87	5.08	4.63
290				7.20	3.10			6.20	7.20
503				< 5.00	< 5.00	< 25.00	< 5.00	< 5.00	6.59
–	–	–	–	–	–	–	–	–	–
No. of laboratories that submitted results	29	28	29	36	36	36	31	39	39

Questions and Answers

Participant	Sample carrier	Analytical method
2	Tenax TA	DIN ISO 16000-6
11	TENAX TA	16000-6
21	Markes Tenax	EN 16516
24	Tenax	16000-6
30	Tenax TA	ISO 16000-6
33	Tenax TA 60/80 Supelco	Hausmethode, SOP M100
52	Perkin Elmer Metalröhrchen, befüllt mit TENAX von SKC	DIN ISO 16000-6
55	Tenax TA (Markes)	ISO 16516
60	manufacturer	DIN ISO 16000-6
63	Tenax, Markes	DIN ISO 16000-6
68	Tenax TA	Auf Basis von EN ISO 16000-5 und ISO 16000-6 wurde eigene Labormethode entwickelt
95	Tenax GR	DIN EN ISO 16017-1
117	Tenax TA, Supelco	DIN ISO 16000-6
127	Tenax TA in Glastube, Hersteller Sigma	in Anlehnung an DIN ISO 16000-6
135	Tenax TA Supelco	16000-6
145	Gerstel Tube, Fuellung Tenax TA + Carbosieve SIII	Dow Intern
148	Tenax TA (Markes)	DIN ISO 16000-6, DIN EN 16516
158	Tenax TA	DIN ISO 16000-6 2012-11
169	TenaxTA, Fa. Gerstel	DIN ISO 16000-6
173	Tenax GR	DIN EN ISO 16017-1
186	Tenax TA	DIN ISO 16000-6
192	glass, Tenax-TA, Markes	ISO 16000-6
193	Desorptionsliner Tenax TA Fa. Gerstel	DIN ISO 16000-6
194	Stainless steel tubes, Tenax TA	TC/GC/Split/FID/MS
196	Manufactuer : Markes, Filling Material : Tenax-TA, Sample carrier material : Stainless steel tubes	ISO 16000-6
198	Carbotrap300 Supelco	UNI EN ISO 16017-1:2002
199	Tenax TA; MARKES	in Anlehnung an DIN ISO 16000-6:2012-11
207	Tenax, Markes-Röhrchen	DIN ISO 16000-6
208	Tenax TA+Carbograph 5TD	in house method modified from 16000-6

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Participant	Sample carrier	Analytical method
213	Glasröhrchen, Tenax TA, Gerstel	16000-6
215	Tenax Adsorber verschiedener Hersteller	DIN ISO 16000-6
218	Glaswolle + Tenax-TA (60/80)	DIN ISO 16000-6
230	Tenax TA	DIN ISO 16000-6
241	Tenax TA, Markes	ISO 16000-6
243	Carbopak B-Röhrchen (CPB), 60-80 mesh, Supelco	validierte Hausmethode
256	Tenax, Camsco	DIN ISO 16000-6
258	Tenax TA	ISO 16000-6
261	Tenax TA, CAMSCO	DIN ISO 16000-6
265	Tenax TA	16000-6
267	Tenax TA	Interne Methode SOP-B-25
283	Tenax TA	IN ISO 16017-1
290	Perkin Elmer Tenax TA	ISO 16000-6
503	manufacturer	DIN EN ISO 16017-1
510	Gertel Tube, Fuellung Tenax TA/Carbosieve SIII	Dow Intern

Participant	Gas chromatograph (GC)	Thermal desorber	Desorption temperature
2	Agilent 8890	Markes TD100-XR	280 °C
11	GC CLARUS 680C / MS CLARUS 600 PERKIN ELMER	ATD 650 PERKIN ELMER	300 °C
21	Agilent 7820A	Markes TD100-xr	300 °C
24	Agilent GC 7890B	Gerstel TD3.5+	280 °C
30	Agilent GC 7890A MS 5975C	Perkin Elmer TD650	260°C
33	PE Autosystem, PE Turbomass	PE ATD 400	250°C
52	Perkin Elmer, Autosystem XL	Perkin Elmer, Turbo Matrix 650 Thermal Desorber	280
55	hp 6890	Markes TD-100	300 °C
60	Agilent 7890A	MARKES	295
63	GC 2010 - Shimadzu	TD-20 - Shimadzu	280 °C
68	Agilent 7890B Series GC Custom	TD100-xr (ATD) von Markes	300°C
95	Agilent 6890N	Gerstel TDSA2	270°C
117	Agilent Technologies 7890 A	PerkinElmer TurboMatrix 650	280°C

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Participant	Gas chromatograph (GC)	Thermal desorber	Desorption temperature
127	Shimadzu Nexes 2030	Shimadzu TD-30	250 °C
135	Agilent 7890A	Perkin Elmer TurboMatrix 650	250°C
145	Agilent 7890B, MSD 5977B	Gerstel TDS 3C	20 Grad/1min/60Grad pro Min/ 260 Grad/16min
148	Agilent GC 7890B	Markes TD100	280°C
158	GC/MS (Agilent 7890/5975c)	Markes TD 100	280 °C
169	GC 6890 Fa. Agilent Technologies	TDS2, Fa. Gerstel	280°C
173	Agilent 7890 B	Perkin Elmer TurboMatrix 650	280
186	Perkin Elmer Gold	Perkin Elmer Turbomatrix 650	280
192	Agilent 7890A	TD-100	270
193	GC 7890B Fa. Agilent	Gerstel TDU	260 °C
194	Thermo Finnigan Trace GC	TD 100 Markes	250°C
196	Shimadzu, GC-2010 Plus	Shimadzu, TD-20	50degrees Celsius ~ 280degrees Celsius
198	Shimadzu	Perkin Elmer TMX350	270 °C
199	GC 7890B	TD-100 von MARKES	250 °C
207	Agilent 7890	Markes Unity TD 100	300
208	Agilent 6890/5975	Markes Unity2+Ultra	280ºC
213	Agilent GC 7890B	Gerstel TDS3	260°C
215	Shimadzu GCMS QP 2010	Shimadzu TD 20	300
218	Agilent 7890A	Markes TD-100	320 °C
230	Thermo Fischer GC Trace Ultra	TDS 3 Fa. Gerstel	40°C-260°C
241	6890 Series Gas Chromatograph	Markes TD-100	280 °C
243	Agilent 6890	Perkin Elmer, ATD 650	270 °C
256	Agilent 8890	ATD 650	300 °C
258	Agilent 7890A	Markes TD100	280°C
261	Perkin Elmer Clarus 680	Perkin Elmer Turbo-Matrix 350	270 °C
265	Shimadzu QP2020	Shimadzu TD 30	250°C
267	GCMS5973	MARKES TD100	280°C
283	Thermodesorption (Markes) gekoppelt mit GCMS (Agilent) (4-TD-GCMS1)	TD 100, Fa. MArkes International	250°C
290	Agilent 7890B (G3440B)	Perkin Elmer TurboMatrix 350	280°C
503	Agilent 7890A	MARKES	295
510	Agilent 6890N, MSD 5975C	Gerstel TDS 2	20 Grad/1min/60Grad pro Min/ 260 Grad/16min

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Participant	Desorption flow	Desorption time	Cryo-trap	Carrier gas	Carrier gas flow
2	50	10	20 °C	He	1,5
11	30 mL/min	15 min	- 30 °C	HELIUM	20 mL/min
21	25	10	10 °C and 320 °C	He	1.6
24	43 ml/min	10 min	-150 °C / 280 °C	Helium	1,3 ml/min
30	50	15	-30°C / 280°C	He	1
33	40	7,5	-25°C 250°C	Helium	1
52	20	15	-30 auf 280	Helium	4,8
55	25	10	10 °C - 350 °C with max heating rate	He	1.5
60	100	5	-10 to 300	Helium	2.5
63	60	10	-6 / 280 °C	Helium	1,88
68	50 ml/min	20 min	-20°C / 300°C	Helium	15 ml/min
95	40 mL/min	8 Minuten	-145°C - 12°C/sec - 300°C - 3 min	Helium	0,91 mL/min bei 40°C
117	20	15	-30°C, 270°C	He	1
127	60 mL/min	20 min	-20°C	Helium	36 cm/sec, konstante Trägergasgeschwindigkeit
135	28	14	-20°C, 300°C	Helium	1,5
145	50ml/min	21.17	Minus 150 Grad	Helium	2ml pro Minute
148	50	10	-25 /315	Helium	0,5
158	75 ml/min	8 min	-10 °C und + 310 °C	Helium	1 ml/min
169	100	5	-100°C	Helium	1
173	50	5	-15 / 280	He	1,0
186	50 mL/min	20 min	-30°C to 280°C at 45°C/sec	Helium	2mL/min
192	30	10	cryo trap at 5degC and desorb at 280degC	Helium	1.3
193	45 ml/min	6 min	Kühlfalle -90 °C ; Ausheiztemperatur 260°C	Helium	1,5 ml/min
194	30	5	-20	Helium	4
196	60 mL/min	5 min	-10degrees Celsius, 280degrees Celsius	Helium	0.9ml/min
198	40	8	-10°C / 270°C	Helium	1.0
199	50 L/min	5 min	25-300 °C	Helium	0,7 mL/min
207	20	8	-25	Helium	1,2
208	50 mL/min	10	-20ºC > 300ºC	He	1 mL/min
213	29mL/min	5min	-150°C - 12°C/sek auf 280°C	Helium	1,3mL/min
215	60	10	0/300	Helium	4,8
218	20 mL/min	20 min	0 °C / 320 °C	Helium	1,3 mL/min

VOC 2020

Participant	Desorption flow	Desorption time	Cryo-trap	Carrier gas	Carrier gas flow
230	30ml/min	5 Minuten	-30°C bis 260°C	Helium	0,6ml/min
241	50	10	0 °C , 280 °C	Helium	1,5
243	8,5 ml/min	10 min	Temperatur der Kühlfalle -30°C - 270°C und die Heizrate 40°C/s	Helium	8,5 ml/min
256	50	5	2°C / 300 °C	Helium	1.2
258	20	15	-30°C; 300°C	Helium	1.3
261	30 ml/min	15 min	-8 / 275 °C	Helium	1,6 ml/min
265	60	8	-20°C/250°C	He	2,46
267	50ml/min	15 min	-5°C	He	1,5 mL/min
283	20	20	-10°C, 180°C	Helium	20
290	40 ml/min	20 min	-30 bis 280°C	Helium	44 ml/min
503	100	10	20 - 300	Helium	2.7
510	50ml/min	21.17	Minus 150 Grad	Helium	2ml pro Minute

Participant	Analytical column	Detector
2	RTX VMS	MSD 5977B
11	5% PHENYL 95% METHYL POLYSILOXANE	MS
21	Restek Rxi-5Sil MS (60m x 250 µm x 1 µm)	Agilent 5977E MSD
24	Agilent Ultra 2	Agilent MSD 5977B
30	Rxi-5ms 55 m x 0.25 µm	FID / MS
33	DB VRX	FID, MS
52	Zebron 1-MS	Clarus 500 Mass Spectrometer, FID
55	Rxi-5Sil-MS 60m x 0.25 mmID x 1.0µ	MS
60	HP-5MS	MS
63	RTX-5-SIL MS	MS
68	Vocol von Supelco	7000D Quadrupol MS/MS von Agilent
95	Rtx-502.2; 40m x 0,18mm ID; 1µm FD	Agilent 5975C MSD
117	HP-5 MS (30 m x 0,25 mm x 0,25 µm)	MS
127	Restek RTX-VMS 30m,0,25mm ID, 1,4 µm df	singlequad MS
135	RTX-200	MSD
145	DB 624, 60m 0.25mm 1.4	FID + MSD

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Participant	Analytical column	Detector
148	Restek Rxi-5Sil MS, 20m x 0,18mm id x 0,36µm df	Agilent 5977B MSD
158	Resteck RTX-1 60m, ID 0,25 x 1µm	MSD Agilent 5978C
169	DB-5ms; 60m x 0,25 mm, 1µm	MS 5975C; Agilent Technologies
173	Supelco SPB 624 - 60m*0,25mm*1,4µm	MS-Agilent 5977B
186	HP-5MS	MS
192	Inert Cap-1(60m length, 0.25mm daim, 1.5um film)	5975C MSD
193	DB-5MS 60 m x 0,32mm 0,5µm Film	MSD 5977B Fa. Agilent
194	Zebron ZB-5MS, Guardian 30m x 0.25mm x 1 ym	MS/FID
196	DB-1, Length : 60m, Diamter : 0.25mm, Thickness : 0.25um	MS
198	Rtx-624 Sil MS	Mass Single Quadrupole
199	DB5-5.625	5977 A MSD
207	DB 5	MS Agilent 5975
208	HP-5MS UI	MSD
213	Ultra 2, 50m*320µm*0,52µm	Agilent MS 5977B
215	VF-5ms	MS
218	DB-5 MS-UI 60 m	MS, Agilent 5975C
230	Optima 1 MS Accent, MN 60m	MS
241	ZB-5 MS, 60 m*0,25 mm*0,25µm	Agilent 5975B inert XL MSD
243	Quarzkapillare RTX 624	FID
256	60m Rtx / 0.25 ID / 1.4 um	Massenspektrometer
258	Agilent HP-Ultra 2	Agilent 5975C
261	Elite-VMS 30m PE	MSD Clarus SQ8 Perkin Elmer
265	Agilant VF-5MS	MS
267	HP INNOWAX 60m x 0.32mm x 0.5µm	MSD
283	DB 624 (30m x 0,25mm x 1,4µm)	Massenspektrometer 5977 E MSD Fa. Agilent Technologies
290	HP Ultra 2 (50m x 0,32mm 0,52µm)	Agilent MSD 5977B
503	HP-5MS	MS
510	DB 624, 60m 0.25mm 1.4	FID/MSD

Participant	Data evaluation

Participant	Data evaluation
2	Extern mit zwei Kalibrierbereichen, Retentionszeit und Massenspektrum
11	MS TIC & SIM
21	Calibration Curve
24	4-Punktkalibrierung externer Standards
30	Identification by MS / Quantification by FID
33	externer Standard
52	Qunatifizierung: FID, Identifizierung: MS
55	7 point calibration curve
63	SIM, externer Standard, MS
68	Identifikation mit MS; Quantifizierung mit entspr. Berechnung in einem Excelfile
95	Quantifizierung über internen Standard, Identifizierung über MS-Spektrum und RT
117	Kalibrierung über substanzspezifische externe Standards. Identifikation über interne Datenbank sowie über die externen Standards.
127	Externe Kalibrierung, Identifizierung über Nist
135	Peakflächen, externer Standard, Massenspektren-Vergleich
145	FID quantifiziert, MSD qualifiziert
148	Identifizierung und Quantifizierung mittels GC-MSD und Toluol d8 als Interner Standard
158	Sim-Ion, Interne Std.-Methode
169	externe Kalibrierung
173	Externer Standard / 8 Kalibrierpunkte je Komp. / MS-SIM
186	Internal calibration
193	externe 10-Punkt Standard-Kalibrierung , Identifizierung mit MSD Nist-Bibliothek
194	x-calibur. Alle Angaben in D8 Äquivalenten
196	NIST library, Calibration Curve(Five Points)
198	SIM and Scan simultaneous
199	externe Kalibrierung
207	EIC Originalreferenzen, eigene und kommerziellle Bibliotheken
208	quantification and identification done with pure reference compounds
213	Massenspur 3 Punk Kalibrierung, Massenspektrum
215	Identifizierung über Datenbank, Quantifizierung über substanzspezifische Kalibrierung und internem Standard, Messwert wurde ohne BW-Abzug angegeben
218	Masshunter 10, NIST DB, externe Kalibrierung, SIM
230	Referenzstandards, eigene Belegung, RT
241	Kalibrierung, Retentionszeit und Massenspektrum

VOC 2020

Participant	Data evaluation
243	Quantifizierung über externen Standard, Identifizierung über Retentionszeitvergleich
256	substanzspezifische 6-Punkt-Kalibrierung, Retentionszeit, Massenspektrum
258	External standards, mass spectra and SIM
261	Interner Standard, 5 Punkt-Eichung
265	über stoffspezifische Kalibration
267	Quantifizierung mittels spezifischer Massenfragmente, Indentifizierung mittels NIST Bibliothek
283	quantifiziert über eine 6-Punktkalibrierung, indentifiziert über Massenspektren und Retentionszeit
290	externe Kalibrierung und die aktuelle NIST-Spektrenbibliothek
510	FID Quantifizierung, MSD Qualifizierung

Participant	Recovery rate	Date of analysis
2	Nein	22.09.2020
11	No	28 SEPTEMBER 2020
21	no	22/09/2020
24	Ja	08-09.10.2020
30	no	22/09/2020
33	ja	05.10.2020
52	Nein	07.09.2020
55	No	21/09/2020
60	No	09/09/2020
63	nein	14.9.2020
68	Nein	30.09./01.10.2020
95	nein	23.09.2020
117	Nein	10 Tage nach Erhalt der Proben.
127	nein	09.10.2020
135	ja	15.09.2020
145	nicht bestimmt	09.09.2020
148	Nein	04.09.2020
158	Es wurden Kontrollstandards eingesetzt	03. bis 04.09.2020
169	nein	4.09.2020

Participant	Recovery rate	Date of analysis
173	Nein, da Kalibrierung übers Gesamtverfahren	14.9.2020
186	No	10/09/2020
192	no	9 September 2020
193	Nein	07.09.2020
194	1	08.09.2020
196	N/A	September-25th-2020
198	no	25/09/2020
199	nein	14.09.2020
207		08.09.2020
208	no	11.9.2020
213	nein	09.10.2020 / 12.10.2020
215	nein	10.09.20
218	Nein	18.09.2020
230	nein	ab 07.09.-15.09.2020
241	Nein	2.10.2020
243	nein	08.09.2020
256	Nein	07.09.2020
258	No	September 11, 2020
261	nein	18.09.2020
265	nein	07,08 Spetember
267	Nein	18/09/2020
283	nein	14./15.09.2020
290	Nein	07.10.2020
503	No	10/09/2020
510	nicht bestimmt	08.09.2020