IFA
Institut für Arbeitsschutz der
Deutschen Gesetzlichen Unfallversicherung

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

Proficiency testing scheme “Organic solvents with own sampling”

20/21 February 2024

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Summary of laboratory test results

Sample 1

	1-Butanol	Z score	1-Methoxy-2-Propanol	Z score	1-Propanol	Z score	2-Butanol	Z score
Unit	mg/m³		mg/m³		mg/m³		mg/m³	
1	163,0	-0,13	60,7	-1,10			125,0	0,39
26	186,5	1,29	72,8	0,68	31,1	0,69	142,6	1,85
33	189,0	1,44	71,3	0,46	31,7	0,88	143,0	1,88
39	122,0	-2,61 E	61,9	-0,92	30,2	0,36	100,0	-1,69
40	163,8	-0,08			27,6	-0,53	118,3	-0,17
42	169,0	0,23	70,2	0,30	27,1	-0,70	122,0	0,14
72	161,7	-0,21	62,8	-0,79	27,3	-0,62	116,8	-0,29
78	168,1	0,17	66,2	-0,29	26,7	-0,84	123,6	0,27
116	133,0	-1,95	59,9	-1,21			106,0	-1,19
130	155,8	-0,57	59,5	-1,28	25,3	-1,33	116,7	-0,31
139	173,3	0,49	81,3	1,93	33,5	1,51	147,0	2,22 E
167	154,0	-0,68	59,0	-1,35	24,0	-1,76	110,0	-0,86
188	160,0	-0,31	57,3	-1,60	27,6	-0,53	121,3	0,08
234	216,9	3,13 E	86,8	2,73 E	35,1	2,05 E	170,5	4,16 FE
236								
238	134,3	-1,87	59,3	-1,30	18,4	-3,69 FE	100,9	-1,62
252								
256	147,4	-1,08	79,8	1,71	28,7	-0,15	136,5	1,34
297	210,0	2,71 E	82,0	2,03 E	32,0	0,98	96,0	-2,02 E
–	–	– –	–	– –	–	– –	–	– –
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	17		16		15		17	
Mean	165,2		68,2		29,1		120,4	
Reprod. s.d.	25,3		9,8		3,2		15,8	
Rel. reproducibility s.d.	15,31 %		14,34 %		11,05 %		13,13 %	
Reference value	176,4		70,6		27,6		129,1	
Target s.d.	16,5		6,8		2,9		12,0	

	1-Butanol	Z score	1-Methoxy-2-Propanol	Z score	1-Propanol	Z score	2-Butanol	Z score
Rel. target s.d.	10,00 %		10,00 %		10,00 %		10,00 %	
Low er limit of tolerance	132,1		54,5		23,3		96,3	
Upper limit of tolerance	198,2		81,8		35,0		144,4	
Type F outliers					1		1	
No. of laboratories after elimination of outliers type A-D and F (w ithout laboratories that only gave states but no measured values)	17		16		14		16	

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|>3,50	

	2-Propanol	Z score		i-Butanol	Z score	
Unit	mg/m³			mg/m³		
1	78,9	-0,05		57,5	0,45	
26	89,7	1,31		57,0	0,36	
33	90,6	1,42		65,4	1,89	
39	47,7	-3,99	FE	47,5	-1,37	
40	78,5	-0,10		53,9	-0,20	
42	77,5	-0,23		54,6	-0,08	
72	76,3	-0,38		54,3	-0,14	
78	77,5	-0,23		55,5	0,08	
116	53,2	-3,29	E	47,2	-1,42	
130	73,2	-0,77		49,8	-0,95	
139	93,5	1,79		67,6	2,28	E
167	71,0	-1,05		50,0	-0,91	
188	74,7	-0,58		52,4	-0,48	

	2-Propanol	Z score		i-Butanol	Z score	
234	99,7	2,57	E	73,9	3,42	E
236	76,9	-0,30				
238	58,2	-2,66	E	44,2	-1,97	
252	78,3	-0,13				
256	83,0	0,46		52,7	-0,42	
297	97,0	2,23	E	52,0	-0,55	
–	–	– –		–	– –	
Method	ISO 5725-2			ISO 5725-2		
Assessment	|Z|<=2,00			|Z|<=2,00		
No. of laboratories that submitted results	19			17		
Mean	79,3			55,0		
Reprod. s.d.	12,0			7,7		
Rel. reproducibility s.d.	15,16 %			13,94 %		
Reference value	81,5			58,4		
Target s.d.	7,9			5,5		
Rel. target s.d.	10,00 %			10,00 %		
Low er limit of tolerance	63,5			44,0		
Upper limit of tolerance	95,2			66,0		
Type F outliers	1					
No. of laboratories after elimination of outliers type A-D and F (w ithout laboratories that only gave states but no measured values)	18			17		

Summary of laboratory test results

Sample 2

	1,2,4-Trimethylbenzene	Z score	Cumene	Z score	Ethylacetate	Z score	Ethylbenzene	Z score
Unit	mg/m³		mg/m³		mg/m³		mg/m³	
1	16,8	-0,97	47,3	-0,98	152,0	-0,12	56,7	-1,45
26	17,0	-0,85	47,3	-0,98	158,4	0,30	59,8	-0,99
33	16,0	-1,40	55,3	0,54	179,0	1,64	69,4	0,46
39	16,1	-1,35	57,8	1,02	127,0	-1,74	68,0	0,25
40			49,7	-0,52			70,7	0,65
42	19,2	0,32	49,8	-0,50	148,0	-0,38	62,7	-0,55
72	20,1	0,83	51,9	-0,11	148,9	-0,32	70,2	0,59
78	20,1	0,78	54,7	0,43	157,1	0,22	67,8	0,22
116	17,2	-0,76	55,1	0,52	131,0	-1,48	60,5	-0,87
130	19,4	0,43	51,9	-0,10	149,5	-0,28	63,1	-0,49
139	20,9	1,24	54,6	0,42	149,1	-0,31	68,6	0,33
167	20,0	0,75	53,0	0,11	144,0	-0,64	67,0	0,10
188	19,8	0,64	52,1	-0,07	156,7	0,19	66,4	0,01
234	24,3	3,05 E	64,6	2,31 E	201,4	3,10 E	82,1	2,38 E
236	19,1	0,26	50,4	-0,39	150,0	-0,25	62,5	-0,58
238	16,6	-1,08	45,7	-1,29	129,2	-1,60	58,9	-1,12
239							60,2	-0,93
252					149,1	-0,30		
256	14,7	-2,10 E	45,8	-1,27	157,7	0,25	72,9	0,99
297	19,0	0,21	57,0	0,87	180,0	1,70	73,0	1,00
–	–	– –	–	– –	–	– –	–	– –
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	17		18		18		19	
Mean	18,6		52,4		153,8		66,3	
Reprod. s.d.	2,3		4,8		18,4		6,2	
Rel. reproducibility s.d.	12,52 %		9,06 %		11,93 %		9,34 %	
Reference value	19,6		50,9		147,6		64,9	

	1,2,4-Trimethylbenzene	Z score	Cumene	Z score	Ethylacetate	Z score	Ethylbenzene	Z score
Target s.d.	1,9		5,2		15,4		6,6	
Rel. target s.d.	10,00 %		10,00 %		10,00 %		10,00 %	
Low er limit of tolerance	14,9		42,0		123,0		53,1	
Upper limit of tolerance	22,3		62,9		184,5		79,6	
No. of laboratories after elimination of outliers type A-D and F (w ithout laboratories that only gave states but no measured values)	17		18		18		19	

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|>3,50	

	m-Xylene	Z score	n-Hexane	Z score	n-Octane	Z score	Toluene	Z score
Unit	mg/m³		mg/m³		mg/m³		mg/m³	
1	61,7	-1,28	55,6	-0,76	64,7	-2,69 E	23,9	-1,32
26	63,5	-1,03	52,9	-1,20	82,7	-0,66	24,5	-1,11
33	67,6	-0,45	64,7	0,75	88,0	-0,06	29,7	0,78
39	69,3	-0,21	68,2	1,34	102,1	1,53	28,6	0,38
40					89,8	0,14	25,4	-0,78
42	68,0	-0,39	52,8	-1,22	82,4	-0,69	26,8	-0,27
72	70,4	-0,06	51,6	-1,43	84,2	-0,49	27,8	0,08
78	72,8	0,29	65,5	0,88	85,8	-0,31	29,5	0,70
116	62,7	-1,14	67,3	1,19	90,3	0,20	25,0	-0,93
130	67,6	-0,45	52,8	-1,23	83,7	-0,55	26,0	-0,57
139	74,5	0,53	52,9	-1,21	89,4	0,10	27,8	0,10
167	72,0	0,17	60,0	-0,03	90,0	0,16	28,0	0,16
188	71,3	0,07	56,8	-0,56	87,7	-0,10	27,8	0,09

	m-Xylene	Z score	n-Hexane	Z score	n-Octane	Z score	Toluene	Z score
234	87,8	2,40 E	79,5	3,22 E	108,5	2,25 E	34,6	2,56 E
236	69,5	-0,18			90,6	0,23	26,9	-0,24
238	63,2	-1,07	56,5	-0,61	83,3	-0,59	25,3	-0,82
239	68,6	-0,31					25,4	-0,78
252							26,1	-0,53
256	82,7	1,68	46,5	-2,27 E	92,7	0,47	30,9	1,22
297	81,0	1,44	79,0	3,13 E	98,0	1,07	31,0	1,25
–	–	– –	–	– –	–	– –	–	– –
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	18		16		18		20	
Mean	70,8		60,2		88,6		27,5	
Reprod. s.d.	7,1		9,7		9,1		2,6	
Rel. reproducibility s.d.	10,00 %		16,14 %		10,31 %		9,56 %	
Reference value	71,0		54,8		84,9		27,9	
Target s.d.	7,1		6,0		8,9		2,8	
Rel. target s.d.	10,00 %		10,00 %		10,00 %		10,00 %	
Low er limit of tolerance	56,6		48,1		70,8		22,0	
Upper limit of tolerance	85,0		72,2		106,3		33,1	
No. of laboratories after elimination of outliers type A-D and F (w ithout laboratories that only gave states but no measured values)	18		16		18		20	

Summary of laboratory test results

Sample 3

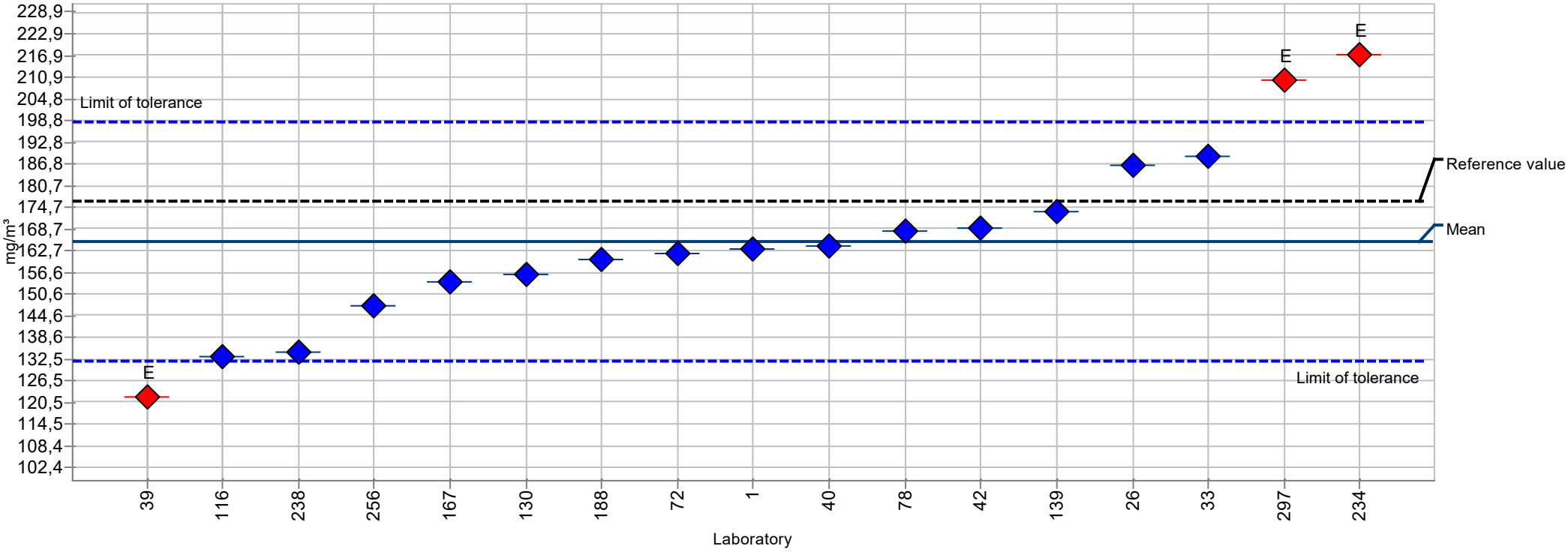
	4-Methyl-2-pentanone	Z score	Cyclohexanone	Z score	Cyclopentanone	Z score	Hexan-2-one	Z score
Unit	mg/m³		mg/m³		mg/m³		mg/m³	
1	48,9	-2,21 E	48,6	0,35	39,2	1,22	29,0	0,23
26	67,6	0,77	40,4	-1,40	32,8	-0,60	26,9	-0,51
33	65,5	0,43	47,0	0,00	9,8	-7,19 FE	34,5	2,17 E
39	35,5	-4,35 FE	7,2	-8,48 FE	2,9	-9,16 FE	12,2	-5,72 BE
40	61,7	-0,17	40,8	-1,32	36,5	0,45	26,2	-0,77
42	60,0	-0,45	49,8	0,60	36,9	0,57	26,4	-0,69
72	87,4	3,92 FE	48,5	0,31	33,8	-0,33	36,0	2,71 E
78	62,6	-0,02	54,1	1,51	39,7	1,38	27,8	-0,21
116	41,1	-3,46 E	52,1	1,09	32,2	-0,78	21,4	-2,45 E
130	63,6	0,13	47,5	0,10	28,1	-1,94	28,4	0,01
139	65,0	0,35	53,1	1,31	37,3	0,69	27,7	-0,25
167	66,0	0,51	55,0	1,71	40,0	1,45	29,0	0,23
188	65,8	0,48	26,8	-4,30 FE	14,8	-5,76 FE	26,9	-0,51
234	78,7	2,52 E	30,7	-3,46 E	21,4	-3,88 E	34,9	2,31 E
236	62,4	-0,06					27,5	-0,30
238	50,4	-1,97	37,5	-2,02 E				
256	68,4	0,89	52,6	1,20	41,1	1,77	25,2	-1,11
297	77,0	2,26 E	75,0	5,96 FE	44,0	2,60 FE	26,0	-0,83
–	–	– –	–	– –	–	– –	–	– –
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	18		17		16		17	
Mean	62,8		47,0		34,9		28,4	
Reprod. s.d.	9,5		7,1		5,7		3,8	
Rel. reproducibility s.d.	15,20 %		15,15 %		16,40 %		13,47 %	
Reference value	59,5		45,9		36,3		27,0	
Target s.d.	6,3		4,7		3,5		2,8	
Rel. target s.d.	10,00 %		10,00 %		10,00 %		10,00 %	

	4-Methyl-2-pentanone	Z score	Cyclohexanone	Z score	Cyclopentanone	Z score	Hexan-2-one	Z score
Low er limit of tolerance	50,2		37,6		27,9		22,7	
Upper limit of tolerance	75,4		56,4		41,9		34,0	
Type B outliers							1	
Type F outliers	2		3		4			
No. of laboratories after elimination of outliers type A-D and F (w ithout laboratories that only gave states but no measured values)	16		14		12		16	

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|>3,50	

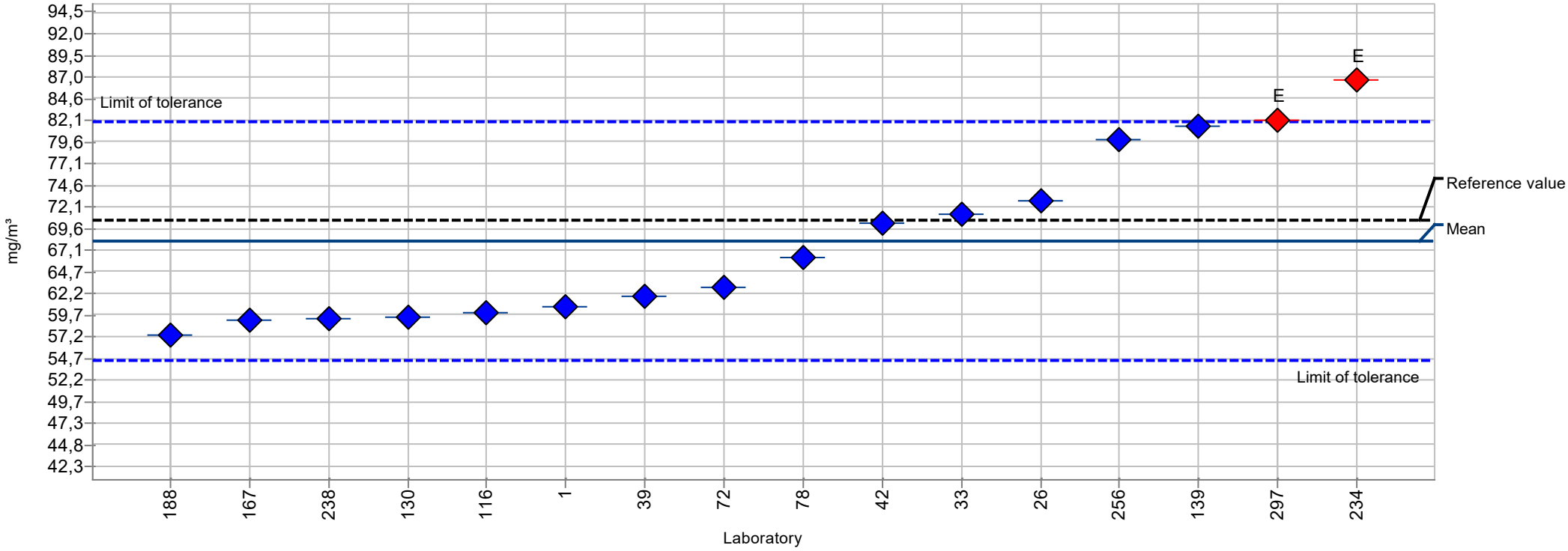
Summary results

Measurand:	**1-Butanol**	**Mean:**	**165,2 mg/m³**
Sample:	**1**	**Reprod. s.d.:**	**25,3 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**15,31%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**176,4 mg/m³**
Number of laboratories in calculation:	**17**	**Range of tolerance:**	**132,1 - 198,2 mg/m³ (|Z-Score| <= 2,00)**



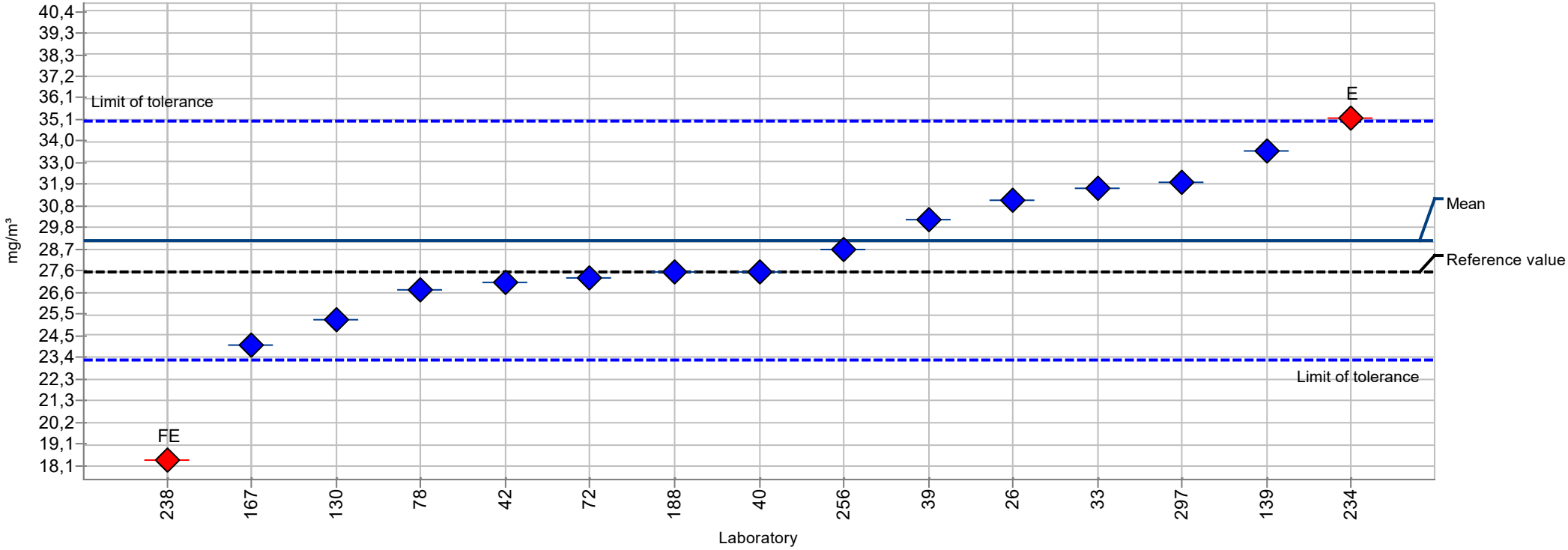
Summary results

Measurand:	**1-Methoxy-2-Propanol**	**Mean:**	**68,2 mg/m³**
Sample:	**1**	**Reprod. s.d.:**	**9,8 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**14,34%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**70,6 mg/m³**
Number of laboratories in calculation:	**16**	**Range of tolerance:**	**54,5 - 81,8 mg/m³ (|Z-Score| <= 2,00)**



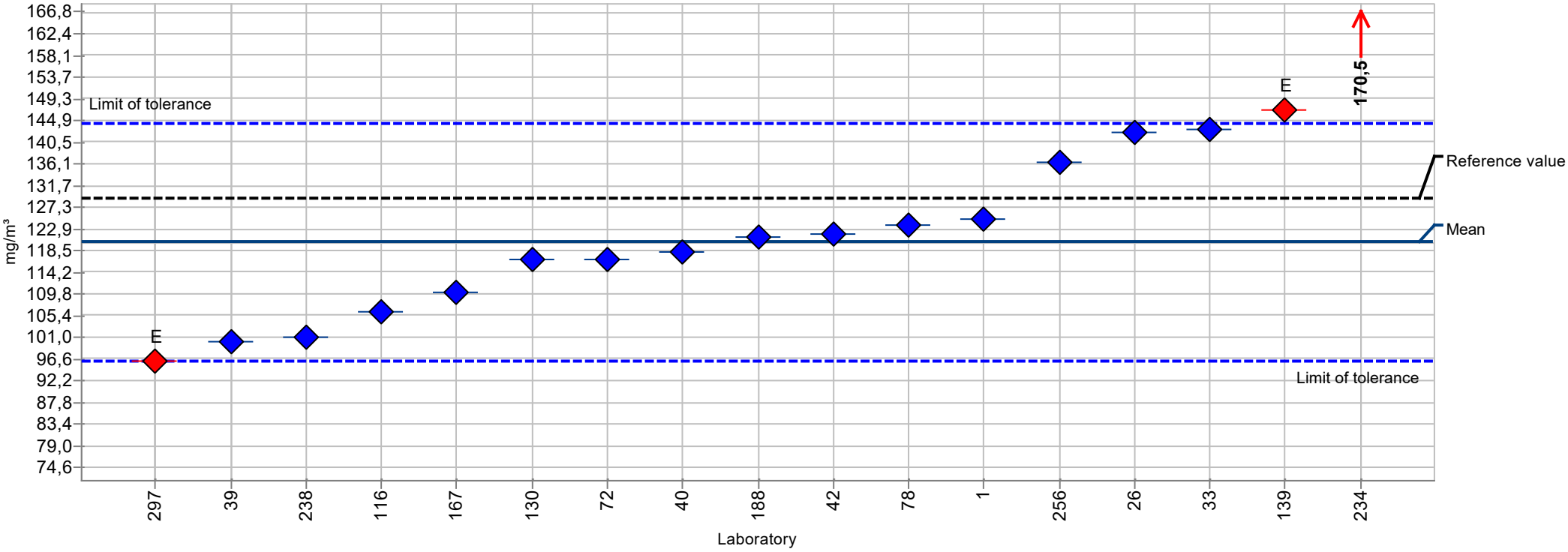
Summary results

Measurand:	**1-Propanol**	**Mean:**	**29,1 mg/m³**
Sample:	**1**	**Reprod. s.d.:**	**3,2 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**11,05%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**27,6 mg/m³**
Number of laboratories in calculation:	**14**	**Range of tolerance:**	**23,3 - 35,0 mg/m³ (|Z-Score| <= 2,00)**



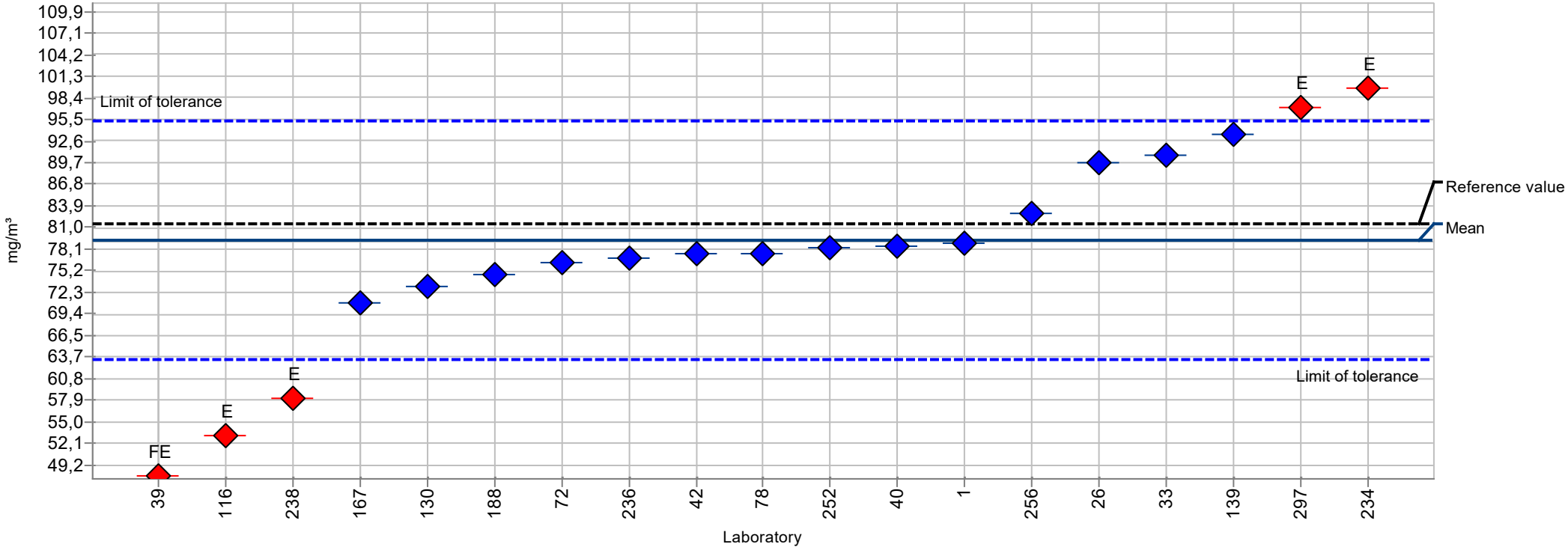
Summary results

Measurand:	**2-Butanol**	**Mean:**	**120,4 mg/m³**
Sample:	**1**	**Reprod. s.d.:**	**15,8 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**13,13%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**129,1 mg/m³**
Number of laboratories in calculation:	**16**	**Range of tolerance:**	**96,3 - 144,4 mg/m³ (|Z-Score| <= 2,00)**



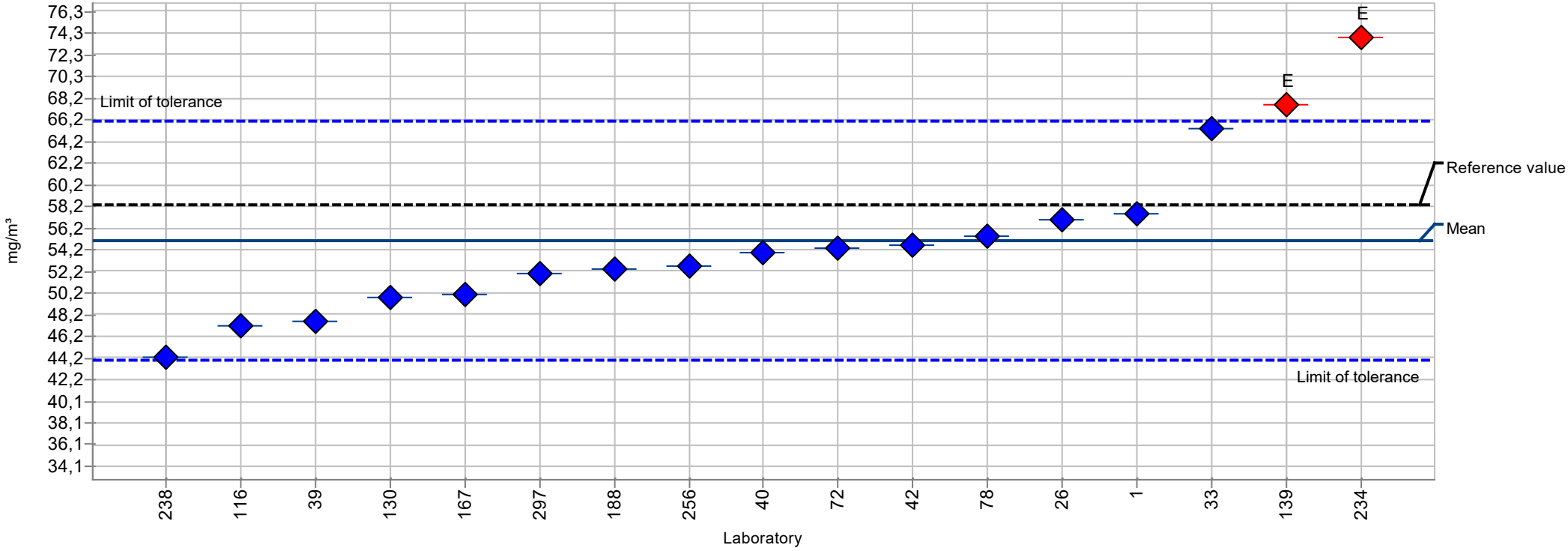
Summary results

Measurand:	**2-Propanol**	**Mean:**	**79,3 mg/m³**
Sample:	**1**	**Reprod. s.d.:**	**12,0 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**15,16%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**81,5 mg/m³**
Number of laboratories in calculation:	**18**	**Range of tolerance:**	**63,5 - 95,2 mg/m³ (|Z-Score| <= 2,00)**



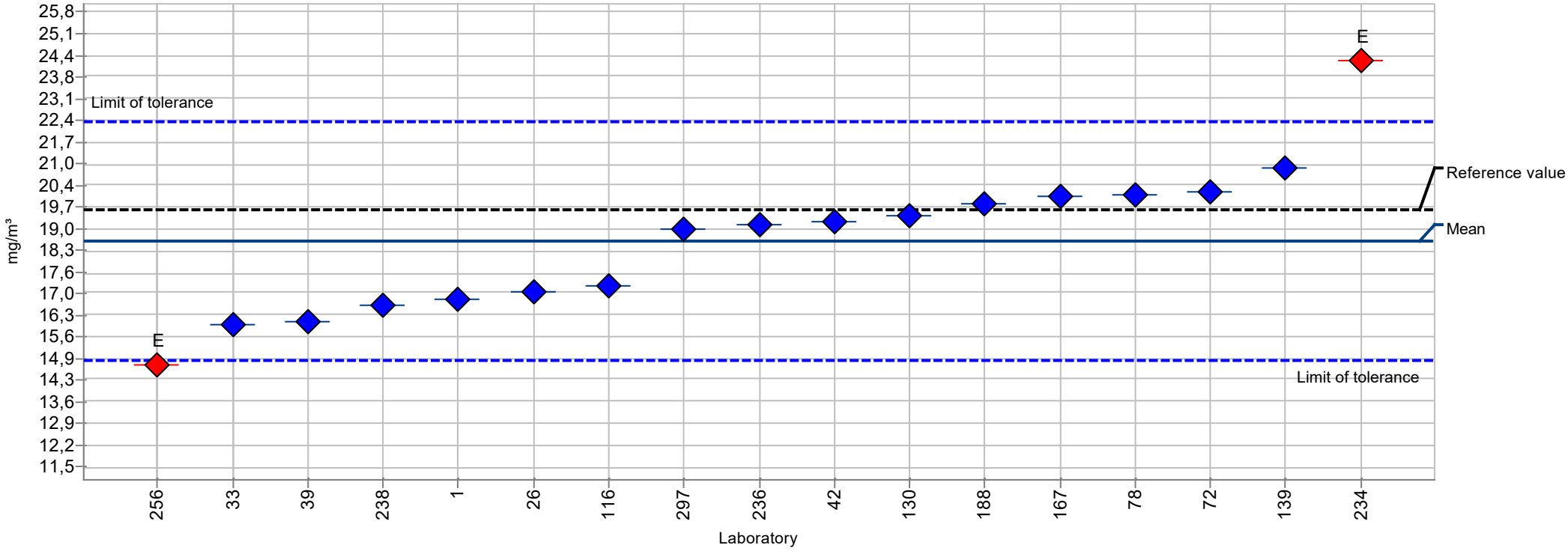
Summary results

Measurand:	**i-Butanol**	**Mean:**	**55,0 mg/m³**
Sample:	**1**	**Reprod. s.d.:**	**7,7 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**13,94%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**58,4 mg/m³**
Number of laboratories in calculation:	**17**	**Range of tolerance:**	**44,0 - 66,0 mg/m³ (|Z-Score| <= 2,00)**



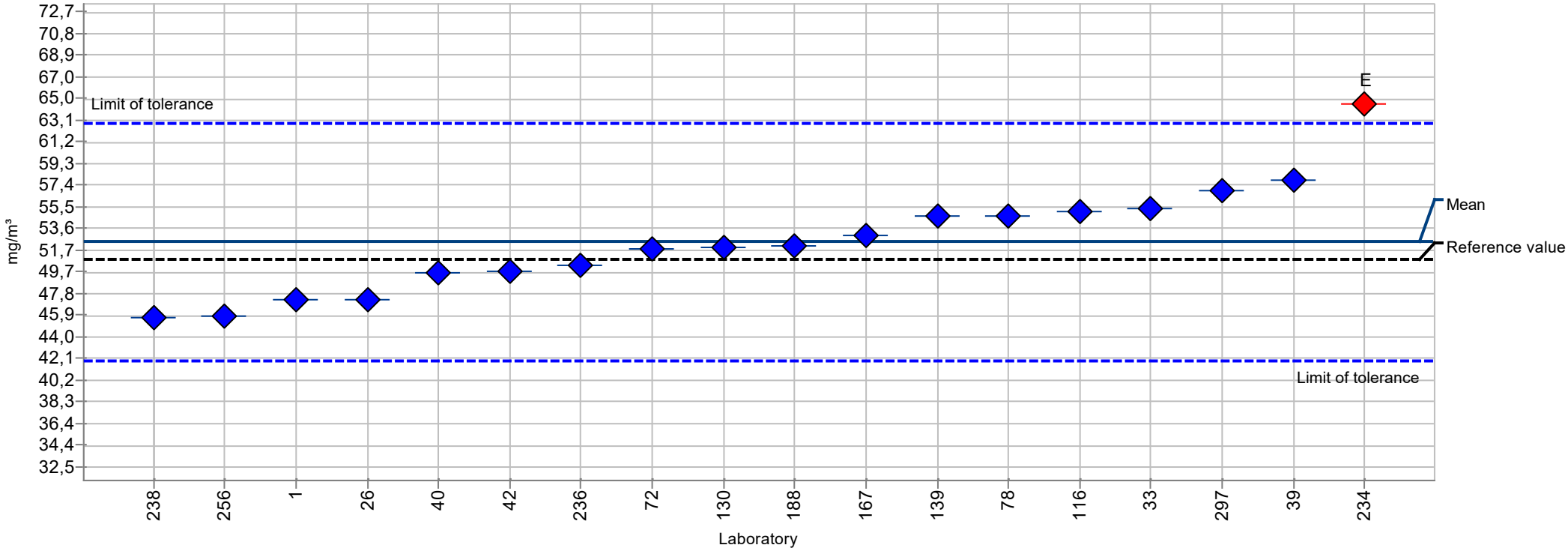
Summary results

Measurand:	**1,2,4-Trimethylbenzene**	**Mean:**	**18,6 mg/m³**
Sample:	**2**	**Reprod. s.d.:**	**2,3 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**12,52%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**19,6 mg/m³**
Number of laboratories in calculation:	**17**	**Range of tolerance:**	**14,9 - 22,3 mg/m³ (|Z-Score| <= 2,00)**



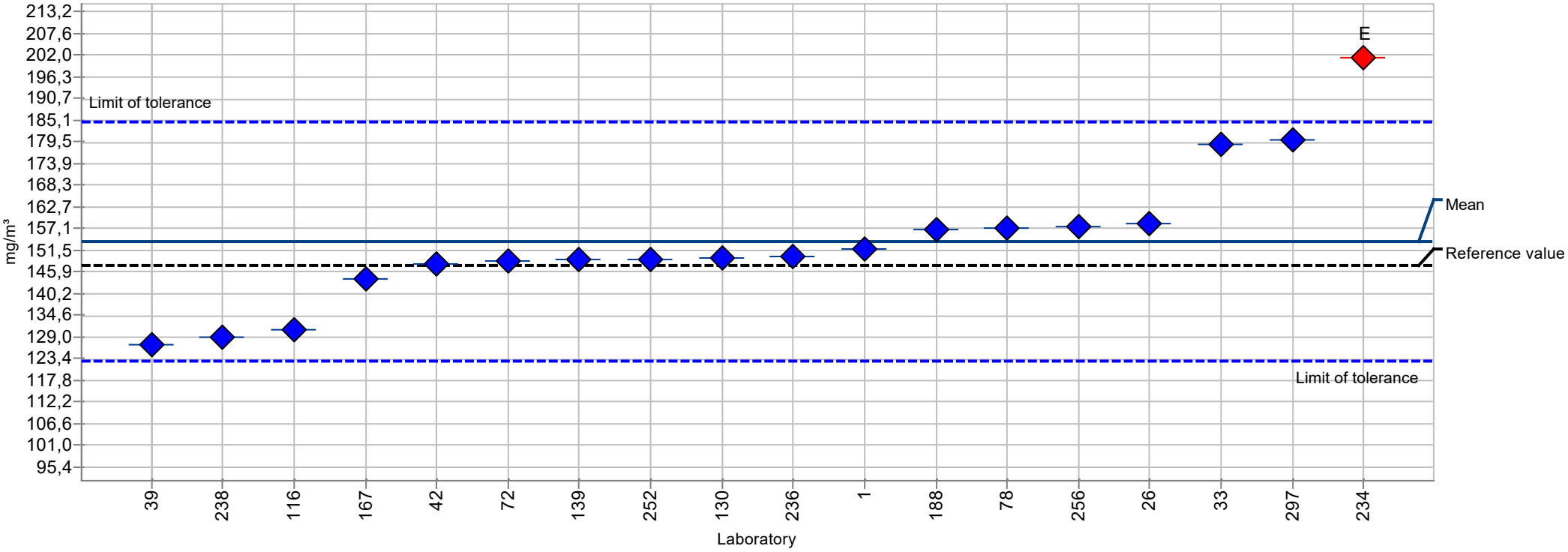
Summary results

Measurand:	**Cumene**	**Mean:**	**52,4 mg/m³**
Sample:	**2**	**Reprod. s.d.:**	**4,8 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**9,06%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**50,9 mg/m³**
Number of laboratories in calculation:	**18**	**Range of tolerance:**	**42,0 - 62,9 mg/m³ (|Z-Score| <= 2,00)**



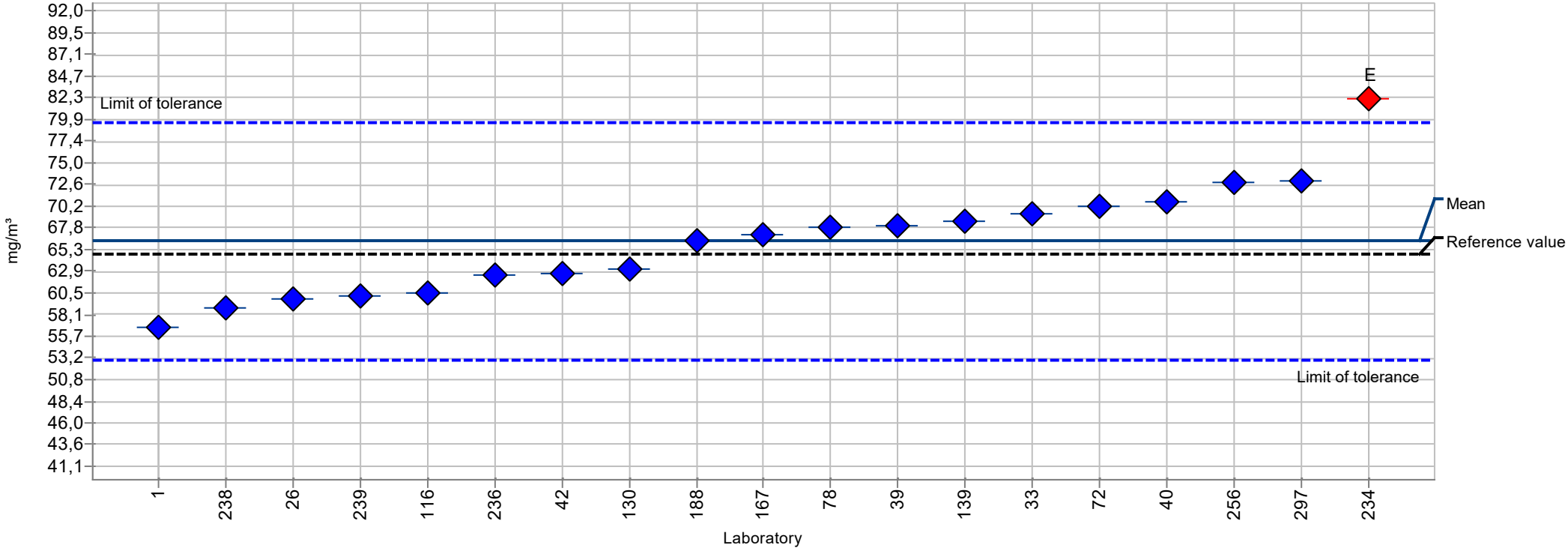
Summary results

Measurand:	**Ethylacetate**	**Mean:**	**153,8 mg/m³**
Sample:	**2**	**Reprod. s.d.:**	**18,4 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**11,93%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**147,6 mg/m³**
Number of laboratories in calculation:	**18**	**Range of tolerance:**	**123,0 - 184,5 mg/m³ (|Z-Score| <= 2,00)**



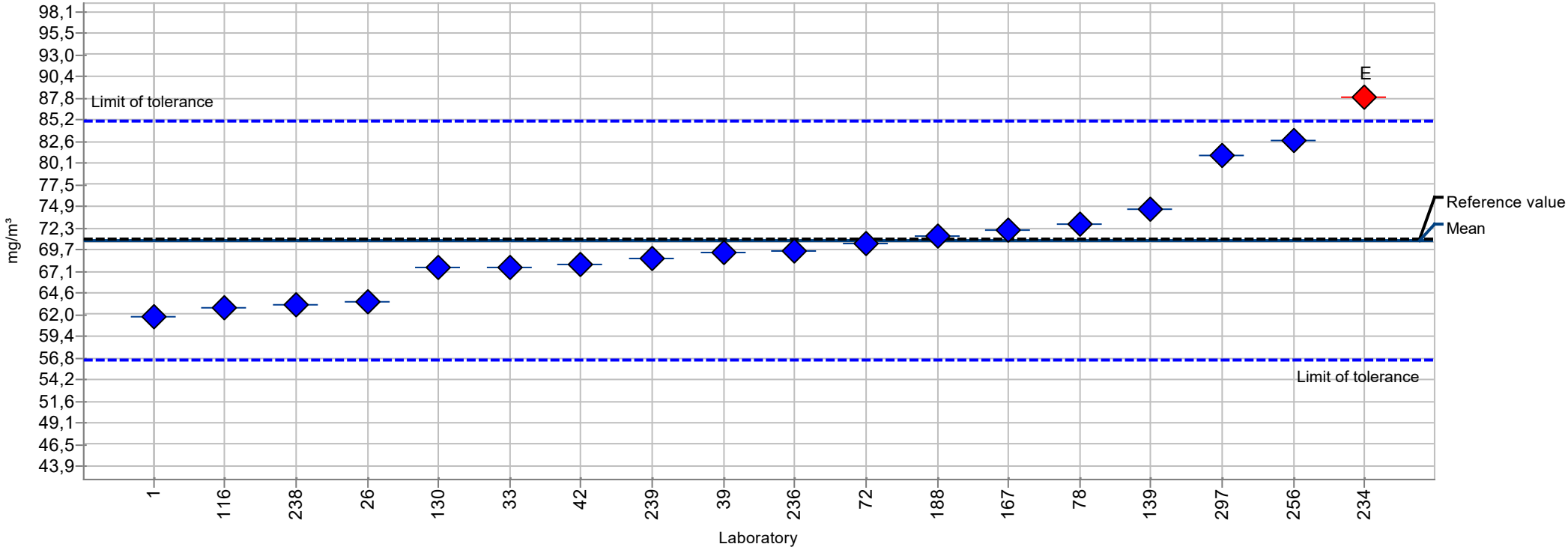
Summary results

Measurand:	**Ethylbenzene**	**Mean:**	**66,3 mg/m³**
Sample:	**2**	**Reprod. s.d.:**	**6,2 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**9,34%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**64,9 mg/m³**
Number of laboratories in calculation:	**19**	**Range of tolerance:**	**53,1 - 79,6 mg/m³ (|Z-Score| <= 2,00)**



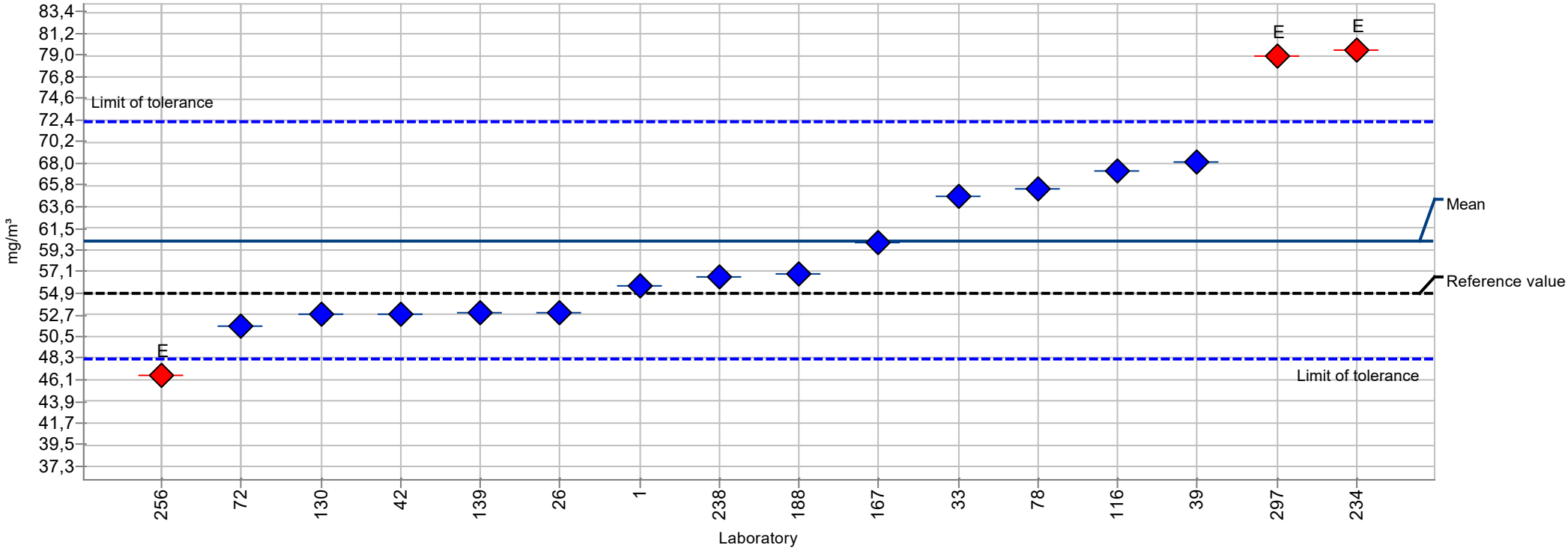
Summary results

Measurand:	**m-Xylene**	**Mean:**	**70,8 mg/m³**
Sample:	**2**	**Reprod. s.d.:**	**7,1 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**10,00%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**71,0 mg/m³**
Number of laboratories in calculation:	**18**	**Range of tolerance:**	**56,6 - 85,0 mg/m³ (|Z-Score| <= 2,00)**



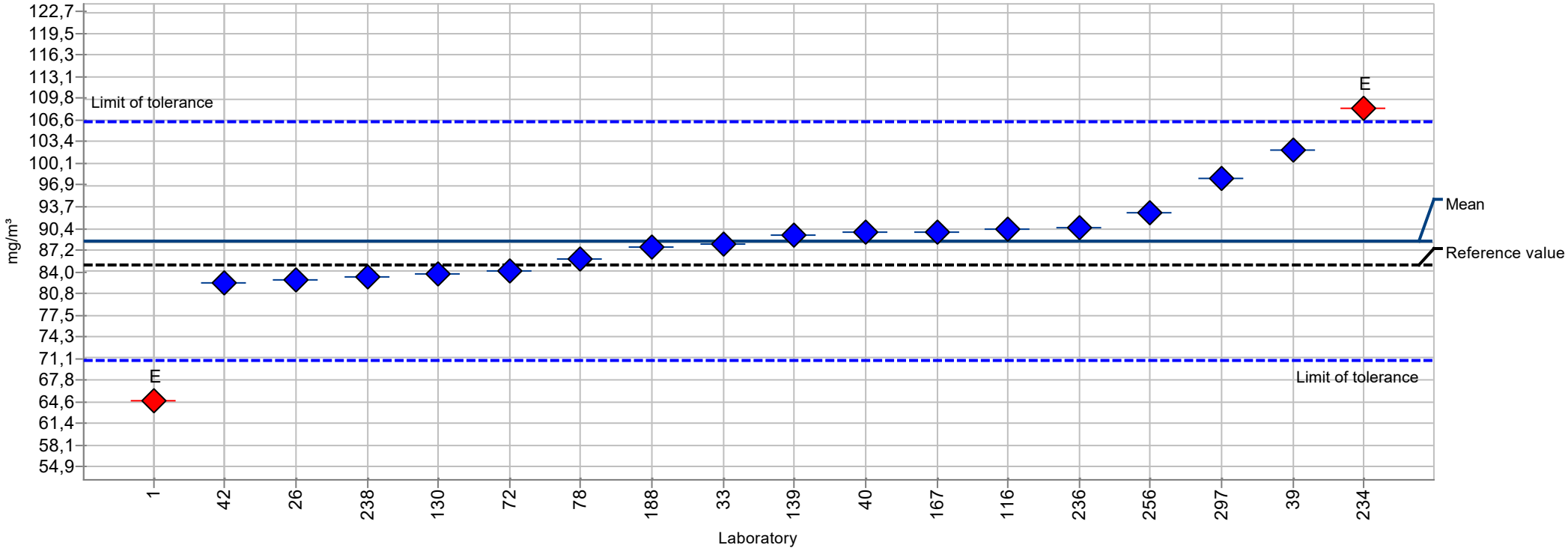
Summary results

Measurand:	**n-Hexane**	**Mean:**	**60,2 mg/m³**
Sample:	**2**	**Reprod. s.d.:**	**9,7 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**16,14%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**54,8 mg/m³**
Number of laboratories in calculation:	**16**	**Range of tolerance:**	**48,1 - 72,2 mg/m³ (|Z-Score| <= 2,00)**



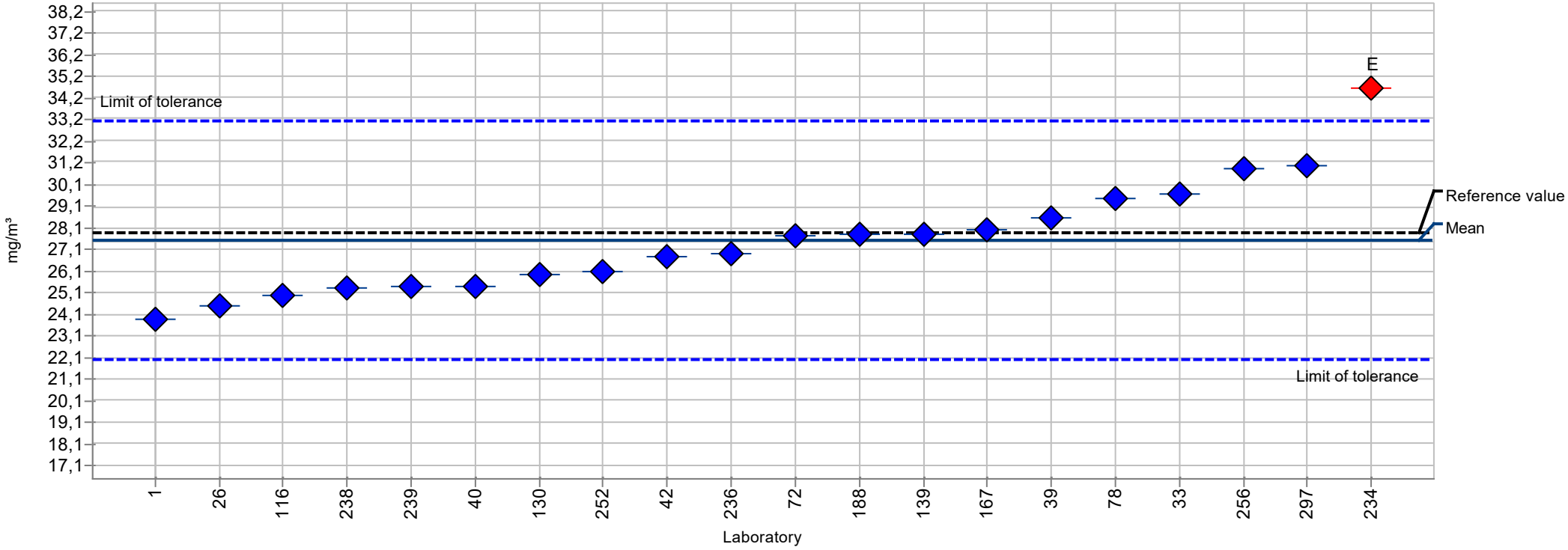
Summary results

Measurand:	**n-Octane**	**Mean:**	**88,6 mg/m³**
Sample:	**2**	**Reprod. s.d.:**	**9,1 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**10,31%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**84,9 mg/m³**
Number of laboratories in calculation:	**18**	**Range of tolerance:**	**70,8 - 106,3 mg/m³ (|Z-Score| <= 2,00)**



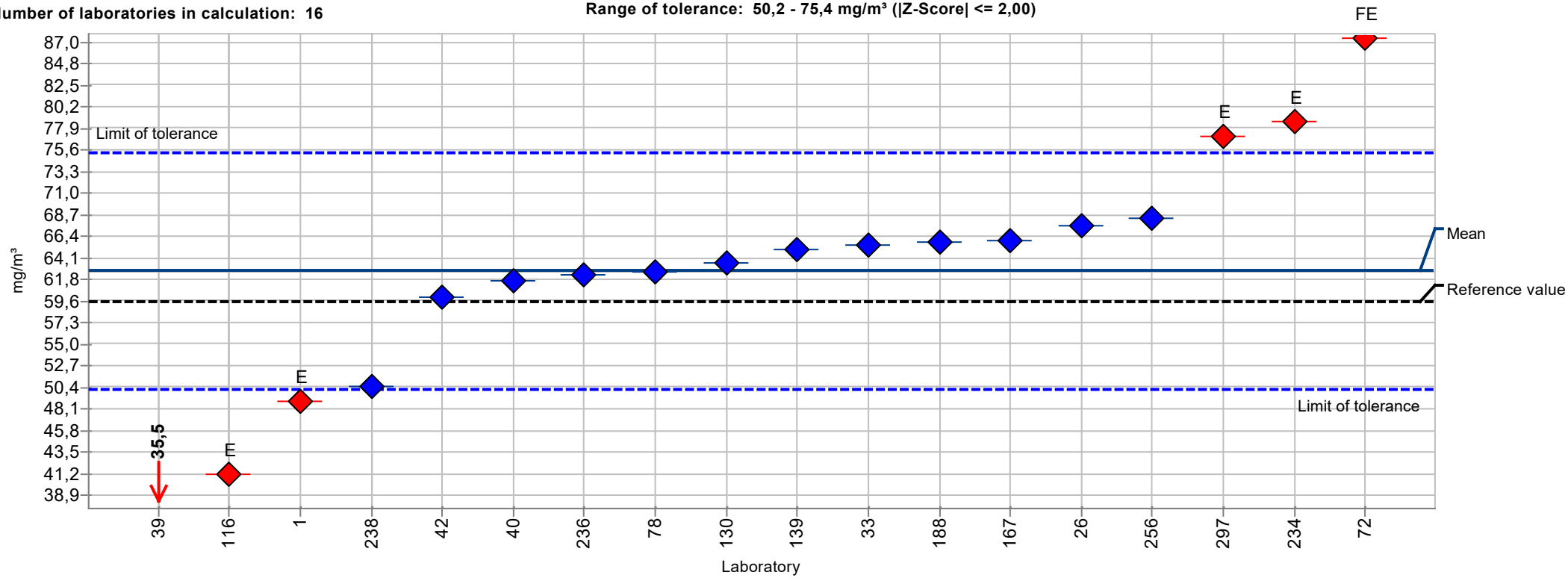
Summary results

Measurand:	**Toluene**	**Mean:**	**27,5 mg/m³**
Sample:	**2**	**Reprod. s.d.:**	**2,6 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**9,56%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**27,9 mg/m³**
Number of laboratories in calculation:	**20**	**Range of tolerance:**	**22,0 - 33,1 mg/m³ (|Z-Score| <= 2,00)**



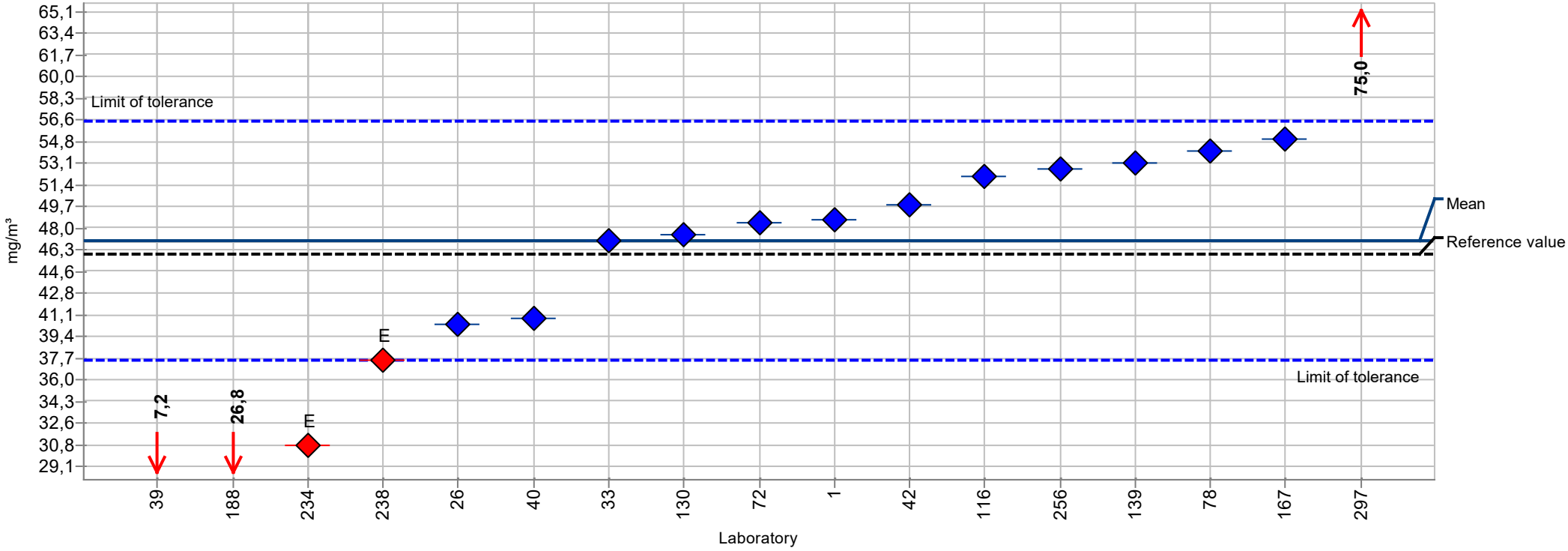
Summary results

Measurand:	**4-Methyl-2-pentanone**	**Mean:**	**62,8 mg/m³**
Sample:	**3**	**Reprod. s.d.:**	**9,5 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**15,20%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**59,5 mg/m³**
Number of laboratories in calculation:	**16**	**Range of tolerance:**	**50,2 - 75,4 mg/m³ (|Z-Score| <= 2,00)**



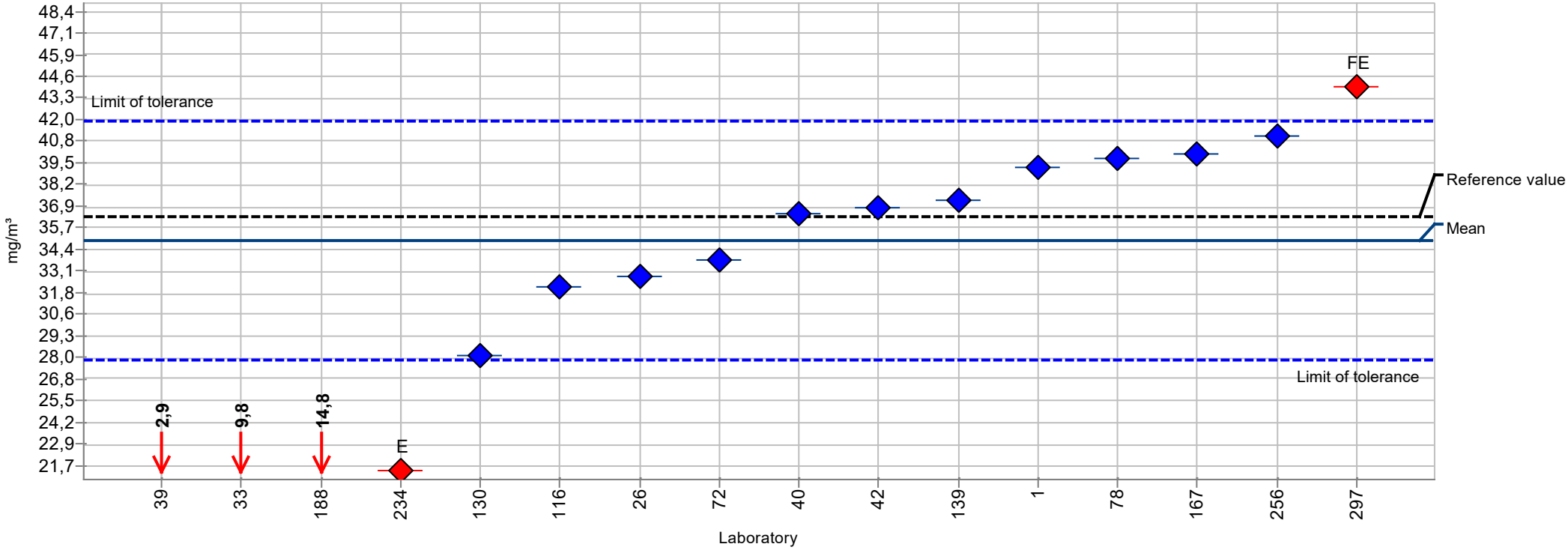
Summary results

Measurand:	**Cyclohexanone**	**Mean:**	**47,0 mg/m³**
Sample:	**3**	**Reprod. s.d.:**	**7,1 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**15,15%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**45,9 mg/m³**
Number of laboratories in calculation:	**14**	**Range of tolerance:**	**37,6 - 56,4 mg/m³ (|Z-Score| <= 2,00)**



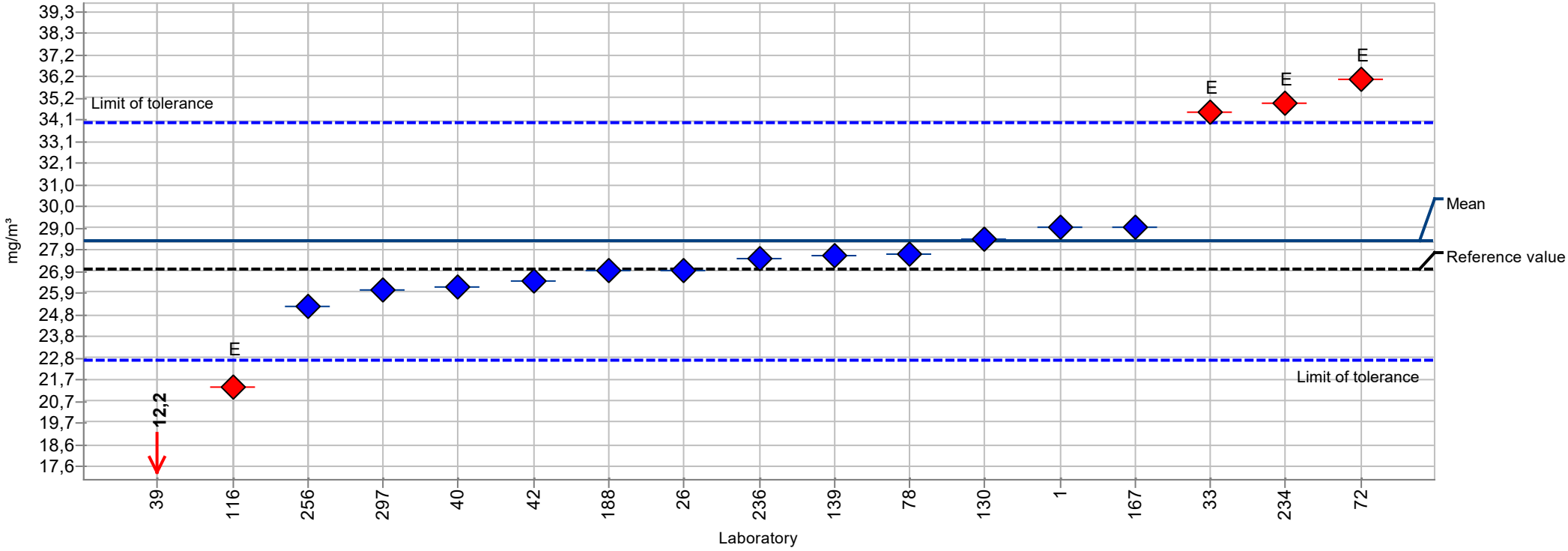
Summary results

Measurand:	**Cyclopentanone**	**Mean:**	**34,9 mg/m³**
Sample:	**3**	**Reprod. s.d.:**	**5,7 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**16,40%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**36,3 mg/m³**
Number of laboratories in calculation:	**12**	**Range of tolerance:**	**27,9 - 41,9 mg/m³ (|Z-Score| <= 2,00)**



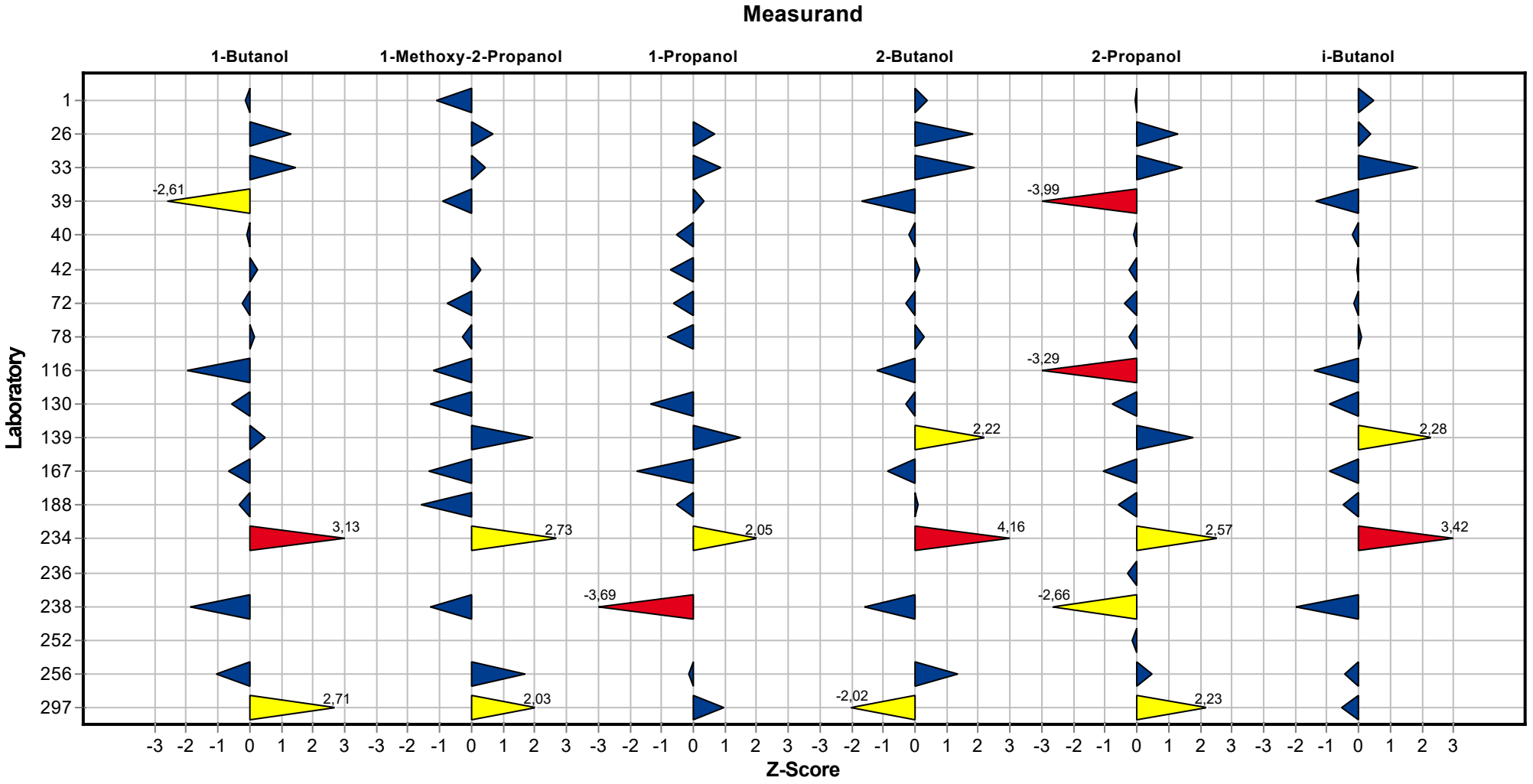
Summary results

Measurand:	**Hexan-2-one**	**Mean:**	**28,4 mg/m³**
Sample:	**3**	**Reprod. s.d.:**	**3,8 mg/m³**
Method:	**ISO 5725-2**	**Rel.reprod. s.d.:**	**13,47%**
Rel.target s.d.:	**10,00%**	**Reference value:**	**27,0 mg/m³**
Number of laboratories in calculation:	**17**	**Range of tolerance:**	**22,7 - 34,0 mg/m³ (|Z-Score| <= 2,00)**



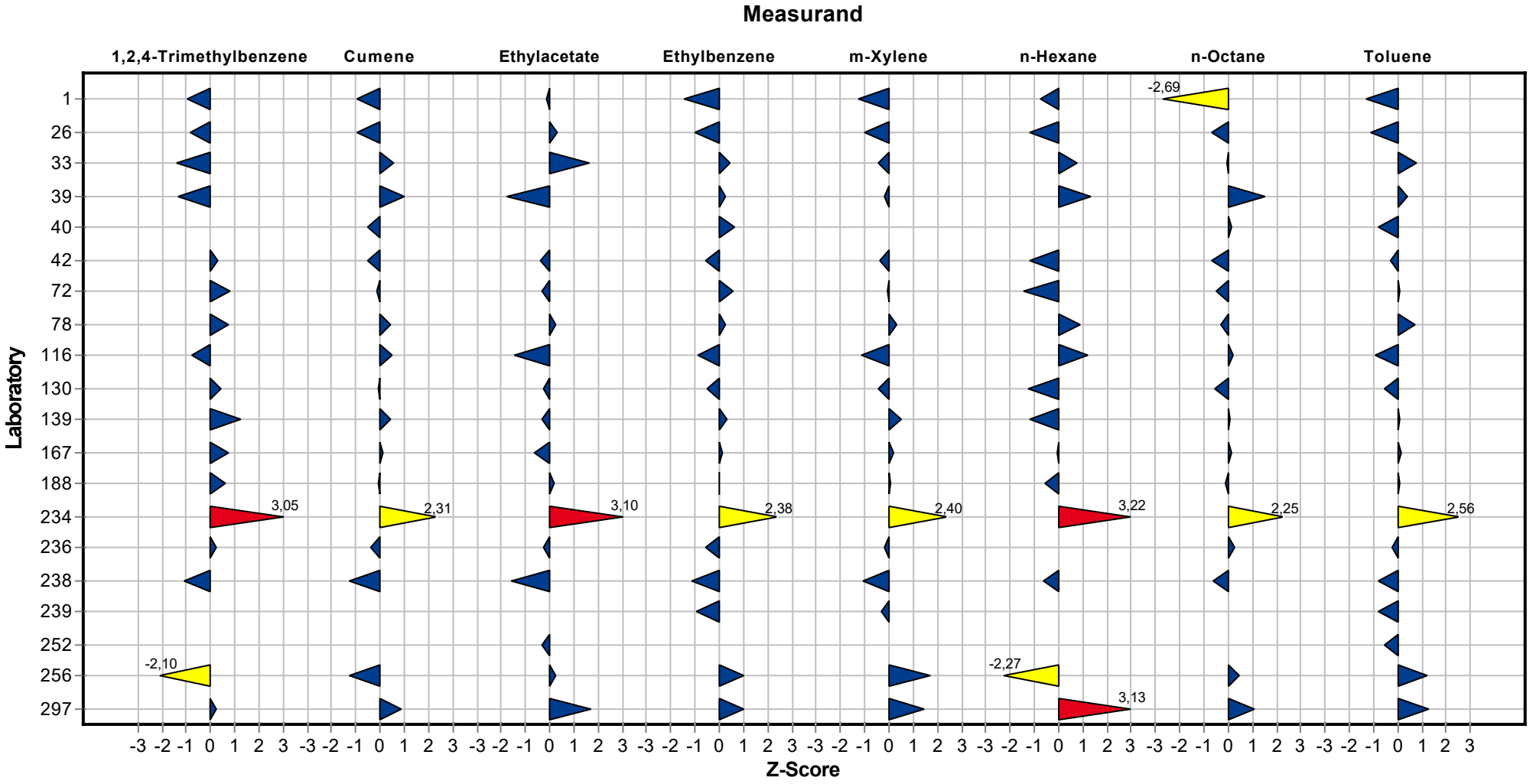
Sample chart of Z-scores

Sample 1



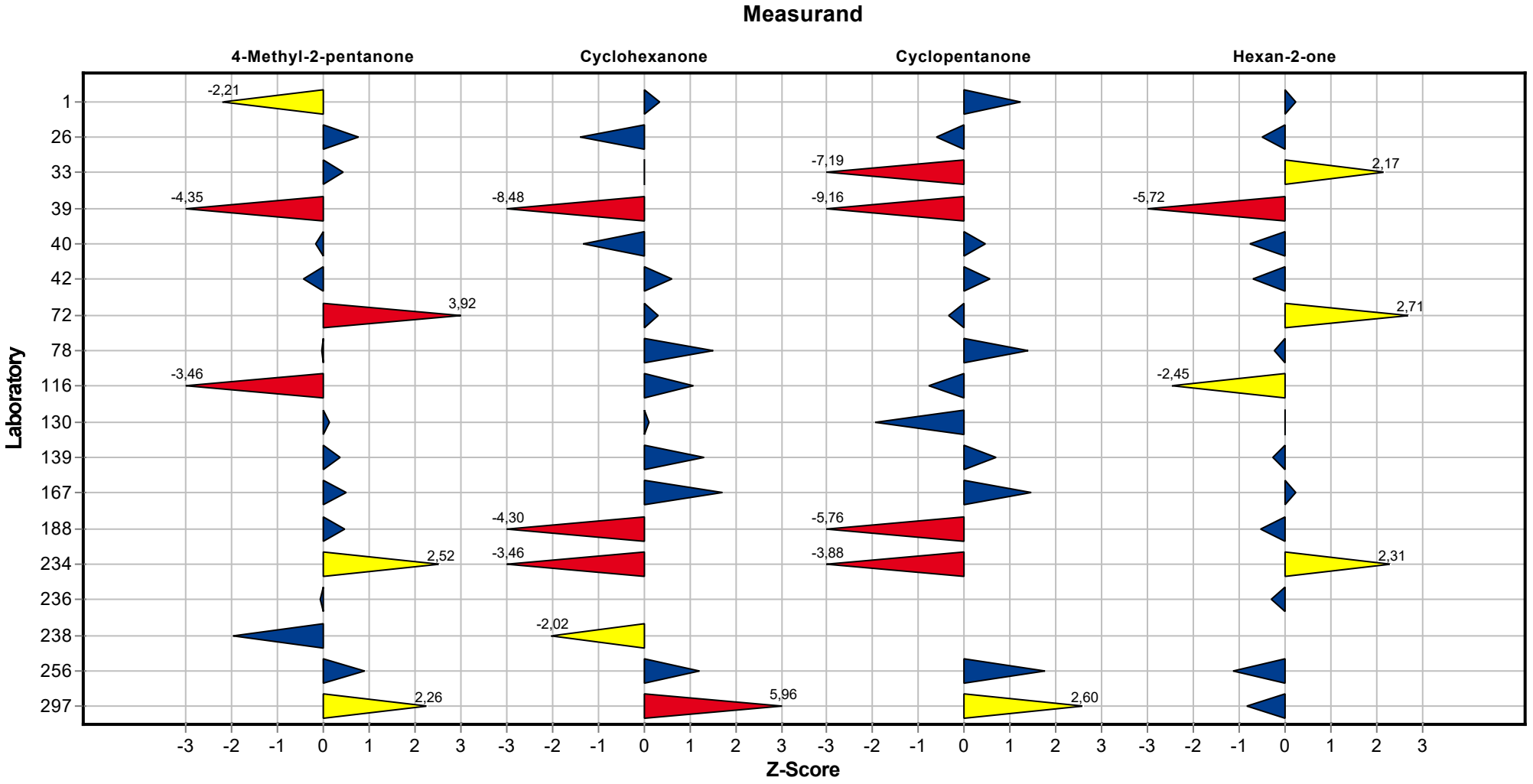
Sample chart of Z-scores

Sample 2



Sample chart of Z-scores

Sample 3



Questions and Answers

Participant	Sample carrier
1	AK Typ BIA
26	Aktivkohle Typ BIA
33	Aktivkohle SKC 226-09, Tenax TA+Carbosiv+Aktivkohle
39	Aktivkohle Typ BIA
40	Kieselgel SKC, Art.-Nr. 226-15 (560mg/260mg), // (400 mg/200 mg), Aktivkohle Fa. SKC, Anasorb CSC, Best.-Nr. 226-09
42	A-Kohle Typ B bzw . Silicagel Typ B
72	Aktivkohle Typ B
78	Probe 1/2 Aktivkohle Typ B/G // Probe 3 Silicagel Typ G
116	Aktivkohleröhrchen Typ B/G und Silikagelröhrchen
130	A-Kohle Typ BIA
139	Charcoal and silicagel tubes (DRAGER)
167	NIOSH Charcoal tubes for solvents and alcohols. BIA Silica Tubes for ketones.
188	Dräger Aktivkohleröhrchen Typ B
234	Röhrchen Dräger A-Kohle Typ B/G für alle drei Prüfgasgemische; Bei der Probe 3 w äre gemäß IFA-Arbeitsmappe 7708 Silikagel-Röhrchen zu nutzen
236	AK- und Tenax-Röhrchen
238	/
239	
252	Dräger Aktivkohle Typ BIA
256	NIOSH (Prod. No. 64 00742) Fa. Dräger Safety
297	Für Ketone: Silicagel, Für Aromaten und Aliphaten: Aktivkohle; für Alkohole: Silicagel (außer 2-Propanol: hier Aktivkohle)

Participant	Sampling pump	Flow rate	Flow rate measurement
1	GSA 350 ex / SKC PCXR8	0,2 - 0,33 l/min	TSI 4146
26	Gilian LFS-113 DC	0,33	DryCal
33	SKC Universal-Luftprobennahmepumpe Typ 224	50-400 ml	Bios Defender 510
39	Gilian Air Plus	0,05 bis 0,4 L/min	Gilibriator 3
40	Gilson LFS-113DC	30mL/min // 40 mL/min	Drycal DC-Lite
42	Analyt-MTC	0,33 L/min und 0,08 L/min	Analyt 852
72	SG 350	333 ml/min	Defender 520 (50-5000 ml/min)

Organic solvents with own sampling 2024

Participant	Sampling pump	Flow rate	Flow rate measurement
78	GilAir5 // SG5100ex // SG350ex // Gilian LFS113	ca. 0,333 L/min	Gilibrator 3
116	LfS 113	0,33 L/min	Bios Defender
130	LFS 113	0,33 l/min	Gilibrator
139	SKC sampling pump	0,33 l/min (charcoal tubes) and 0,083 l/min (silicagel tubes)	SKC flow meter
167	Analyt-MTC	0,033 L/min und 0,08 L/min	Analyt 852
188	SG4000, SG5200	etw a 20 l pro Stunde, w urde dokumentiert zur Berechnung	Gillibrator
234	Gillian GilAir Plus	0,08 L/min	TSI 4140
236	Gilian LFS-113	100 und 30 mL/min	MesaLabs Bios DryCal Definer 220
238	Analyt-MTC	0,033 L/min	Analyt 852
239	Analyt-MTC	0,033 L/min	Analyt 852
252	GilAir Plus, SG5200, SG5100ex	0,33 l/min	Gilian Gilbrator 3
256	Analyt-MTC	0,033 L/min	Analyt 852
297	BiVOC2	In der Regel 0,3 l/min und 0,8 l/min	

Participant	Sampling time	Front-/ back section separated
1	1- 2 h	ja
26	120 Min	nein
33	60-120 Minuten	ja
39	40 - 90 min	ja und ja
40	ca. 115min und ca. 60 min	Nein
42	120 min	nein
72	60 min	Ja
78	120	ja
116	(30, 60, 90, 120) min	ja
130	120 Minuten / 60 Minuten	ja
139	120 min	the analysis w as performed by an external laboratory
167	120 min	Yes
188	120 min	ja
234	120 Minuten	ja
236	30 - 60 min	(bei AK) ja
238	120 min	Yes
239	120 min	

Organic solvents with own sampling 2024

Participant	Sampling time	Front-/ back section separated
252	120 min	ja
256	120 min	nein
297	In der Regeln ca. 2 h	Ja

Participant	Analytical method
1	IFA-Arbeitsmappe
26	BIA 6386 (1997-04) / BIA 8415 (1997-04) / BIA 6385 (1997-04) / IFA 7732 (2011-11) / BGIA 7733 (2005-04) / BGIA 7708 (2005-04) / BGIA 7322 (2009-05)
33	Hausmethode SOP M110, SOP M 100
39	Aliphaten: NIOSH 1500; Aromaten: NIOSH 1501; Ethylacetat: NIOSH 1450; 2-Propanol: NIOSH 1400; 1-,2-,i-Butanol: NIOSH 1401; 1-Methoxy-2-propanol: NIOSH 2554; Ketone: NIOSH 2555
40	DFG-Methode Lösemittelgemische Nr. 3 // DFG-Methode Lösemittelgemische Nr. 5 // Hausmethode
42	IFA-Arbeitsmappe 7322; 7708; 7732
72	validierte eigene SOP in Anlehnung an IFA Arbeitsmappe
78	IFA 7732/7733
116	Aliphaten: NIOSH 1500 (2003); Aromaten: NIOSH 1501 (2003); Ethylacetat: NIOSH 1450 (2003); 2-Propanol: NIOSH 1400 (1994); 1-,2-,i-Butanol: NIOSH 1401 (1994), 1-Methoxy-2-propanol: NIOSH 2554 (200
130	DFG-Luftanalysenband 1 2013-10
139	NIOSH 1500, NIOSH 1501, IFA 7322, NIOSH 1400, NIOSH 1401, IFA 7569, IFA 7708
167	Internal method for solvents and alcohols. IFA Folder 7708 for ketones.
188	NIOSH 1400 1994, IFA 7733 2005, IFA 7732 2011 und NIOSH 2554 2003
234	BGIA-Methode 7732/7733; BGIA-Methode 7569; BGIA-Methode 7708
236	DFG-Methoden Lösemittelgemische 2 & 6
238	NF X 43-267
252	Hausinterne Methode
256	VDI 2100 Blatt2
297	VDI 2100 Bl. 2, 2010-11, modifiziert, GC-MS

Participant	Desorption solution
1	ternäres Gemisch
26	ternäres Gemisch (TG1): CH2Cl2:CS2:CH3OH=60%:30%:10%
33	Benzylalkohol, Thermodesorption

Organic solvents with own sampling 2024

Participant	Desorption solution
39	Schw efelkohlenstoff; Schw efelkohlenstoff + 1% 2-Butanol; Schw efelkohlenstoff + 1% 2-Propanol; 85% 1- Dichlormethan + 15% Methanol;
40	Dichlormethan/Methanol/Wasser 65/33/2 (v/v) // Wasser // N,N-Dimethylformamid/Benzylalkohol (4+1 v/v)
42	ternäres Gemisch für AK35 bzw . Keton-TG für AK60 (nach MGU-Standardverfahren)
72	Benzylalkohol
78	ternäres Gemisch Dichlormethan 60 : Schw efelkohlenstoff 35 : Methanol 5
116	Aliphaten/Aromaten/Ethylacetat/Ketone: Schw efelkohlenstoff 2-Propanol: Schw efelkohlenstoff + 1% 2-Butanol 1-,2-,i-Butanol: Schw efelkohlenstoff + 1% 2-Propanol 1-Methoxy-2-propanol: Dichlormethan/Metha
130	Ternärem Gemisch
139	the analysis w as performed by an external laboratory
167	CS2 for solvents and alcohols. DCM:MeOH:H2O 65:33:2 for ketones.
234	Tenäres Gemisch aus 60% DCM / 35% CS2 / 5% MeOH) für 18h im Kühlschrank desorbiert
236	(bei AK) CS2 mit 2-Butanol
238	CS2 for sample 2 ans Dichloromethane + CS2 for sample 1 and 3
252	DMF:CS2 (60/40)
256	Diethylether und CS2

Participant	Volume of desorption solution	Gas chromatograph (GC)
1	Messzone: 1 ml, Durchbruchszone: 2 ml	GC 3800 (Varian)
26	5 ml	Agilent 7890A
33	1 ml	PE-HS, PE-ATD
39	Messzone: 2 ml, Durchbruchszone: 1 ml	GC 3800 (Varian)
40	5 mL // 10 mL // 5 mL	8890 // 7890
42	10 ml	Agilent 7890A
72	5 ml	GC-FID HP 7890b
78	20	Clarus590 Perkin Elmer
116	Messzone: 1 ml, Durchbruchszone: 2 ml	GC 3800 (Varian)
130	4,0 ml je Phase	Kapillar GC-FID
139	the analysis w as performed by an external laboratory	the analysis w as performed by an external laboratory
167	1,5 mL for solvents and alcohols. 5 mL for ketones.	Agilent 7890N / Agilent 6890N
234	10	nicht bekannt
236	(bei AK) 2 mL	Agilent 7890A und 8890
238	2 mL	Sample 2 and 3 : GC-MS ans Sample 1 : GC-FID

Organic solvents with own sampling 2024

Participant	Volume of desorption solution	Gas chromatograph (GC)
252	5 ml	Shimadzu GC 2010Plus
256	2x 5 mL	Agilent Technologies 7890B

Participant	Carrier gas	Sample injection
1	Helium	Split/splitless
26	Helium	split
33	Helium	Headspace (Splitless), Thermodesorption (split)
39	Helium	split/splitless
40	Helium	Split
42	Helium	split
72	Helium 6.0	split
78	Helium	split
116	Helium	Split/splitless
130	Stickstoff	Split-Injektor
139	the analysis w as performed by an external laboratory	the analysis w as performed by an external laboratory
167	Helium (Agilent 7890N), Nitrogen (Agilent 6890N)	Splitless (Agilent 7890N), On column (Agilent 6890N)
234	nicht bekannt	nicht bekannt
236	He	split
238	Hydrogen	Split
252	Helium	Split
256	Helium	splitlos

Participant	Analytical column
1	RTX Volatiles (L = 60 m, ID = 0,25 mm, FD = 1 µm)
26	DB Wax UI UA2232723H
33	DB-VRX
39	RTX Volatiles (L = 60 m, ID = 0,25 mm, FD = 1 µm)
40	HP-5ms, Länge 30 m; Innendurchmesser 0,25 mm; Filmdicke 0,25 µm // RXI-5ms
42	HP FFAP / HP Ultra 2 (je 50 m; 0,32 mm, 0,52 µm), parallel
72	Phenomenex Zebron ZB-WAX,
78	DB1 // Rxi-624 SilMS

Organic solvents with own sampling 2024

Participant	Analytical column
116	RTX Volatiles (L = 60 m, ID = 0,25 mm, FD = 1 µm)
130	Phenomenex ZB-5 (60 m x 0,32 mm x 1,0 µm)
139	the analysis w as performed by an external laboratory
167	Agilent DB 624 30m, 0,25mm id, 1,4 µm (Agilent 7890N), Restek Porapak PS 80/20 2m, 2mm id (Agilent 6890N)
234	DB-5ms (60 m * 0,25 mm; 0,25 µm) DB-WAX UI (30 m * 0,25 mm; 0,25 µm)
236	DB-624 und HP-5MS
238	DB624
252	Rxi-5Sil MS
256	RTx-624, 40 m, 0.18 mm ID, 1 ul Film thickness

Participant	Detector
1	Massenspektrometer (MS)
26	MSD Agilent 5975C
33	FID/MS
39	Massenspektrometer (MS)
40	5977B
42	FID / FID
72	FID
78	FID
116	Massenspektrometer (MS)
130	FID, 250 °C
139	the analysis w as performed by an external laboratory
167	FID
234	nicht bekannt
236	FID und MS
238	Sample 2 and 3 : GC-MS and Sample 1 : GC-FID
252	FID
256	MSD

Participant	Data evaluation
1	Interner Standard

Organic solvents with own sampling 2024

Participant	Data evaluation
26	Quantifizierung: Durch eine Kalibrierung von Standards mit verschiedenen Stufen gegen Anw esenheit von internem Standard. Identifizierung: Durch die Massen von Analyten mittels Massenspektrometer
33	externer Standard
39	Interner Standard
40	Internes Standard Verfahren
42	interner Standard; Identifizierung: GC-FID und GC-MS
72	externer Standard, 6 Pkt. Kalibrierung
78	interner Standard
116	Interner Standard
130	Externe Mehrpunktkalibrierung
139	the analysis w as performed by an external laboratory
167	Internal Standard
234	interner Standard
236	externer Standard
238	Internal
252	Interner Standard
256	Interner Standard

Participant	Recovery rates	Date of analysis
1	Nein	04.-11.03.2024
26	nein	06. und 12.03.2024
33	ja	29.02.24
39	Nein	04.-11.03.2024
40	ja	27.02.2024 & 28.02.2024
42	ja	Aufarbeitung 26.02.24 , Analyse 27.02.24
72	ja (0,90 bis 0,98)	bis 04.03.2024
78	nein	alles außer Ethylacetat/n-Hexan 23.02.2024 - Ethylacetat/n-Hexan 27.02.2024
116	Nein	04.-11.03.2024
130	nein	siehe oben
139	the analysis w as performed by an external laboratory	the analysis w as performed by an external laboratory
167	No	Betw een 20/3 - 4/9 2024
234	nicht bekannt	20.03. Datum vom Bericht, genaues Analysedatum nicht bekannt

Organic solvents with own sampling 2024

Participant	Recovery rates	Date of analysis
236	ja	29.02.2024
238	No	26/02/2024
252	Nein	19.03.2024
256	ja	27.02.2024
297		25.03.2024