

Round-robin tests for in-house and external measuring stations - results and evaluation

Round-robin test

Volatile Organic Substances (VOC) with Thermodesorption

09-10 May 2017

Summary of laboratory test results

Sample 1

	n-Heptane Z score		Toluene Z score		m-Xylene Z score		1- Butanol Z score		1,2,4-Trimethylbenzene Z score		Benzene Z score	
Unit	µg/m³		µg/m³		µg/m³		µg/m³		µg/m³		µg/m³	
40	70,14	-0,14	84,80	-0,60	98,29	-0,46	165,70	0,25	45,28	-0,73	25,77	0,89
75	123,20	7,32 BE	97,80	0,84	115,20	1,18	148,50	-0,82	52,50	0,75	27,30	1,54
95	66,40	-0,66	87,43	-0,31	101,50	-0,15	179,78	1,12	50,20	0,28	21,22	-1,03
116	75,00	0,55	96,00	0,64	113,00	0,97	195,00	2,06 E	51,00	0,45	20,00	-1,55
120	61,68	-1,33	50,13	-4,44 BE	64,53	-3,74 BE	93,12	-4,24 FE	31,13	-3,62 BE	17,14	-2,75 E
124	67,32	-0,53	83,10	-0,79	98,03	-0,48	120,45	-2,55 E	43,16	-1,16	27,88	1,79
126	77,02	0,83	92,12	0,21	106,28	0,32	176,76	0,93	48,43	-0,08	23,93	0,12
135	76,80	0,80	91,60	0,15	107,30	0,42	158,30	-0,21	50,30	0,30	23,20	-0,19
158	79,40	1,16	88,80	-0,16	102,50	-0,05	180,80	1,18	46,50	-0,48	24,80	0,48
230	58,00	-1,84	99,00	0,97	86,00	-1,65	56,00	-6,54 FE	50,00	0,24	30,00	2,68 E
243	76,00	0,69	91,20	0,11	106,00	0,29	180,00	1,13	47,20	-0,33	25,90	0,95
265	65,00	-0,86	80,00	-1,13	95,00	-0,78	149,00	-0,79	44,00	-0,99	21,00	-1,12
287	80,70	1,35	90,80	0,06	107,10	0,40	124,70	-2,29 E	57,30	1,74	19,40	-1,80
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Method	ISO 5725-2		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		Z <=2,00	
Mean	71,12		90,22		103,02		161,73		48,82		23,66	
Reproducibility s.d.	7,40		5,79		8,01		24,07		3,95		3,76	
Rel. reproducibility s.d.	10,41 %		6,42 %		7,78 %		14,89 %		8,09 %		15,88 %	
Reference value	81,20		88,20		107,00		160,90		47,00		27,10	
Target s.d.	7,11		9,02		10,30		16,17		4,88		2,37	
Rel. target s.d.:	10,00 %		10,00 %		10,00 %		10,00 %		10,00 %		10,00 %	
Lower limit of tolerance	56,90		72,18		82,41		129,38		39,06		18,93	
Upper limit of tolerance	85,35		108,27		123,62		194,07		58,59		28,39	
Type B outliers	1		1		1				1			
Type E outliers	1		1		1		5		1		2	
Type F outliers							2					
No. of laboratories that submitted	13		13		13		13		13		13	

n-Heptane Z score	Toluene Z score	m-Xylene Z score	1- Butanol Z score	1,2,4-Trimethylbenzene Z score	Benzene Z score
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results

Explanation of outlier types

B: Differing laboratory mean Grubbs

D: Excluded manually

E: mean outside tolerance limits

F: $|Z\text{-Score}| > 3,5$

L: Differing laboratory mean Grubbs für 2
(Grubbs II)

2-Ethoxyethyl acetate Z score	Cumene Z score	alpha-Pinene Z score
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Unit	$\mu\text{g}/\text{m}^3$		$\mu\text{g}/\text{m}^3$		$\mu\text{g}/\text{m}^3$	
40	78,80	-0,60	36,75	-0,46	65,77	-0,33
75					83,30	2,25 E
95	87,37	0,42	37,64	-0,23	64,45	-0,52
116	92,00	0,98	38,00	-0,13	72,00	0,59
120	25,50	-6,96 BE	26,91	-3,01 BE	36,42	-4,64 FE
124	80,77	-0,36	34,90	-0,94	58,35	-1,42
126	93,61	1,17	38,78	0,07	69,36	0,20
135	84,90	0,13	39,30	0,20	68,40	0,06
158	85,40	0,19	40,50	0,51	72,90	0,72
230	67,00	-2,01 E	105,00	17,26 BE	56,00	-1,76
243	92,30	1,01	37,20	-0,34		
265	76,00	-0,93	38,00	-0,13	58,00	-1,47
287	117,60	4,03 FE	44,10	1,45	79,30	1,66
-	-	--	-	--	-	--
Method	ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	$ Z \leq 2,00$		$ Z \leq 2,00$		$ Z \leq 2,00$	
Mean	83,82		38,52		67,98	
Reproducibility s.d.	8,36		2,47		8,71	
Rel. reproducibility s.d.	9,98 %		6,42 %		12,81 %	
Reference value	81,50		36,30		70,20	

	2-Ethoxyethyl acetate Z score	Cumene Z score	alpha-Pinene Z score
Target s.d.	8,38	3,85	6,80
Rel. target s.d.:	10,00 %	10,00 %	10,00 %
Lower limit of tolerance	67,05	30,81	54,39
Upper limit of tolerance	100,58	46,22	81,58
Type B outliers	1	2	
Type E outliers	3	2	2
Type F outliers	1		1
No. of laboratories that submitted results	12	12	12

Summary of laboratory test results

Sample 2

	n-Heptane Z score		Toluene Z score		m-Xylene Z score		1- Butanol Z score		1,2,4-Trimethylbenzene Z score		Benzene Z score	
Unit	µg/m³		µg/m³		µg/m³		µg/m³		µg/m³		µg/m³	
40	52,65	0,00	76,51	-0,49	186,07	-0,31	124,38	0,14	62,22	-0,50	39,50	0,88
75	91,20	7,32 BE	90,20	1,21	198,80	0,35	112,50	-0,83	70,40	0,75	42,40	1,68
95	53,15	0,09	79,94	-0,06	189,48	-0,14	147,25	2,00 E	64,57	-0,14	35,21	-0,30
116	54,00	0,25	84,00	0,44	220,00	1,45	139,00	1,33	68,00	0,39	36,00	-0,08
120	40,10	-2,39 E	50,96	-3,66 BE	119,15	-3,80 BE	66,70	-4,56 FE	38,20	-4,16 BE	24,72	-3,19 E
124	47,99	-0,89	69,26	-1,39	185,07	-0,37	86,15	-2,98 E	56,39	-1,39	32,15	-1,14
126	51,24	-0,27	75,36	-0,63	186,45	-0,29	123,26	0,05	62,32	-0,48	35,83	-0,13
135	57,20	0,86	82,60	0,27	200,30	0,43	120,60	-0,17	69,10	0,56	38,30	0,55
158	60,10	1,41	81,10	0,08	195,80	0,19	141,72	1,55	64,34	-0,17	40,90	1,27
230	47,00	-1,07	89,00	1,07	153,00	-2,04 E	77,00	-3,72 DE	64,00	-0,22	43,00	1,85
243	56,70	0,77	83,30	0,36	202,00	0,52	138,00	1,25	66,10	0,10	41,20	1,35
265	52,00	-0,13	69,00	-1,42	174,00	-0,94	122,00	-0,06	59,00	-0,99	34,00	-0,63
287	59,80	1,36	84,90	0,56	214,20	1,15	94,60	-2,29 E	79,10	2,08 E	28,70	-2,09 E
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Method	ISO 5725-2		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		Z <=2,00	
Mean	52,66		80,43		192,10		122,68		65,46		36,30	
Reproducibility s.d.	5,72		6,82		17,77		19,24		5,87		5,46	
Rel. reproducibility s.d.	10,85 %		8,48 %		9,25 %		15,68 %		8,97 %		15,03 %	
Reference value	60,00		79,20		204,20		121,40		64,20		41,10	
Target s.d.	5,27		8,04		19,21		12,27		6,55		3,63	
Rel. target s.d.:	10,00 %		10,00 %		10,00 %		10,00 %		10,00 %		10,00 %	
Lower limit of tolerance	42,13		64,34		153,68		98,14		52,37		29,04	
Upper limit of tolerance	63,19		96,52		230,52		147,21		78,55		43,56	
Type B outliers	1		1		1				1			
Type E outliers	2		1		2		5		2		2	
Type F outliers							1					
No. of laboratories that submitted	13		13		13		13		13		13	

n-Heptane Z score	Toluene Z score	m-Xylene Z score	1- Butanol Z score	1,2,4-Trimethylbenzene Z score	Benzene Z score
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results

Explanation of outlier types

B: Differing laboratory mean Grubbs

D: Excluded manually

E: mean outside tolerance limits

F: |Z-Score|>3,5

L: Differing laboratory mean Grubbs für 2
(Grubbs II)

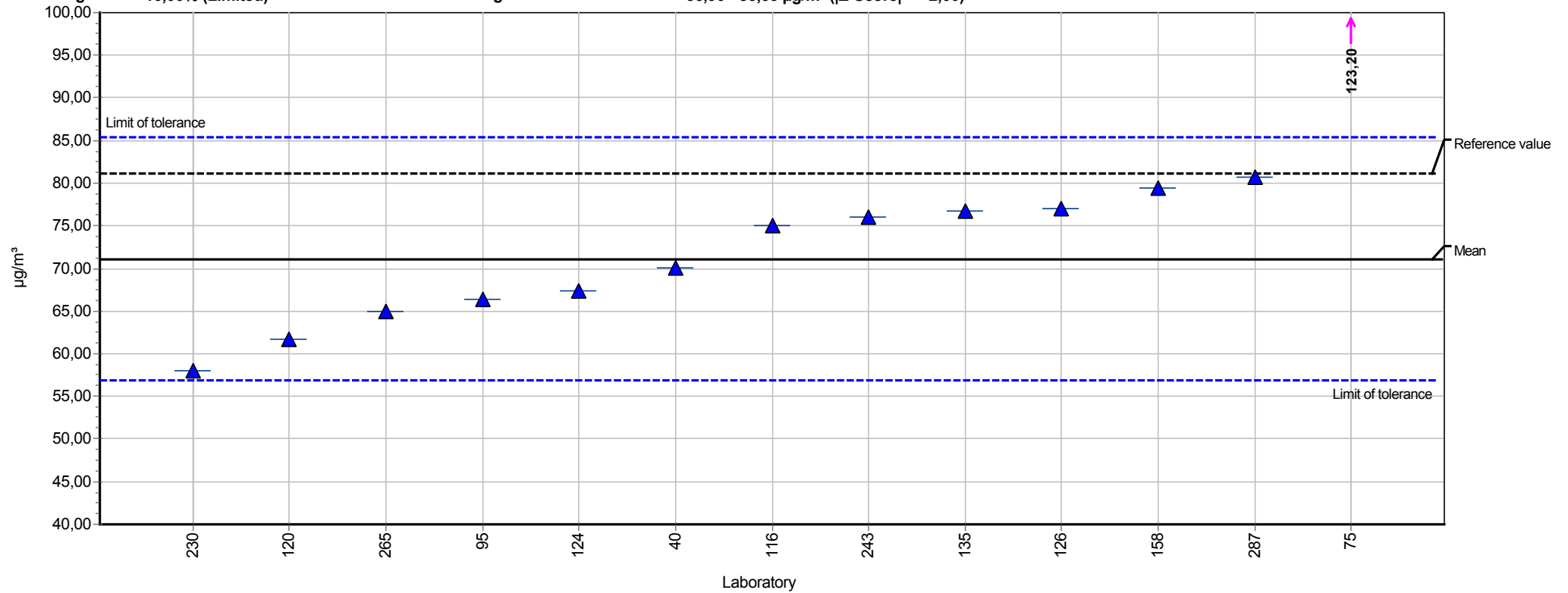
2-Ethoxyethyl acetate Z score	Cumene Z score	alpha-Pinene Z score
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Unit	µg/m³		µg/m³		µg/m³	
40	113,50	-0,42	105,09	-0,73	47,84	0,39
75					57,80	2,56 E
95	118,75	0,03	111,86	-0,14	43,79	-0,49
116	128,00	0,81	114,00	0,05	46,00	-0,01
120	54,59	-5,39 BE	69,92	-3,83 FE	26,94	-4,15 FE
124	109,70	-0,74	96,39	-1,50	37,82	-1,78
126	121,48	0,26	97,72	-1,38	45,34	-0,15
135	119,90	0,12	115,30	0,17	48,70	0,58
158	121,30	0,24	120,90	0,66	50,90	1,06
230	86,00	-2,74 E	123,00	0,85	39,00	-1,53
243	135,00	1,40	111,00	-0,21		
265	106,00	-1,05	112,00	-0,12	41,00	-1,09
287	143,00	2,08 E	140,10	2,35 E	48,20	0,47
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Method	ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	Z <=2,00		Z <=2,00		Z <=2,00	
Mean	118,42		113,40		46,03	
Reproducibility s.d.	15,15		12,16		5,70	
Rel. reproducibility s.d.	12,80 %		10,73 %		12,38 %	
Reference value	113,90		107,90		48,30	

	2-Ethoxyethyl acetate Z score	Cumene Z score	alpha-Pinene Z score
Target s.d.	11,84	11,34	4,60
Rel. target s.d.:	10,00 %	10,00 %	10,00 %
Lower limit of tolerance	94,74	90,72	36,83
Upper limit of tolerance	142,11	136,08	55,24
Type B outliers	1		
Type E outliers	3	2	2
Type F outliers		1	1
No. of laboratories that submitted results	12	12	12

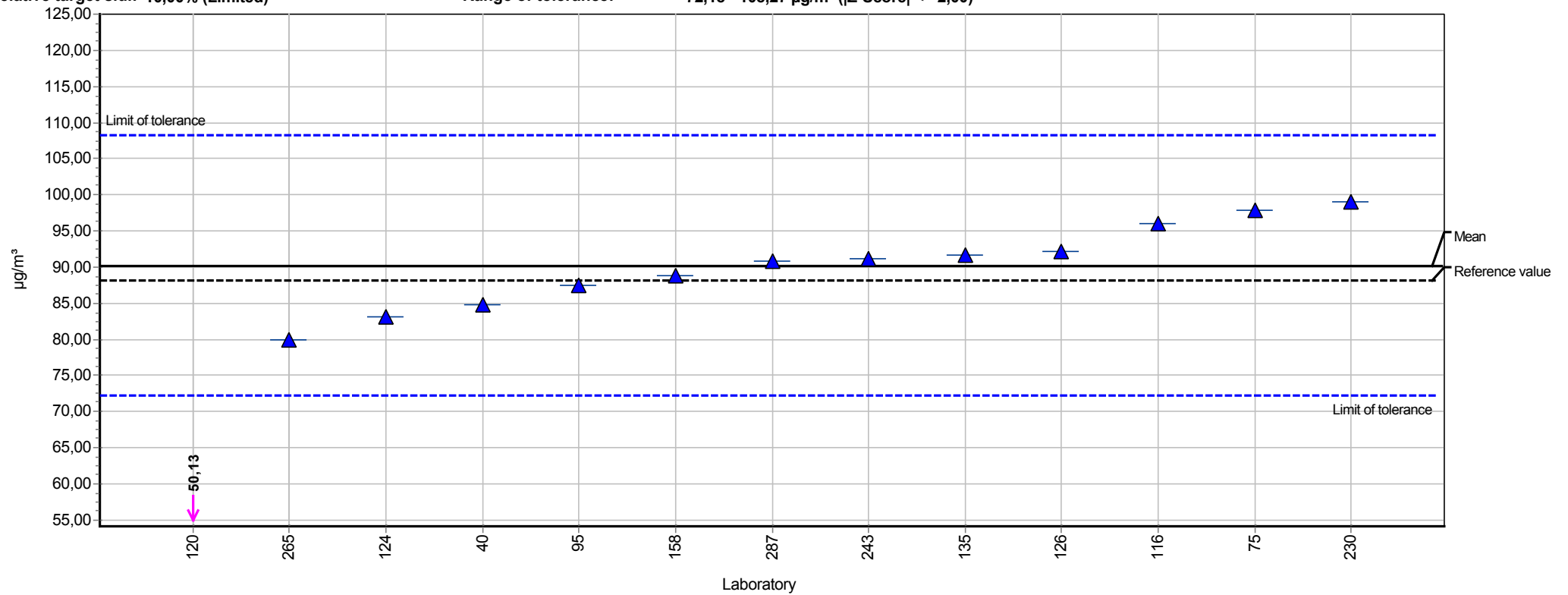
Summary results

Measurand:	n-Heptane	Mean:	71,12 µg/m³
Sample:	1	Reproducibility s.d.:	7,40 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	10,41%
No. of laboratories:	12	Reference value:	81,20 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	56,90 - 85,35 µg/m³ (Z-Score ≤ 2,00)



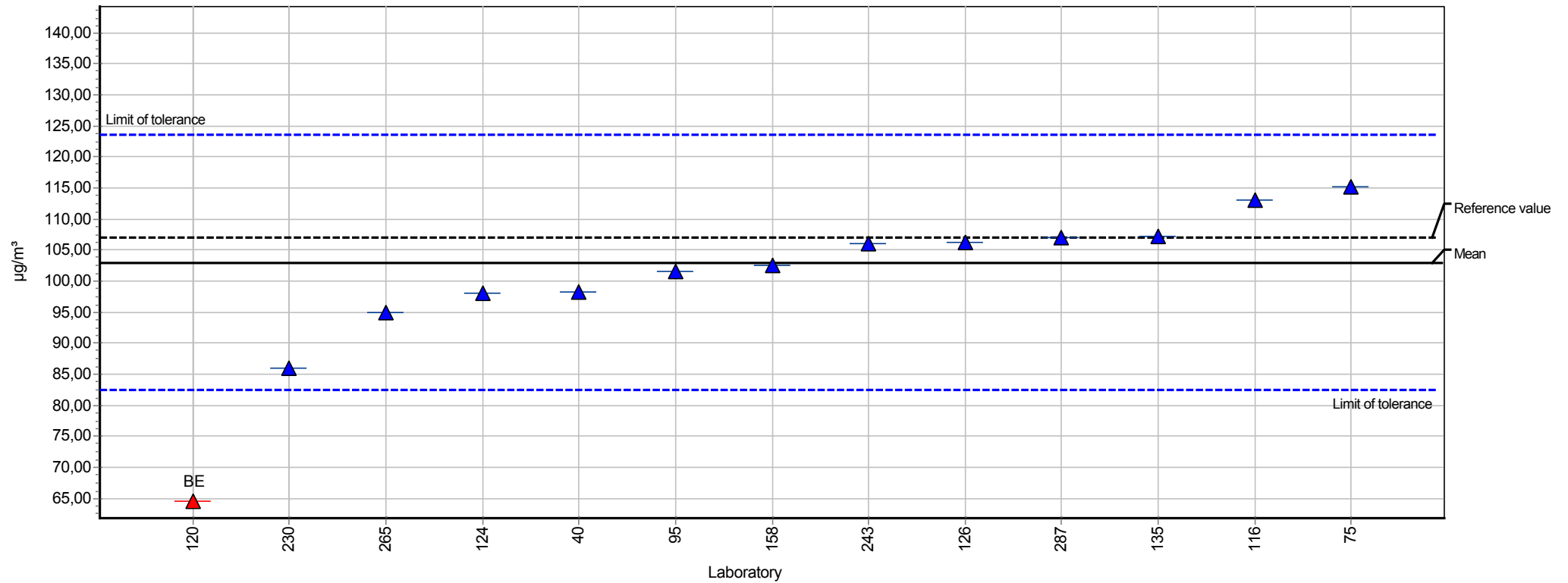
Summary results

Measurand:	Toluene	Mean:	90,22 µg/m³
Sample:	1	Reproducibility s.d.:	5,79 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	6,42%
No. of laboratories:	12	Reference value:	88,20 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	72,18 - 108,27 µg/m³ (Z-Score ≤ 2,00)



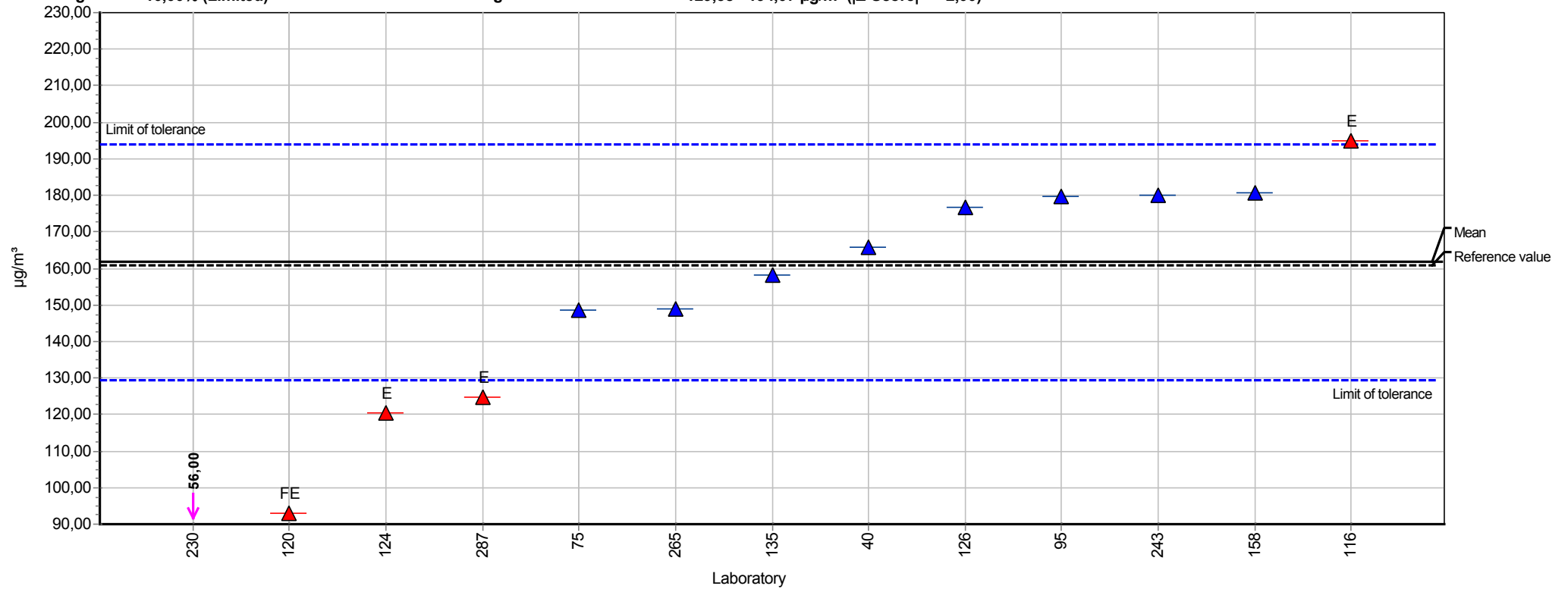
Summary results

Measurand:	m-Xylene	Mean:	103,02 µg/m³
Sample:	1	Reproducibility s.d.:	8,01 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	7,78%
No. of laboratories:	12	Reference value:	107,00 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	82,41 - 123,62 µg/m³ (Z-Score ≤ 2,00)



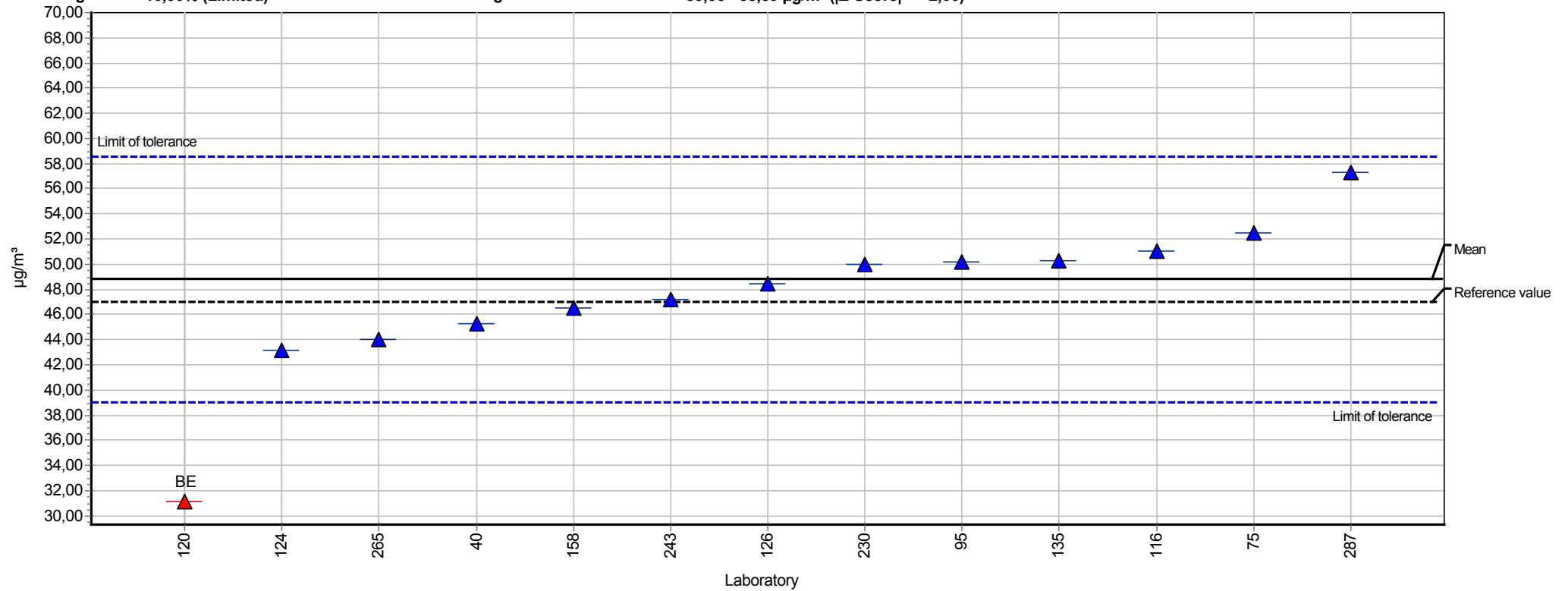
Summary results

Measurand:	1- Butanol	Mean:	161,73 $\mu\text{g}/\text{m}^3$
Sample:	1	Reproducibility s.d.:	24,07 $\mu\text{g}/\text{m}^3$
Method:	ISO 5725-2	Relative reproducibility s.d.:	14,89%
No. of laboratories:	11	Reference value:	160,90 $\mu\text{g}/\text{m}^3$
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	129,38 - 194,07 $\mu\text{g}/\text{m}^3$ ($ Z\text{-Score} \leq 2,00$)



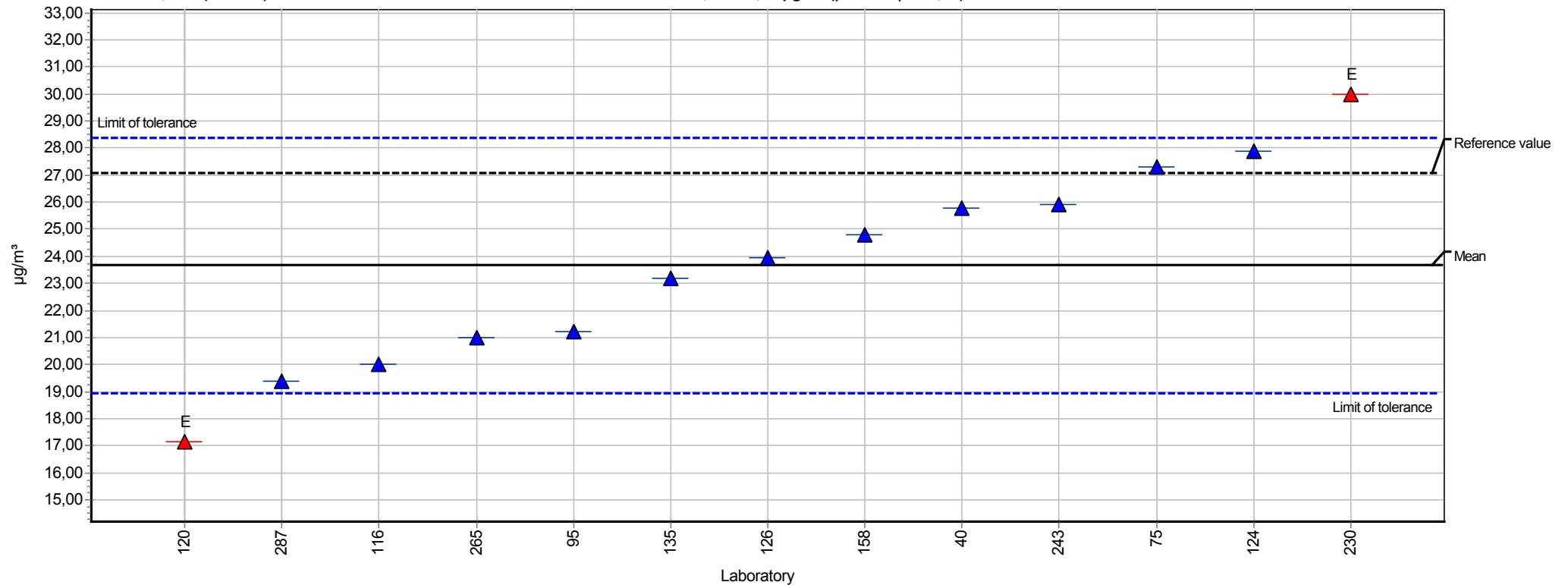
Summary results

Measurand:	1,2,4-Trimethylbenzene	Mean:	48,82 µg/m³
Sample:	1	Reproducibility s.d.:	3,95 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	8,09%
No. of laboratories:	12	Reference value:	47,00 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	39,06 - 58,59 µg/m³ (Z-Score ≤ 2,00)



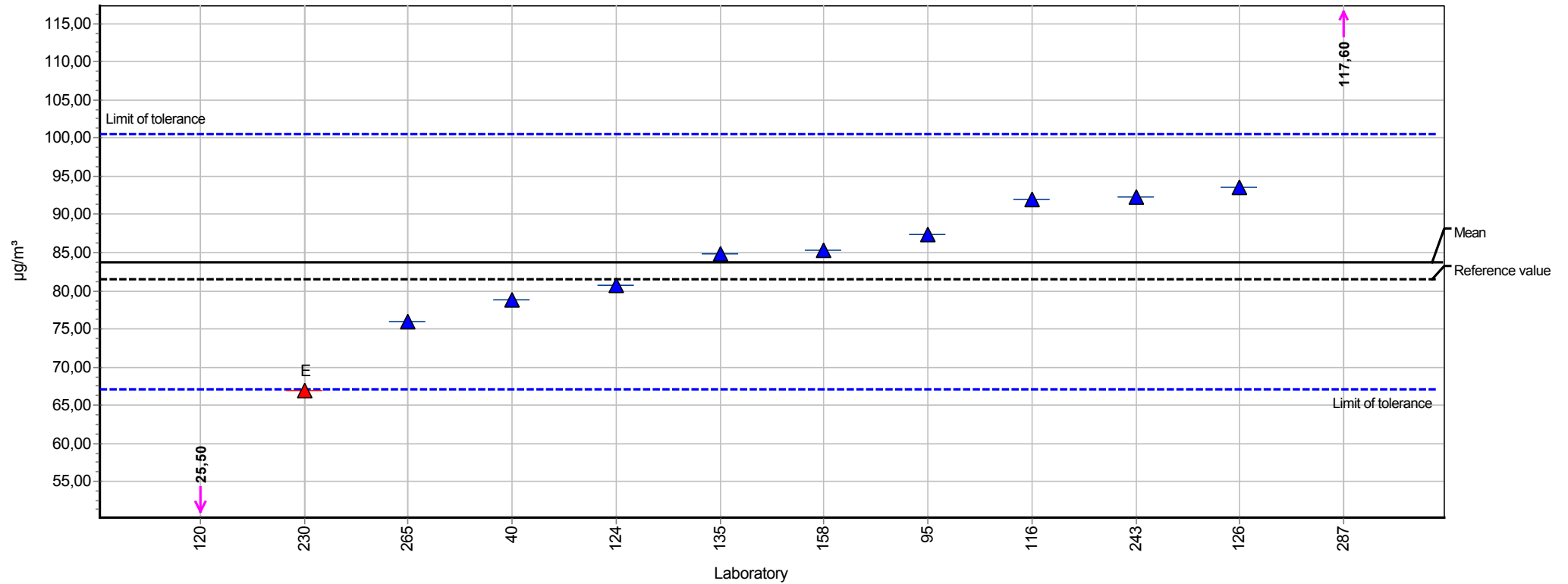
Summary results

Measurand:	Benzene	Mean:	23,66 µg/m³
Sample:	1	Reproducibility s.d.:	3,76 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	15,88%
No. of laboratories:	13	Reference value:	27,10 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	18,93 - 28,39 µg/m³ (Z-Score ≤ 2,00)



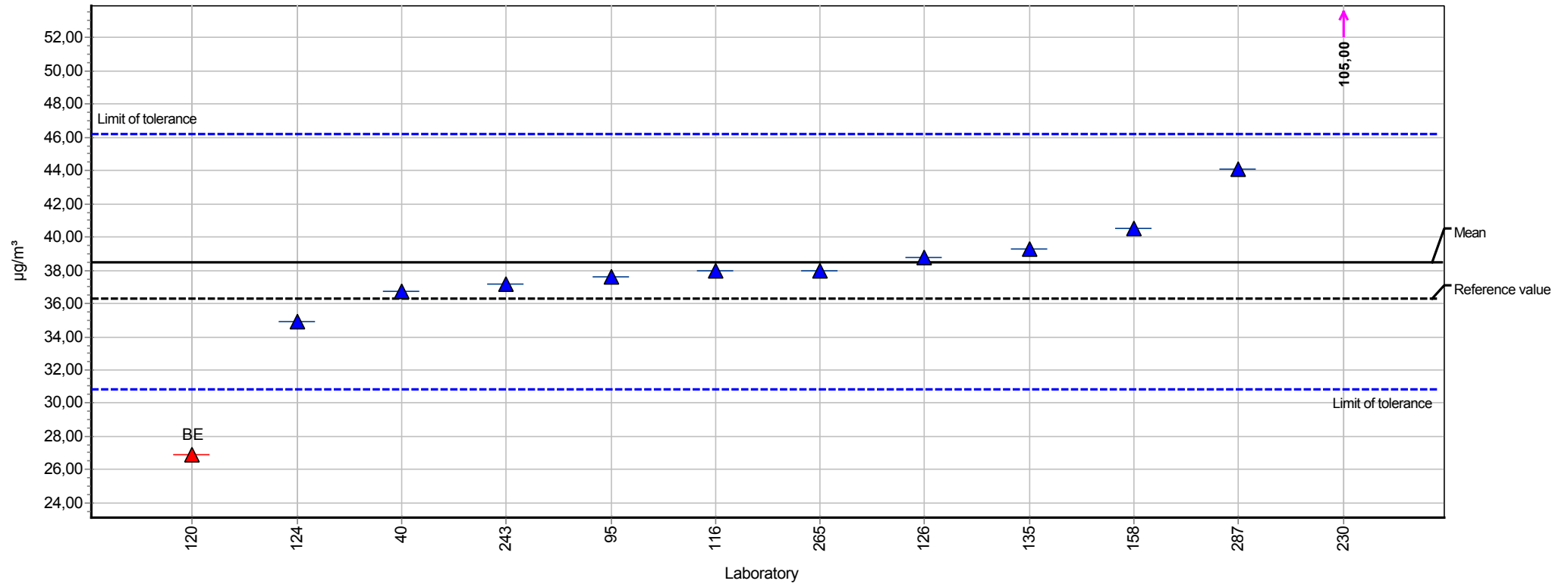
Summary results

Measurand:	2-Ethoxyethyl acetate	Mean:	83,82 µg/m³
Sample:	1	Reproducibility s.d.:	8,36 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	9,98%
No. of laboratories:	10	Reference value:	81,50 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	67,05 - 100,58 µg/m³ (Z-Score ≤ 2,00)



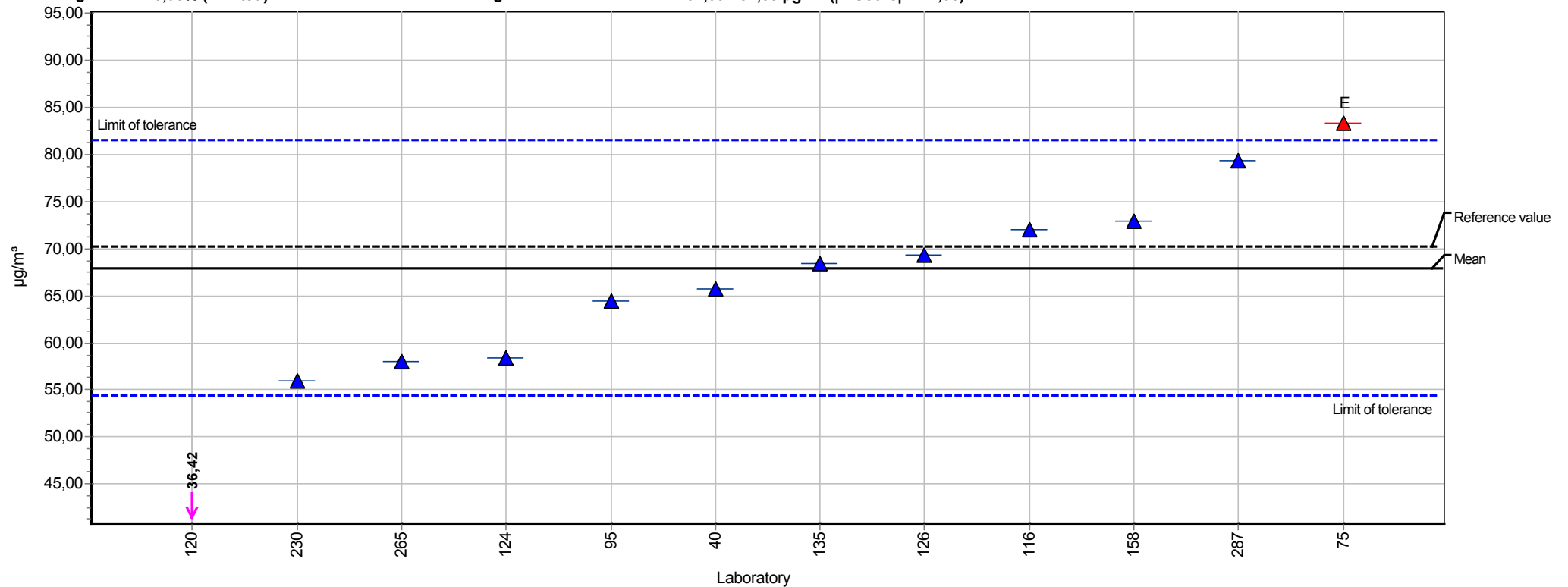
Summary results

Measurand:	Cumene	Mean:	38,52 µg/m³
Sample:	1	Reproducibility s.d.:	2,47 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	6,42%
No. of laboratories:	10	Reference value:	36,30 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	30,81 - 46,22 µg/m³ (Z-Score ≤ 2,00)



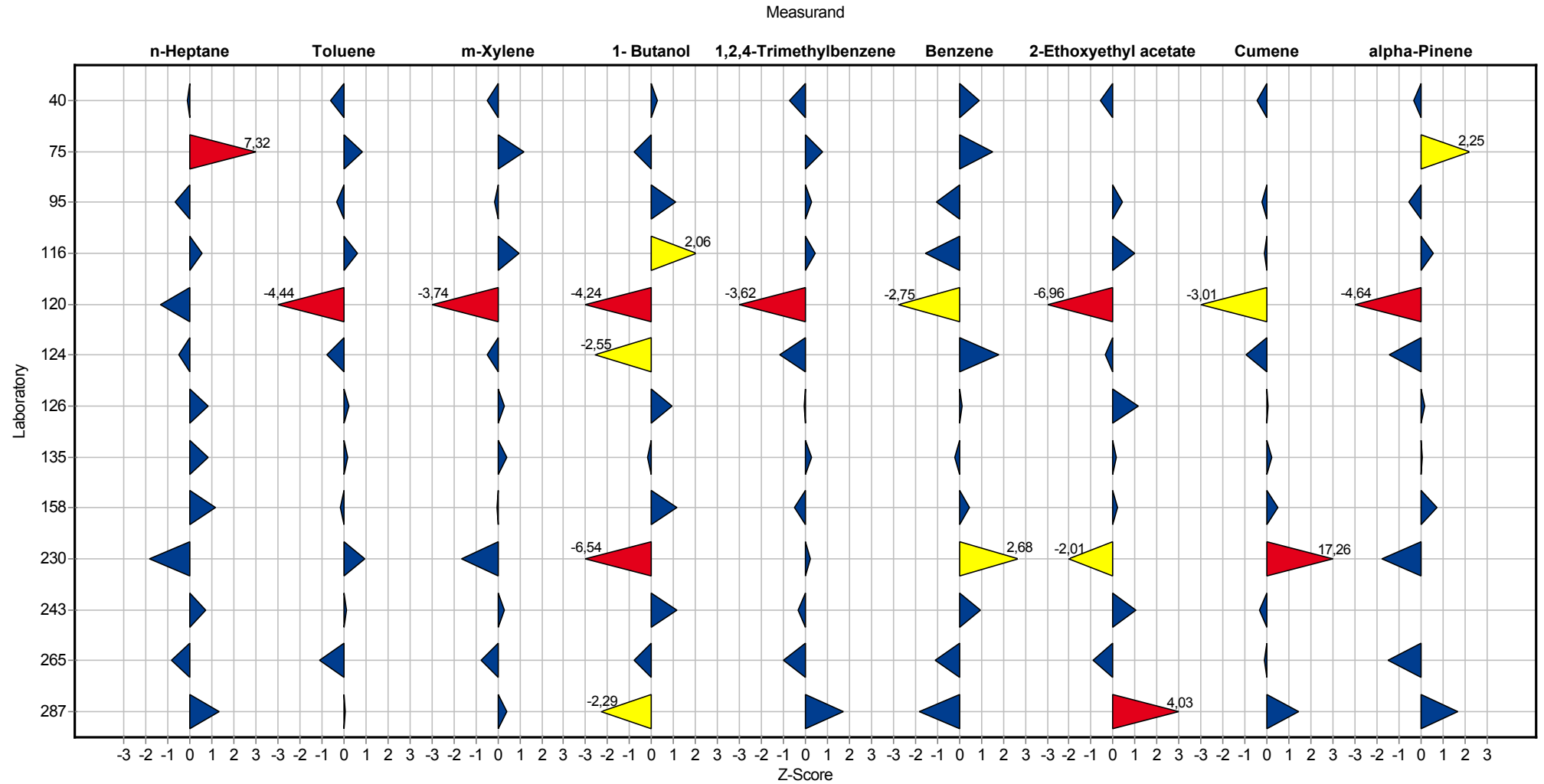
Summary results

Measurand:	alpha-Pinene	Mean:	67,98 µg/m³
Sample:	1	Reproducibility s.d.:	8,71 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	12,81%
No. of laboratories:	11	Reference value:	70,20 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	54,39 - 81,58 µg/m³ (Z-Score ≤ 2,00)



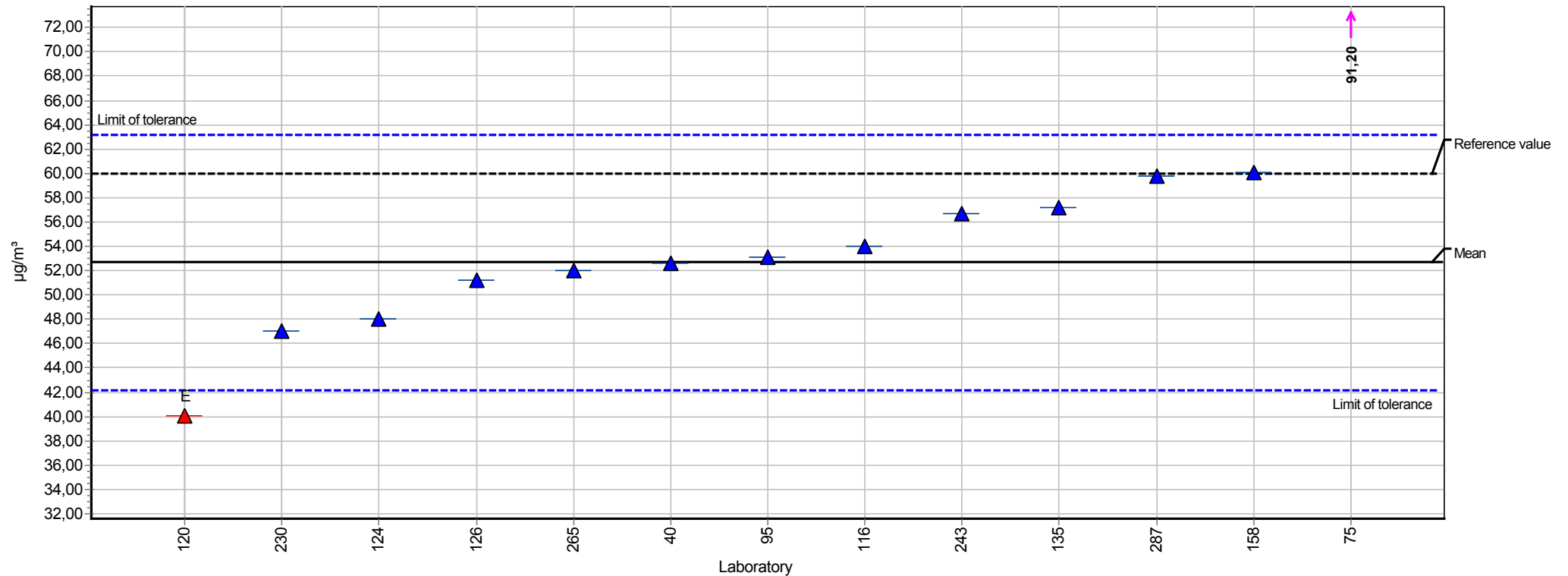
Sample chart of Z-scores

Sample 1



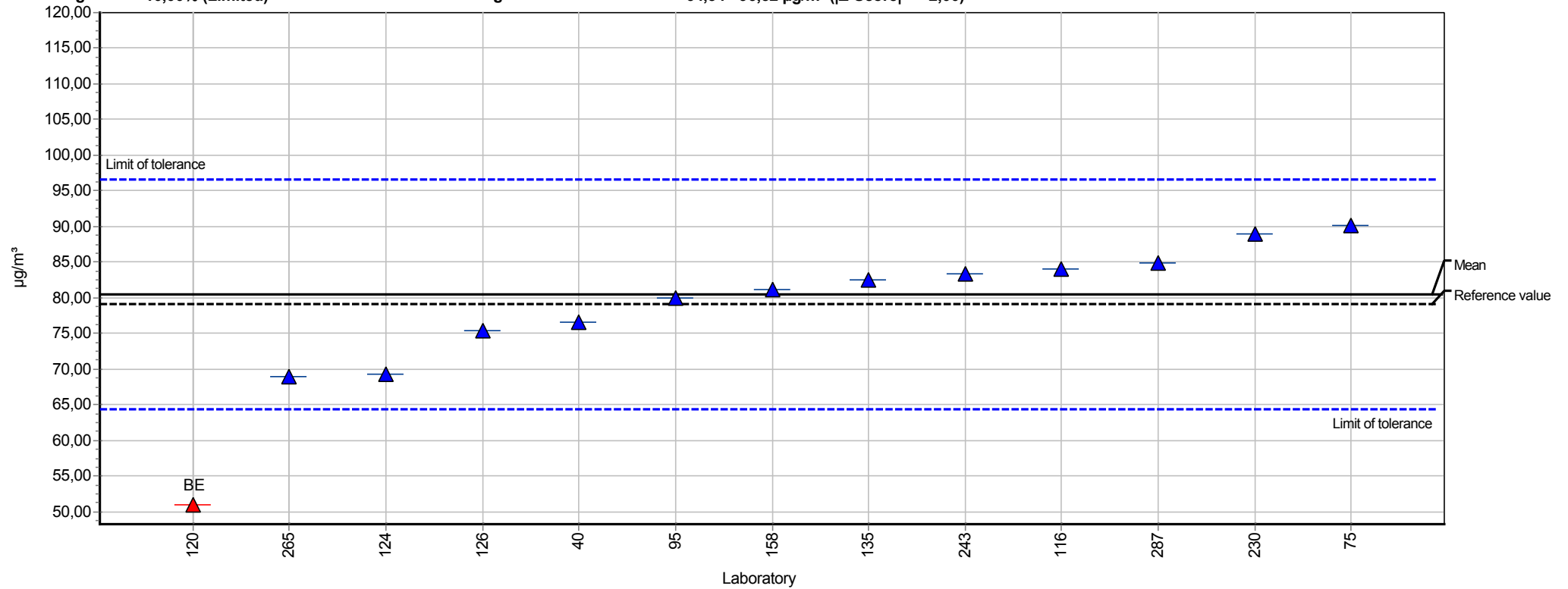
Summary results

Measurand:	n-Heptane	Mean:	52,66 µg/m ³
Sample:	2	Reproducibility s.d.:	5,72 µg/m ³
Method:	ISO 5725-2	Relative reproducibility s.d.:	10,85%
No. of laboratories:	12	Reference value:	60,00 µg/m ³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	42,13 - 63,19 µg/m ³ (Z-Score ≤ 2,00)



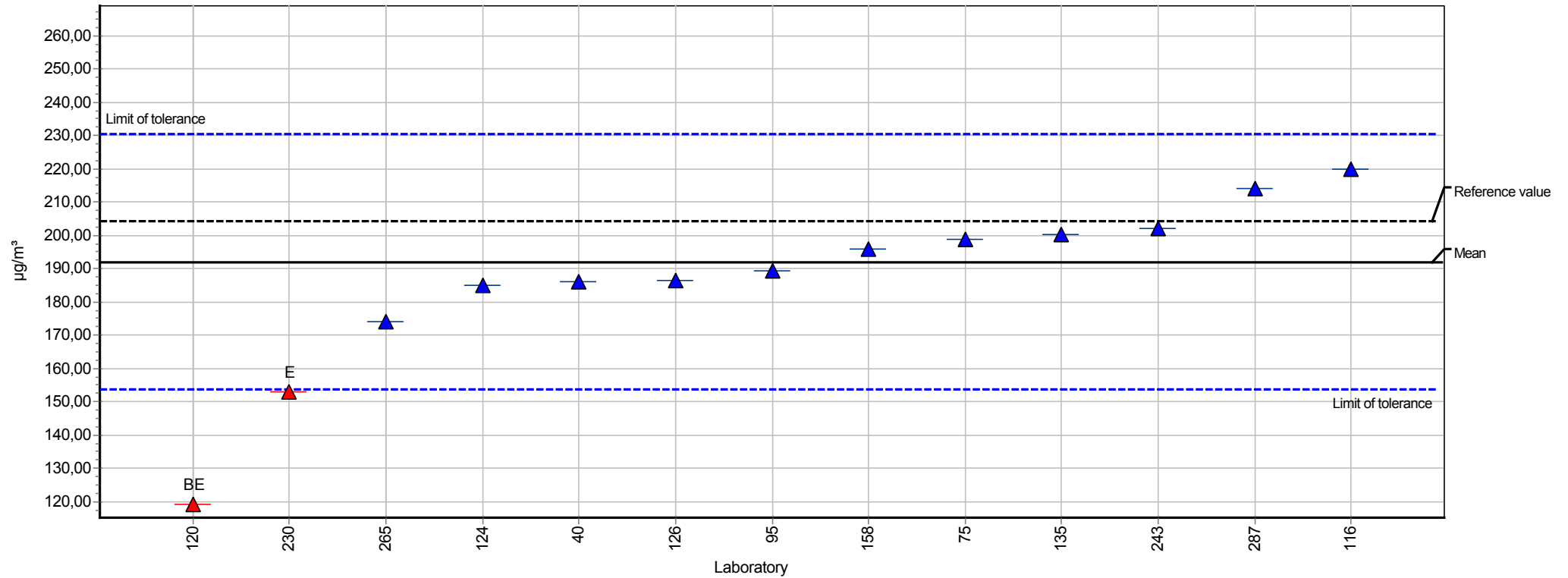
Summary results

Measurand:	Toluene	Mean:	80,43 µg/m³
Sample:	2	Reproducibility s.d.:	6,82 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	8,48%
No. of laboratories:	12	Reference value:	79,20 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	64,34 - 96,52 µg/m³ (Z-Score ≤ 2,00)



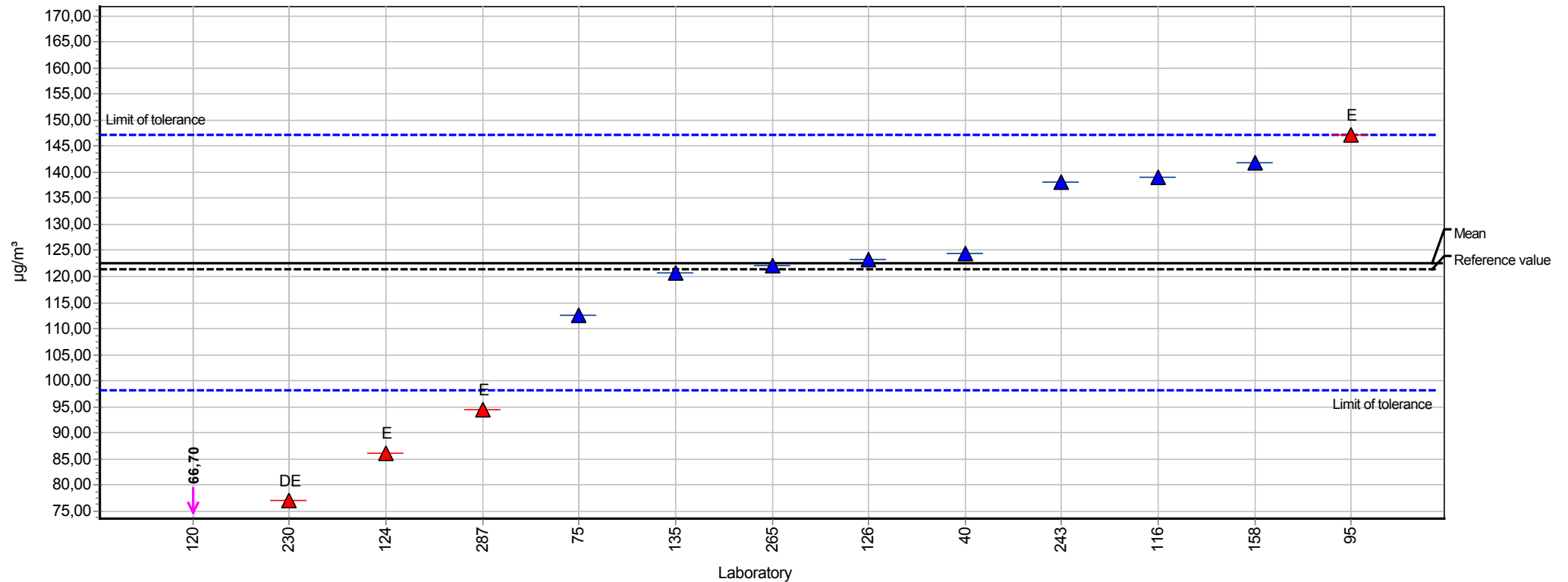
Summary results

Measurand:	m-Xylene	Mean:	192,10 µg/m³
Sample:	2	Reproducibility s.d.:	17,77 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	9,25%
No. of laboratories:	12	Reference value:	204,20 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	153,68 - 230,52 µg/m³ (Z-Score ≤ 2,00)



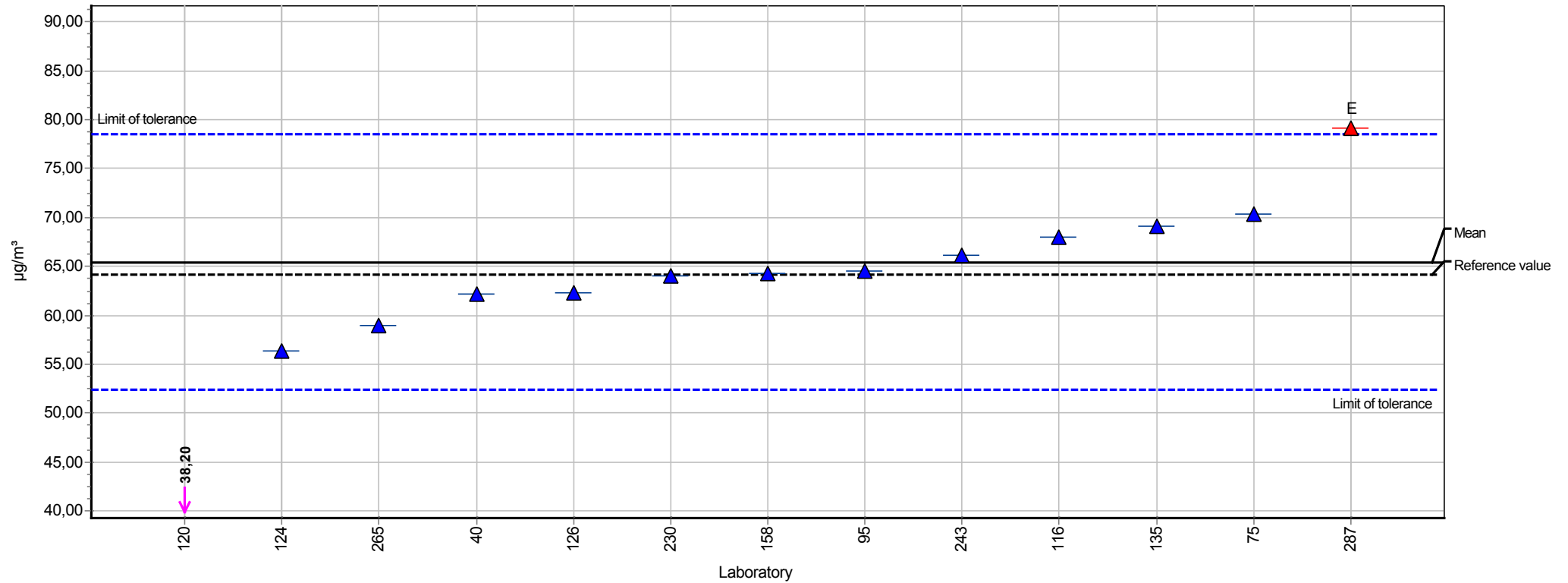
Summary results

Measurand:	1- Butanol	Mean:	122,68 µg/m³
Sample:	2	Reproducibility s.d.:	19,24 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	15,68%
No. of laboratories:	11	Reference value:	121,40 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	98,14 - 147,21 µg/m³ (Z-Score ≤ 2,00)



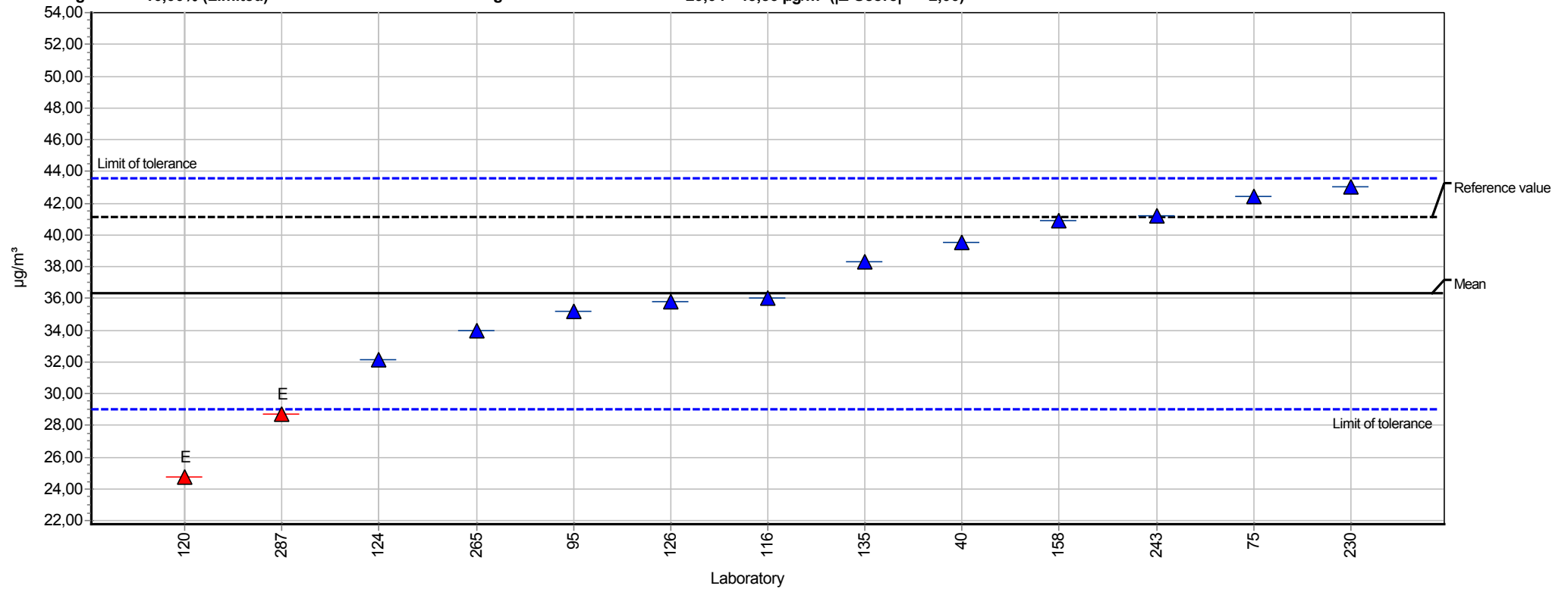
Summary results

Measurand:	1,2,4-Trimethylbenzene	Mean:	65,46 µg/m³
Sample:	2	Reproducibility s.d.:	5,87 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	8,97%
No. of laboratories:	12	Reference value:	64,20 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	52,37 - 78,55 µg/m³ (Z-Score ≤ 2,00)



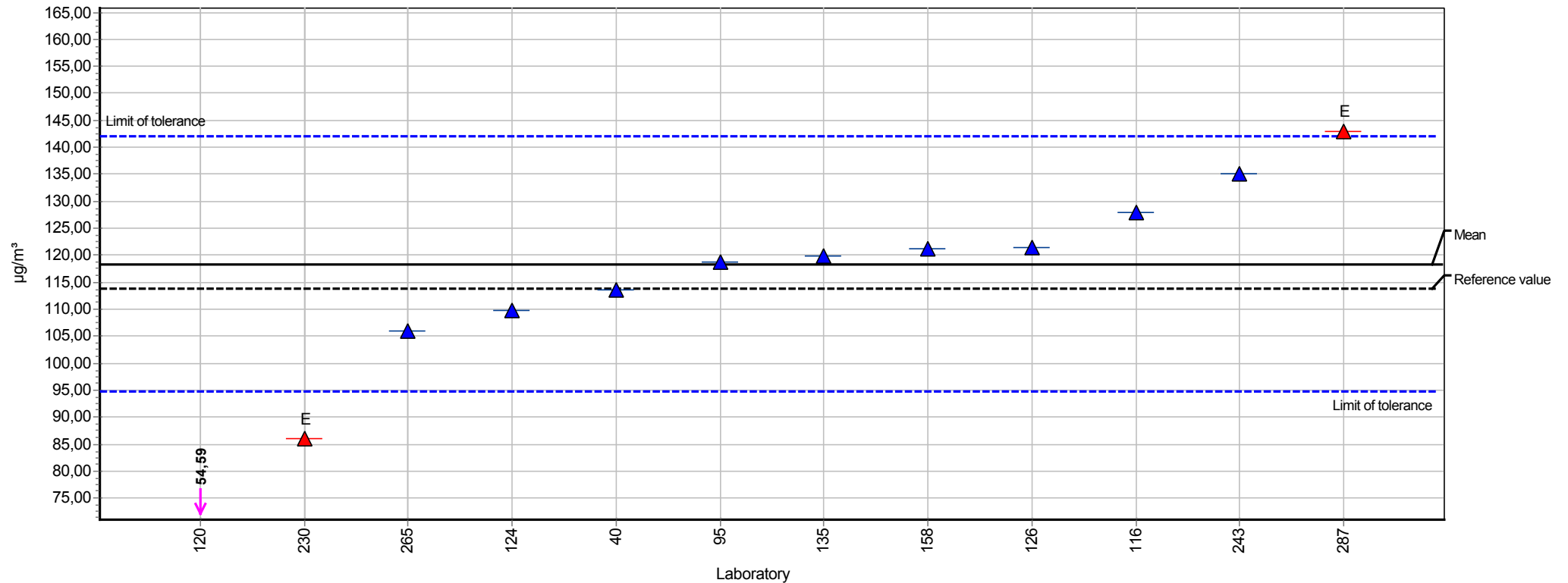
Summary results

Measurand:	Benzene	Mean:	36,30 µg/m ³
Sample:	2	Reproducibility s.d.:	5,46 µg/m ³
Method:	ISO 5725-2	Relative reproducibility s.d.:	15,03%
No. of laboratories:	13	Reference value:	41,10 µg/m ³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	29,04 - 43,56 µg/m ³ (Z-Score ≤ 2,00)



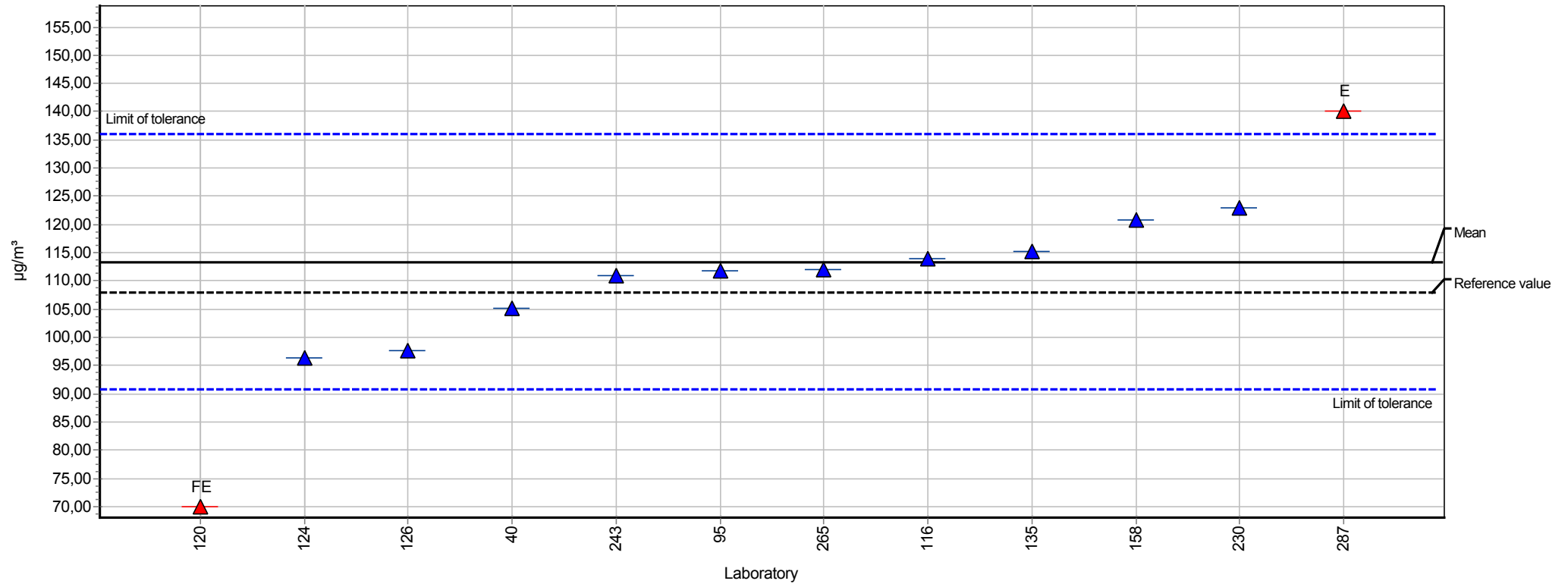
Summary results

Measurand:	2-Ethoxyethyl acetate	Mean:	118,42 µg/m³
Sample:	2	Reproducibility s.d.:	15,15 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	12,80%
No. of laboratories:	11	Reference value:	113,90 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	94,74 - 142,11 µg/m³ (Z-Score ≤ 2,00)



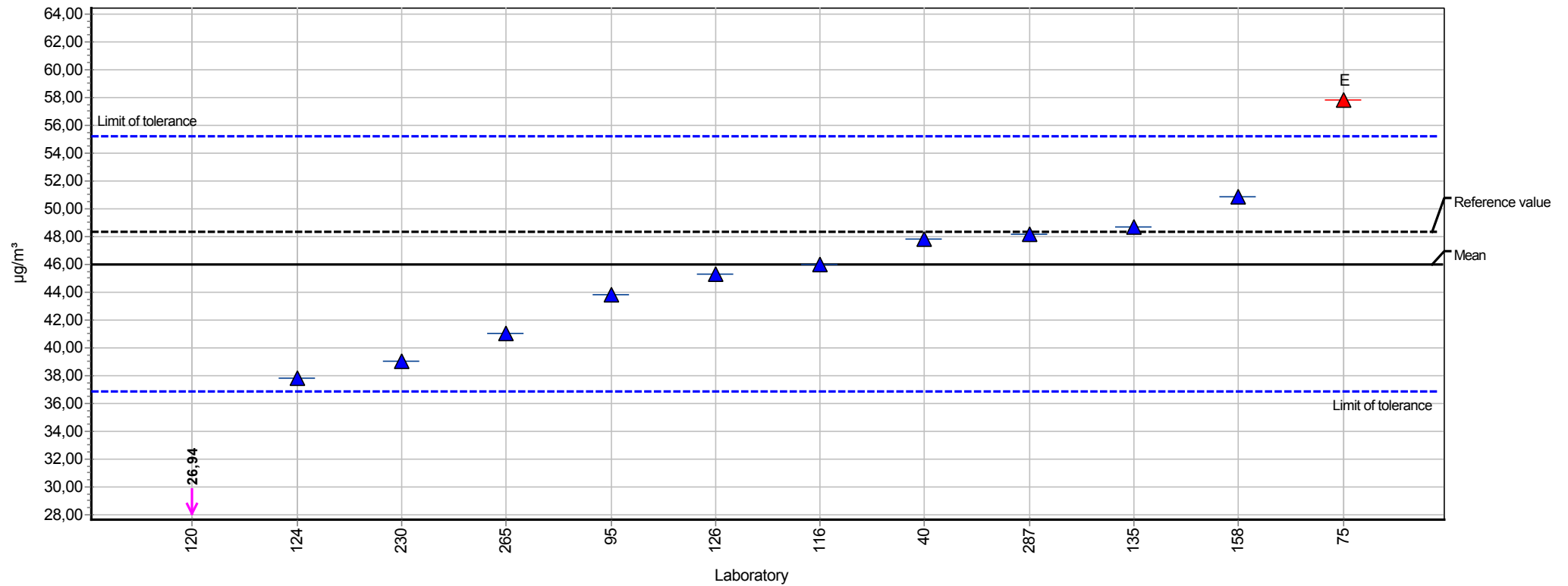
Summary results

Measurand:	Cumene	Mean:	113,40 µg/m³
Sample:	2	Reproducibility s.d.:	12,16 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	10,73%
No. of laboratories:	11	Reference value:	107,90 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	90,72 - 136,08 µg/m³ (Z-Score ≤ 2,00)



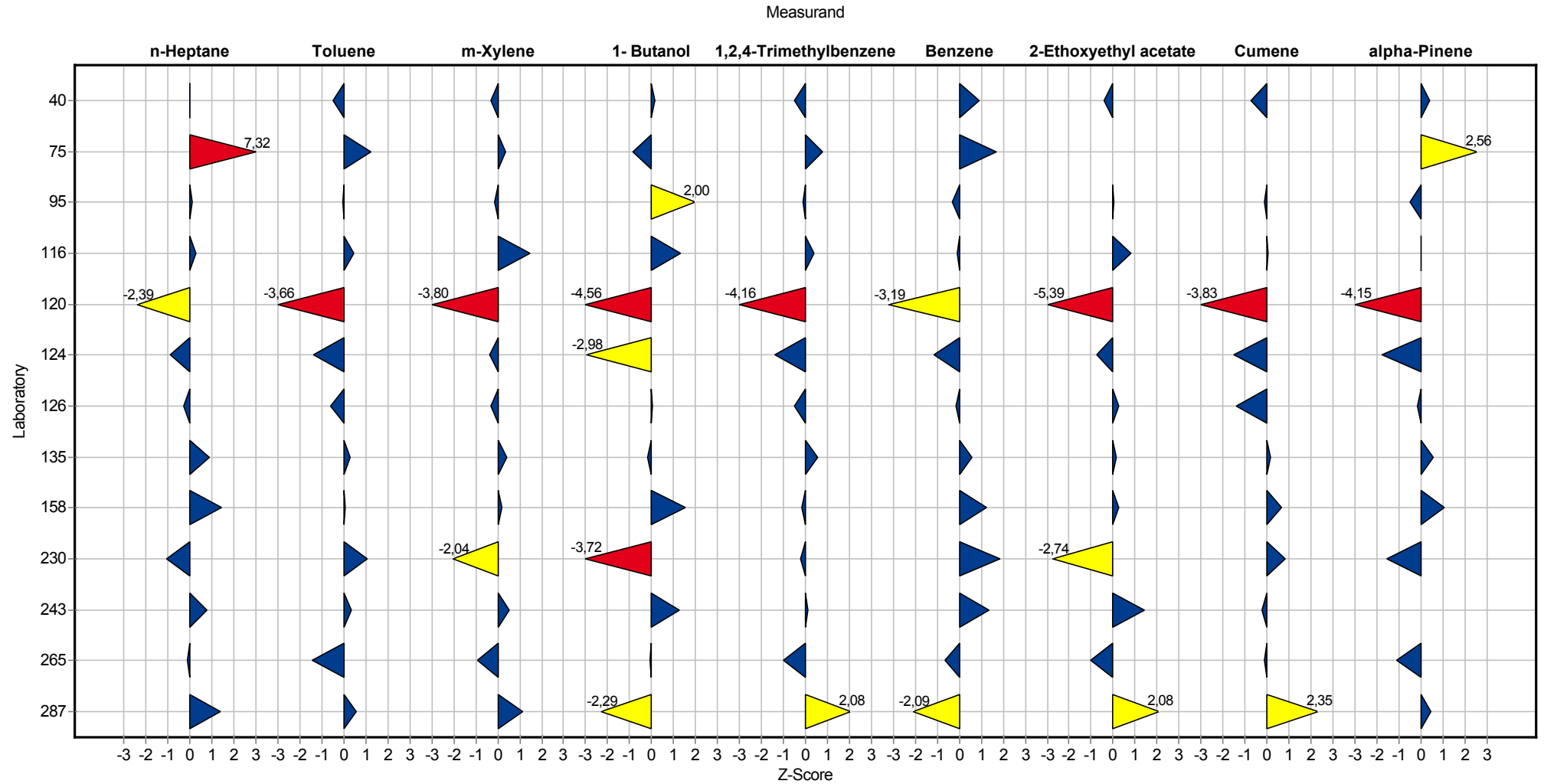
Summary results

Measurand:	alpha-Pinene	Mean:	46,03 µg/m³
Sample:	2	Reproducibility s.d.:	5,70 µg/m³
Method:	ISO 5725-2	Relative reproducibility s.d.:	12,38%
No. of laboratories:	11	Reference value:	48,30 µg/m³
Relative target s.d.:	10,00% (Limited)	Range of tolerance:	36,83 - 55,24 µg/m³ (Z-Score ≤ 2,00)



Sample chart of Z-scores

Sample 2



Summary of laboratory test results

Sample Blank conc.1

	n-Heptane	Toluene	m-Xylene	1- Butanol	1,2,4-Trimethylbenzene	Benzene	2-Ethoxyethyl acetate	Cumene	alpha-Pinene
Unit	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
40	0,00	1,10	0,00	0,00	0,00	0,00	0,00	0,00	0,00
75	< 5,00	< 14,00	< 2,00	< 5,00	< 5,00	< 5,00			< 5,00
95	0,05	0,00	0,00	0,00	0,00	0,00	2,94	0,00	0,00
120	1,15	4,29	3,42	13,50	1,15	6,85	1,13	1,09	1,22
124	0,03	0,13	1,13	0,03	0,39	0,05	0,44	0,37	0,32
135	< 1,00	< 1,00	< 1,00	< 1,00	< 1,00	< 1,00	< 1,00	< 1,00	< 1,00
230	< 2,00	< 2,00	< 2,00	< 2,00	< 2,00	< 2,00	< 2,00	< 2,00	< 2,00
265	0,00	0,00	0,00	2,00	0,00	0,00	1,00	0,00	0,00
287	0,10	0,10	0,30	0,20	0,20	0,30	0,60	0,20	0,10
–	–	–	–	–	–	–	–	–	–
No. of laboratories that submitted results	9	9	9	9	9	9	8	8	9

Summary of laboratory test results

Sample Blank conc.2

	n-Heptane	Toluene	m-Xylene	1- Butanol	1,2,4-Trimethylbenzene	Benzene	2-Ethoxyethyl acetate	Cumene	alpha-Pinene
Unit	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³	µg/m³
40	0,00	3,90	0,00	0,00	0,00	0,00	0,00	0,00	0,00
75	< 5,00	< 14,00	< 2,00	< 5,00	< 5,00	< 9,00			< 5,00
95	0,17	0,00	0,00	0,32	0,00	0,00	2,84	0,00	0,00
120	0,18	0,42	0,50	2,47	0,20	1,06	0,94	0,44	0,28
124	0,05	0,86	1,35	0,06	0,69	0,06	0,15	0,33	0,63
135	< 1,00	< 1,00	< 1,00	< 1,00	< 1,00	< 1,00	< 1,00	< 1,00	< 1,00
230	< 2,00	< 2,00	< 2,00	< 2,00	< 2,00	< 2,00	< 2,00	< 2,00	< 2,00
265	0,00	6,00	1,00	2,00	2,00	1,00	1,00	0,00	1,00
287	0,10	0,40	0,40	0,40	0,30	0,30	0,70	0,20	0,20
–	–	–	–	–	–	–	–	–	–
No. of laboratories that submitted results	9	9	9	9	9	9	8	8	9

Questions and Answers

Participant	Kind of tube	Sampling pump	Volume flow	Volume flow measurement	Sampling time	Analytical method
40	Tenax TA	Gilian LFS 1130C			60 Minuten	Hausmethode
75	Tenax TA	Air Check 2000 SKC	50ml/min		20min	ISO 16000-6
95	Chromosorb 106	GSA SG350ex			20 Minuten	DIN EN ISO 16017-1
116	Tenax	LfS 113			30 Minuten	
120	Tenax	BiVOC2			5 bis 15 Minuten	DIN ISO 16000-6
124	Tenax	Gilian LFS-113DC Low Flow Sampler	+/-122ml/min	Gilibrator 2	+/-38min	ISO 16000-6
126	Tenax TA	AirCon 2			40 min	DIN 16000-1; -5; -6 und DIN 16017-1
135	Tenax TA	Holbach BiVOC2			43 Minuten	16000-6
158	Tenax TA	Gilian LFS-113 DC Low Flow Sampler			20 Min	DIN ISO 16000-6 2012-11
230	Tenax TA	Fa. Holbach, BIVOC 2			0,15 ml/l	DIN ISO 16000-6
243	Tenax	GSA SG35			BLW: 45min Proben: 90min bzw. 80min	Hausmethode (GC/ATD)
265	Tenax					DIN ISO 16000-6
287	Tenax TA	SKC Universal PCXR8	100 ml/min	Applied Instruments FP-407	20	DIN ISO 16000-6

Participant	thermodesorber	Desorption temperature	Desorption flow	Desorption time	Cyro trap	Carrier gas
40	Perkin Elmer Turbomatrix 650	250	15	10	4	Helium
75	Markes TD-100	250°C	30	10	0-300°C	He
95	Gerstel TDSA2	180°C	40ml/min	8 Minuten	-145°C-12°C/s-300°C, 3 Min.	Helium
120	GERSTEL-ThermalDesorptionSystem TDS 3	30 °C 60 °C/min bis 300 °C	0,075 ml/min	10 Minuten	-150 °C 10°C/min bis 300 °C (3 Minuten)	Helium
124	Markes Unity	280C	50ml/min	10min.	-6C ramp with 24C/s to 300C hold 5 min.	Helium
126	Turbomatrix Thermodesorption ATD 450, Fa. Perkin Elmer	250	35 ml/min	5 min	-24 / 250	Helium
135	Perkin Elmer TurboMatrix 650	280°C	29	15	-20°C/300°C	Helium
158	Markes TD 100	280 °C	75 ml/min	8	-10 °C und +310 °C	Helium
230	TDS 3, Fa. Gerstel	40°C bis 260°C	30 ml/min	5 Minuten	- 30°C bis 260°C	Helium
243	ATD 650, Fa. PerkinElmer	270°C	30ml/m³	10min	-30°C / 40°C/sec auf 270°C	Helium
265	TD 20 Shimadzu	250°C	60ml/min	28 min	-13°C, 250°C	Helium
287	Optic 3 - GL sciences	300 °C	10 ml/min	3 min	-190 °C (liquid nitrogen) on column	Helium

Round-robin test VOC with sampling 2/2017

Participant	Flow rate	Analytical column	Detector
40	2,6	DB 1	FID bzw. MS
75	1.3	Supelco SPB-1	Agilent MS
95	0,91ml/min bei 40°C	Rtx-502.2, 40m x 0,18mm ID, 1µmFD	Agilent 7000C
120	1,5 ml/min	DB-5MS 60m, 0,25mm, 1,00µm	Agilent MSD 5977
124	3ml/min divided over two columns (two columns are used in parallel)	Agilent VF-5MS (30m, ID 0.25mm, film 0.25µm)	MS and FID. Provided measured values are based on MS data.
126	-	RXI 624Sil MS 60m x 0,25mm, 1,4µm df	DSQ II; Fa. Thermo Fischer
135	1,5	RTX-200	MSD
158	1 ml/min	Resteck RTX-1 60m, ID 0,25 x 1µm	MSD Agilent 5978C
230	0,6 ml/min	Optima 1MS Accent, MN 60 m	MS
243	8,5ml/min (Vorsäule ATD)	RTX 624 / DB Waxeter	FID
265	27,1ml/min	Agilent VF-5ms	MS
287	1	AT-5MS	MS

Participant	Data evaluation	Recovery rate	Date of analysis
40	FID quantifiziert; MS identifiziert	Nein	11/12.05.17
75	Identification and quantification (external)	Yes	May 29
95	Quantifizierung über internen Standard, Identifizierung MS-Spektrum+RT	Nein	22./23. Mai 2017
120	SIM / SCAN	Nein	11.05.2017
124	Xcaliber	No. Calibration of all compounds was performed on the same day.	May 24th, 2017
126	Quantifizierung: SIM; Identifizierung: Massenspektrum	nein	16.05.2017
135	externer Standard/Massenspektren- und Retentionszeitvergleich	ja	24.05.2017
158	Sim-Ion, Interne Std.-Methode	Es w urde ein Kontrollstandard eingesetzt	11.05.2017 bis 16.05.2017
230	Referenzstandar bekannter Konzentration mit eigener Belegung, Identifizierung RT + Massenpeak	nein	ab 15.05.2017
243	Laufzeitvergleich, Auswertung gegen externen Standard	ja	16. und 17.05.2017
265	Substanzspezifische Kalibration	nein	24.05.2017
287	Internal standard (toluene-D8)	No	16 may 2017 & 17 may 2017