

## Summary of laboratory means

Sample 1

Unit	i-Butyl acetate		n-Heptane		n-Propyl acetate	
	mg/tube	Z score	mg/tube	Z score	mg/tube	Z score
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38	0,400	0,18	0,629	0,03	0,160	0,69
68	0,364	-0,74	0,610	-0,27	0,139	-0,71
79			0,531	-1,53		
82	0,440	1,20	0,710	1,32	0,170	1,36
118	0,425	0,80	0,616	-0,18	0,178	1,88
135	0,376	-0,43	0,591	-0,58	0,146	-0,25
156	0,381	-0,30	0,623	-0,07	0,150	0,02
162	0,342	-1,30	0,634	0,11	0,119	-2,00
167	0,400	0,18	0,615	-0,19	0,152	0,15
184	0,392	-0,02	0,589	-0,61	0,144	-0,38
195	0,351	-1,07	0,709	1,31	0,140	-0,65
208	0,409	0,41	0,620	-0,11	0,148	-0,11
224	0,348	-1,14	0,629	0,03	0,129	-1,38
253	0,419	0,66			0,162	0,82
262	0,210	-4,66 BE	0,830	3,24 BE	0,240	6,03 BE
272	0,455	1,58	0,605	-0,35	0,159	0,62
281			0,695	1,09		
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Method	ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	Z <=2,00		Z <=2,00		Z <=2,00	
No. of laboratories that submitted results	15		16		15	
Mean	0,393		0,627		0,150	
Reproducibility s.d.	0,035		0,047		0,016	

	i-Butyl acetate	Z score	n-Heptane	Z score	n-Propyl acetate	Z score
Rel. reproducibility s.d.	8,86 %		7,55 %		10,45 %	
Reference value	0,391		0,633		0,155	
Target s.d.	0,039		0,063		0,015	
Rel. target s.d.	10,00 %		10,00 %		10,00 %	
Lower limit of tolerance	0,314		0,502		0,120	
Upper limit of tolerance	0,472		0,753		0,180	
Type B outliers	1		1		1	
Type E outliers	1		1		2	
Type F outliers	0		0		0	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	14		15		14	
Explanation of outlier types						
A: Single outlier	Grubbs					
B: Differing laboratory mean	Grubbs					
C: Excessive laboratory s.d.	Cochran					
D: Excluded manually						
E: score outside tolerance limits						
F:  Score >3,5						

## Summary of laboratory means

Sample 2

Unit	o-Xylene		Ethyl acetate		n-Heptane		Toluene	
	mg/tube	Z score	mg/tube	Z score	mg/tube	Z score	mg/tube	Z score
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38	0,105	-0,33	0,611	0,89	0,526	-0,24	1,106	0,27
68	0,107	-0,15	0,499	-1,11	0,519	-0,37	1,047	-0,28
79	0,098	-0,95			0,514	-0,47	1,048	-0,27
82	0,120	1,05	0,660	1,76	0,620	1,50	1,210	1,23
85	0,120	1,05					1,100	0,21
118	0,110	0,14	0,634	1,30	0,526	-0,25	1,099	0,20
125	0,103	-0,51					1,060	-0,16
135	0,109	0,04	0,535	-0,47	0,504	-0,65	1,059	-0,17
156	0,112	0,32	0,578	0,30	0,538	-0,02	1,091	0,13
162	0,100	-0,79	0,425	-2,43 E	0,543	0,07	1,077	0,00
167	0,117	0,78	0,593	0,57	0,523	-0,30	1,082	0,05
184	0,113	0,41	0,540	-0,38	0,513	-0,48	1,071	-0,06
195	0,078	-2,82 BE	0,509	-0,93	0,605	1,23	1,058	-0,18
208	0,108	-0,05	0,549	-0,22	0,516	-0,43	1,097	0,18
224	0,108	-0,05	0,516	-0,81	0,550	0,20	1,020	-0,53
253	0,110	0,13	0,742	3,22 E			1,240	1,51
262	0,100	-0,79			0,550	0,20	0,910	-1,55
272	0,103	-0,51	0,499	-1,11	0,497	-0,78	0,981	-0,89
281	0,111	0,22	0,529	-0,58	0,580	0,76	1,109	0,30
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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	19		15		16		19	

	o-Xylene	Z score	Ethyl acetate	Z score	n-Heptane	Z score	Toluene	Z score
Mean	0,109		0,561		0,539		1,077	
Reproducibility s.d.	0,006		0,078		0,035		0,071	
Rel. reproducibility s.d.	5,93 %		13,88 %		6,55 %		6,60 %	
Reference value	0,115		0,548		0,535		1,109	
Target s.d.	0,011		0,056		0,054		0,108	
Rel. target s.d.	10,00 %		10,00 %		10,00 %		10,00 %	
Lower limit of tolerance	0,087		0,449		0,431		0,862	
Upper limit of tolerance	0,130		0,674		0,647		1,293	
Type B outliers	1		0		0		0	
Type E outliers	1		2		0		0	
Type F outliers	0		0		0		0	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	18		15		16		19	
Explanation of outlier types								
A: Single outlier	Grubbs							
B: Differing laboratory mean	Grubbs							
C: Excessive laboratory s.d.	Cochran							
D: Excluded manually								
E: score outside tolerance limits								
F:  Score >3,5								

## Summary of laboratory means

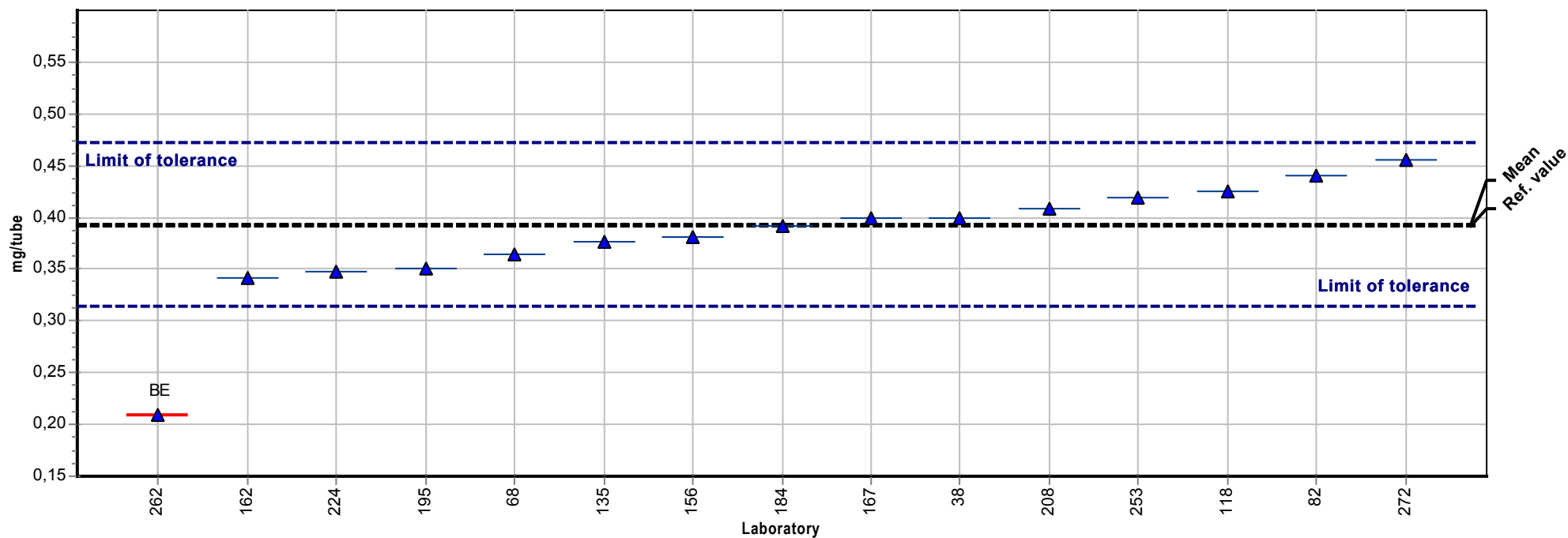
Sample 3

Unit	n-Octane		Ethylbenzene		cyclohexane	
	mg/tube	Z score	mg/tube	Z score	mg/tube	Z score
–	–	--	–	--	–	--
38	0,427	-0,77	0,132	-1,25	0,536	0,22
68	0,481	0,40	0,161	0,67	0,525	0,01
79	0,482	0,42	0,159	0,54	0,562	0,72
82	0,530	1,46	0,170	1,27	0,590	1,25
85			0,170	1,27		
118	0,470	0,16	0,150	-0,07	0,517	-0,13
125			0,147	-0,26		
135	0,470	0,16	0,142	-0,59	0,496	-0,54
156	0,393	-1,51	0,145	-0,39	0,523	-0,03
162	0,470	0,16	0,141	-0,65	0,518	-0,12
167	0,464	0,03	0,152	0,07	0,523	-0,03
184	0,459	-0,08	0,152	0,07	0,505	-0,37
195	0,441	-0,47	0,147	-0,26	0,573	0,93
208	0,300	-3,52 BE	0,094	-3,77 BE	0,449	-1,44
224	0,487	0,53	0,150	-0,06	0,507	-0,33
253			0,161	0,67		
262	0,440	-0,49	0,140	-0,72	0,540	0,30
272	0,455	-0,17	0,141	-0,65	0,520	-0,08
281	0,470	0,17	0,156	0,33	0,506	-0,35
–	–	--	–	--	–	--
Method	ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	Z <=2,00		Z <=2,00		Z <=2,00	
No. of laboratories that submitted results	16		19		16	

	n-Octane	Z score	Ethylbenzene	Z score	cyclohexane	Z score
Mean	0,463		0,151		0,524	
Reproducibility s.d.	0,031		0,010		0,033	
Rel. reproducibility s.d.	6,65 %		6,91 %		6,24 %	
Reference value	0,474		0,154		0,527	
Target s.d.	0,046		0,015		0,052	
Rel. target s.d.	10,00 %		10,00 %		10,00 %	
Lower limit of tolerance	0,370		0,121		0,420	
Upper limit of tolerance	0,555		0,181		0,629	
Type B outliers	1		1		0	
Type E outliers	1		1		0	
Type F outliers	0		0		0	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	15		18		16	
Explanation of outlier types						
A: Single outlier	Grubbs					
B: Differing laboratory mean	Grubbs					
C: Excessive laboratory s.d.	Cochran					
D: Excluded manually						
E: score outside tolerance limits						
F:  Score >3,5						

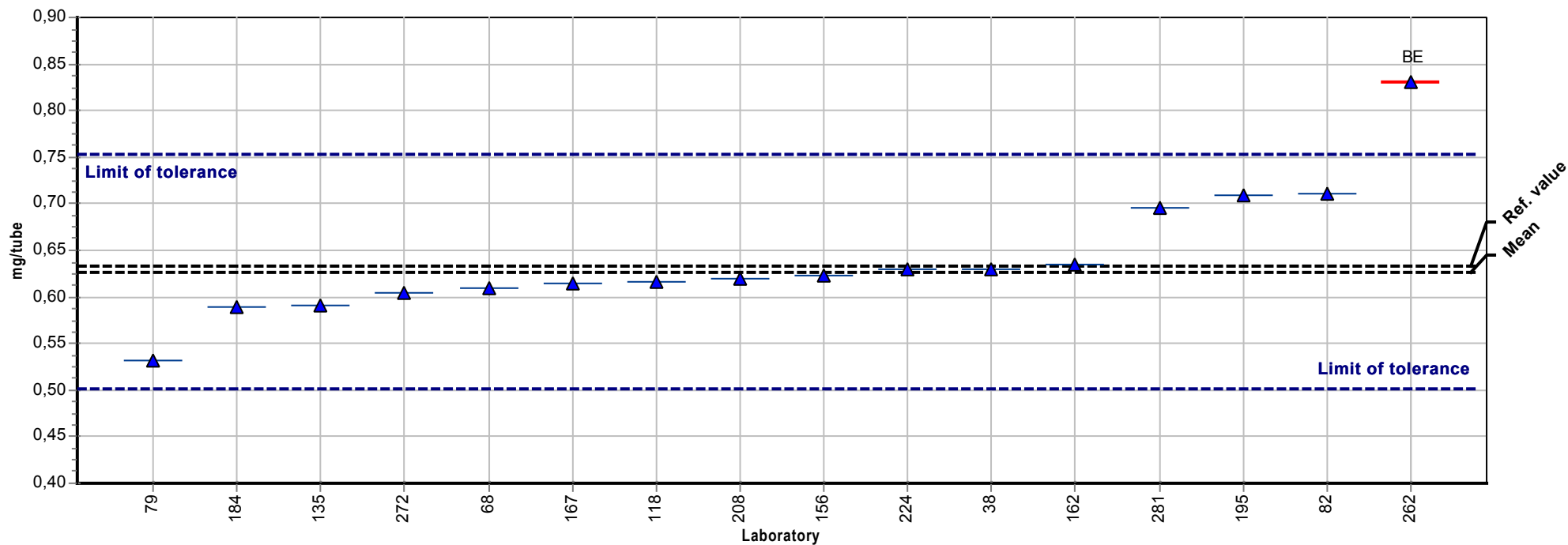
## Summary results

Measurand:	i-Butyl acetate	Mean:	0,393 mg/tube
Sample:	1	Reproducibility s.d.:	0,035 mg/tube
Method:	ISO 5725-2	Rel. reproducibility s.d.:	8,86%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,391 mg/tube
No. of laboratories:	14	Range of tolerance:	0,314 - 0,472 mg/tube ( Z Score  <= 2,00)



## Summary results

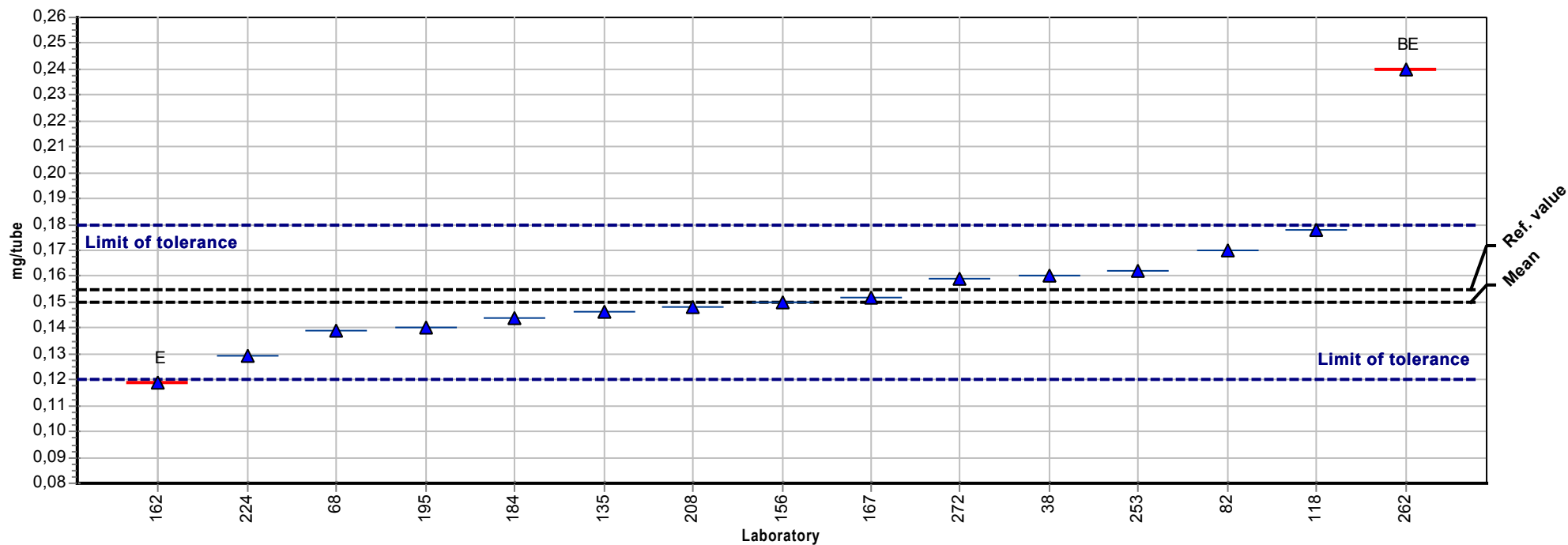
Measurand:	n-Heptane	Mean:	0,627 mg/tube
Sample:	1	Reproducibility s.d.:	0,047 mg/tube
Method:	ISO 5725-2	Rel. reproducibility s.d.:	7,55%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,633 mg/tube
No. of laboratories:	15	Range of tolerance:	0,502 - 0,753 mg/tube ( Z Score  <= 2,00)





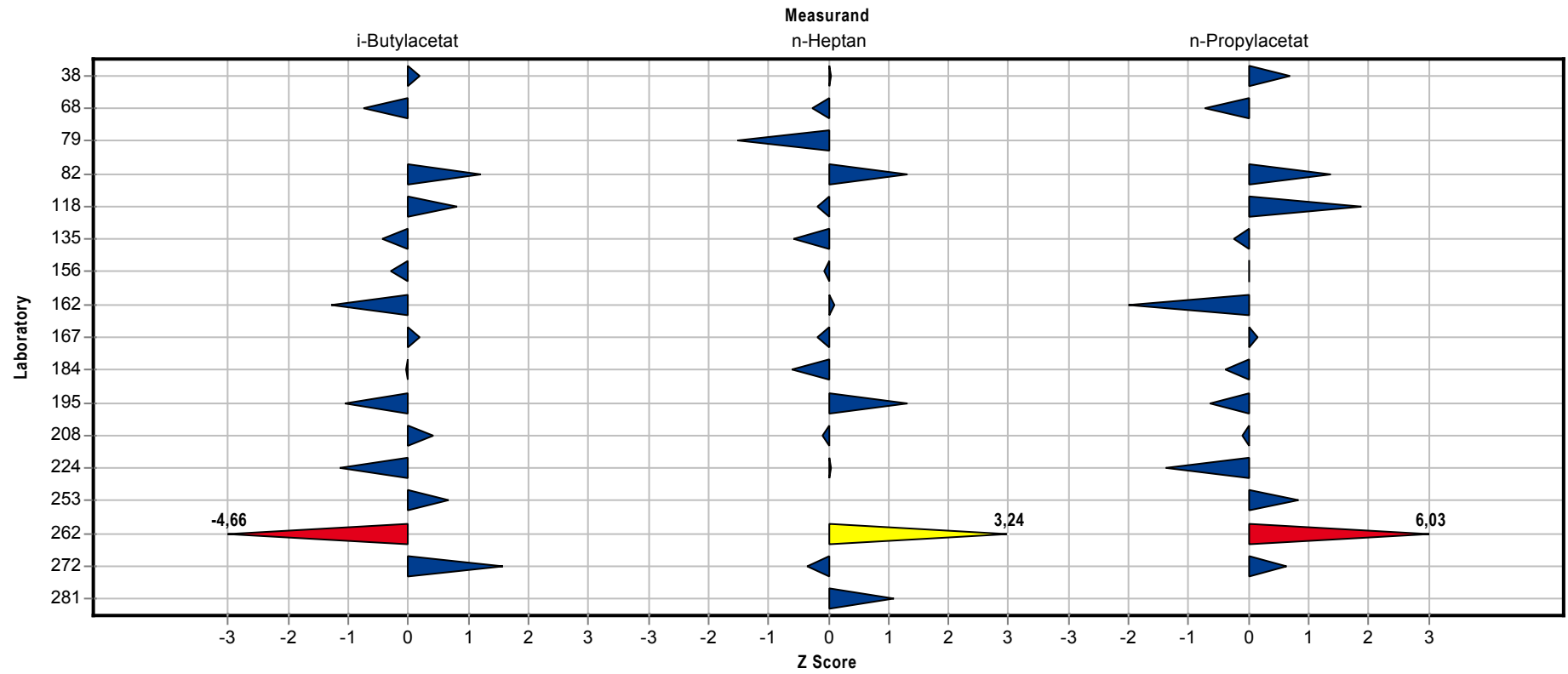
## Summary results

Measurand:	n-Propyl acetate	Mean:	0,150 mg/tube
Sample:	1	Reproducibility s.d.:	0,016 mg/tube
Method:	ISO 5725-2	Rel. reproducibility s.d.:	10,45%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,155 mg/tube
No. of laboratories:	14	Range of tolerance:	0,120 - 0,180 mg/tube ( $ Z \text{ Score}  \leq 2,00$ )



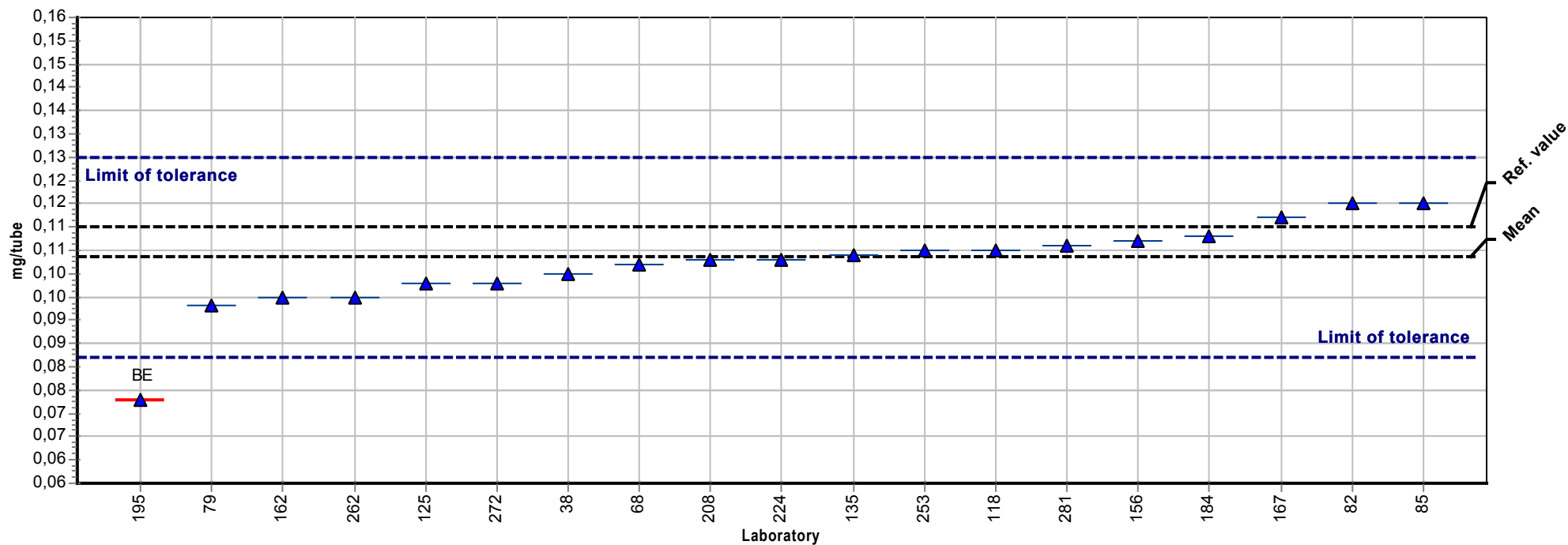
# Sample chart of Z Scores

Sample: 1



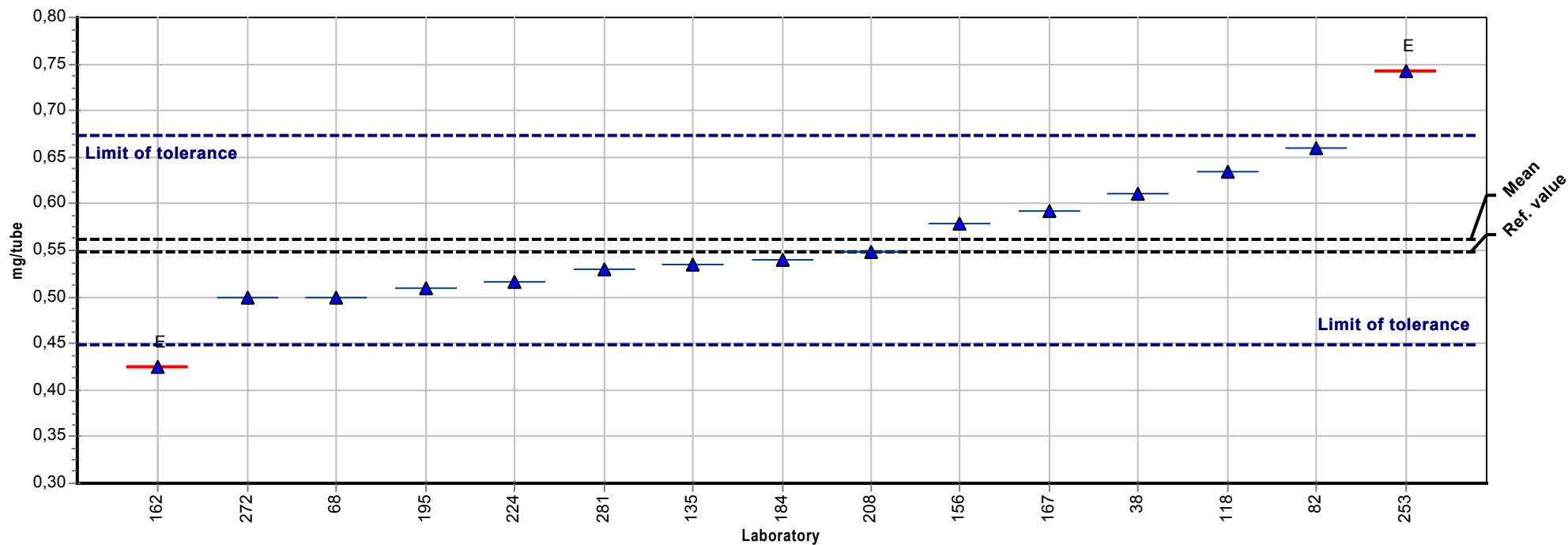
## Summary results

Measurand:	o-Xylene	Mean:	0,109 mg/tube
Sample:	2	Reproducibility s.d.:	0,006 mg/tube
Method:	ISO 5725-2	Rel. reproducibility s.d.:	5,93%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,115 mg/tube
No. of laboratories:	18	Range of tolerance:	0,087 - 0,130 mg/tube ( Z Score  <= 2,00)



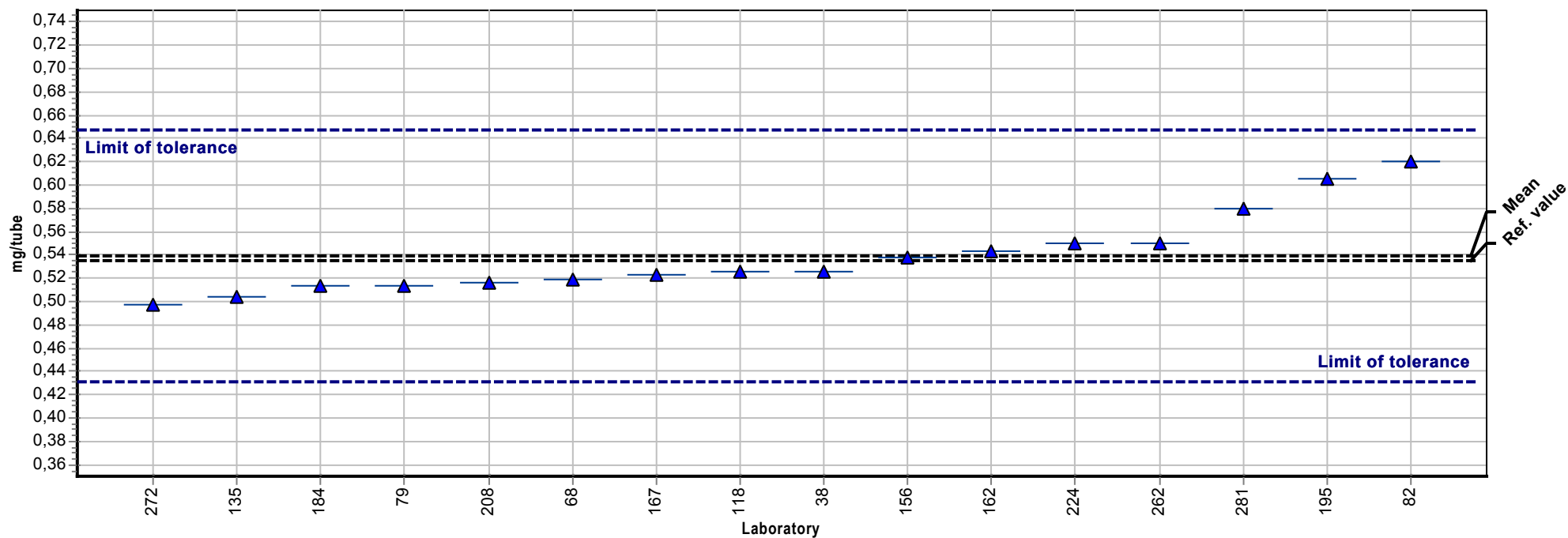
## Summary results

Measurand:	Ethyl acetate	Mean:	0,561 mg/tube
Sample:	2	Reproducibility s.d.:	0,078 mg/tube
Method:	ISO 5725-2	Rel. reproducibility s.d.:	13,88%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,548 mg/tube
No. of laboratories:	15	Range of tolerance:	0,449 - 0,674 mg/tube ( Z Score  <= 2,00)



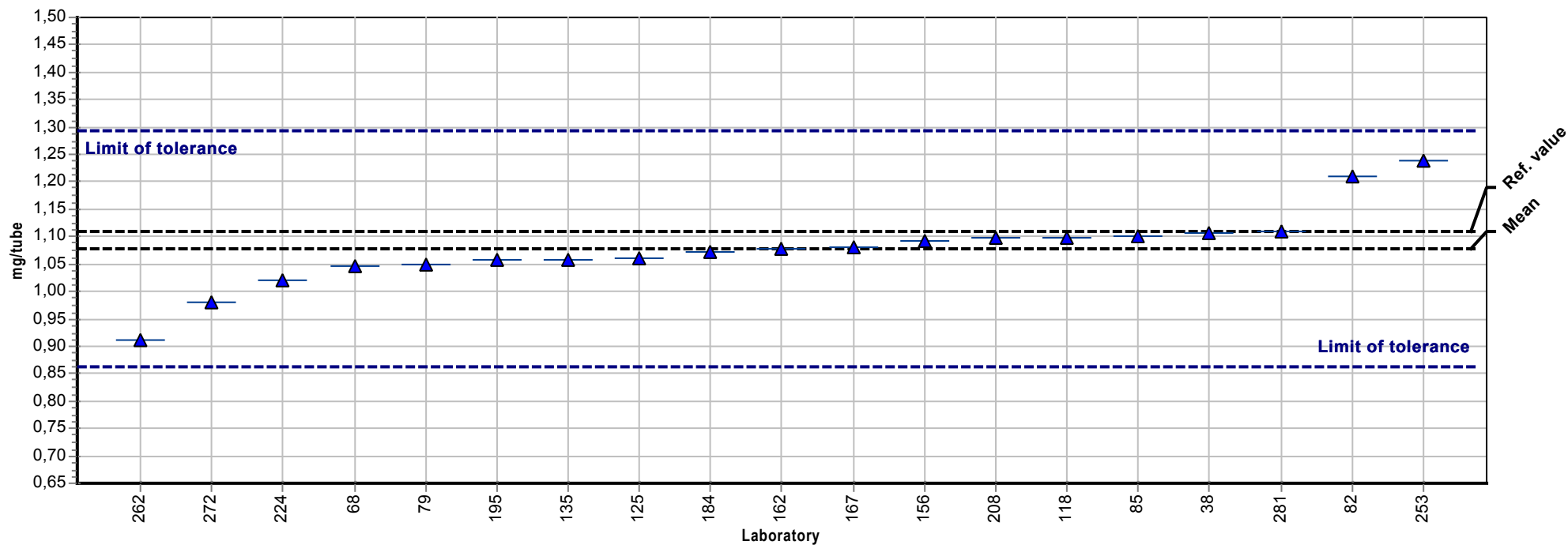
## Summary results

Measurand:	n-Heptane	Mean:	0,539 mg/tube
Sample:	2	Reproducibility s.d.:	0,035 mg/tube
Method:	ISO 5725-2	Rel. reproducibility s.d.:	6,55%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,535 mg/tube
No. of laboratories:	16	Range of tolerance:	0,431 - 0,647 mg/tube ( Z Score  <= 2,00)



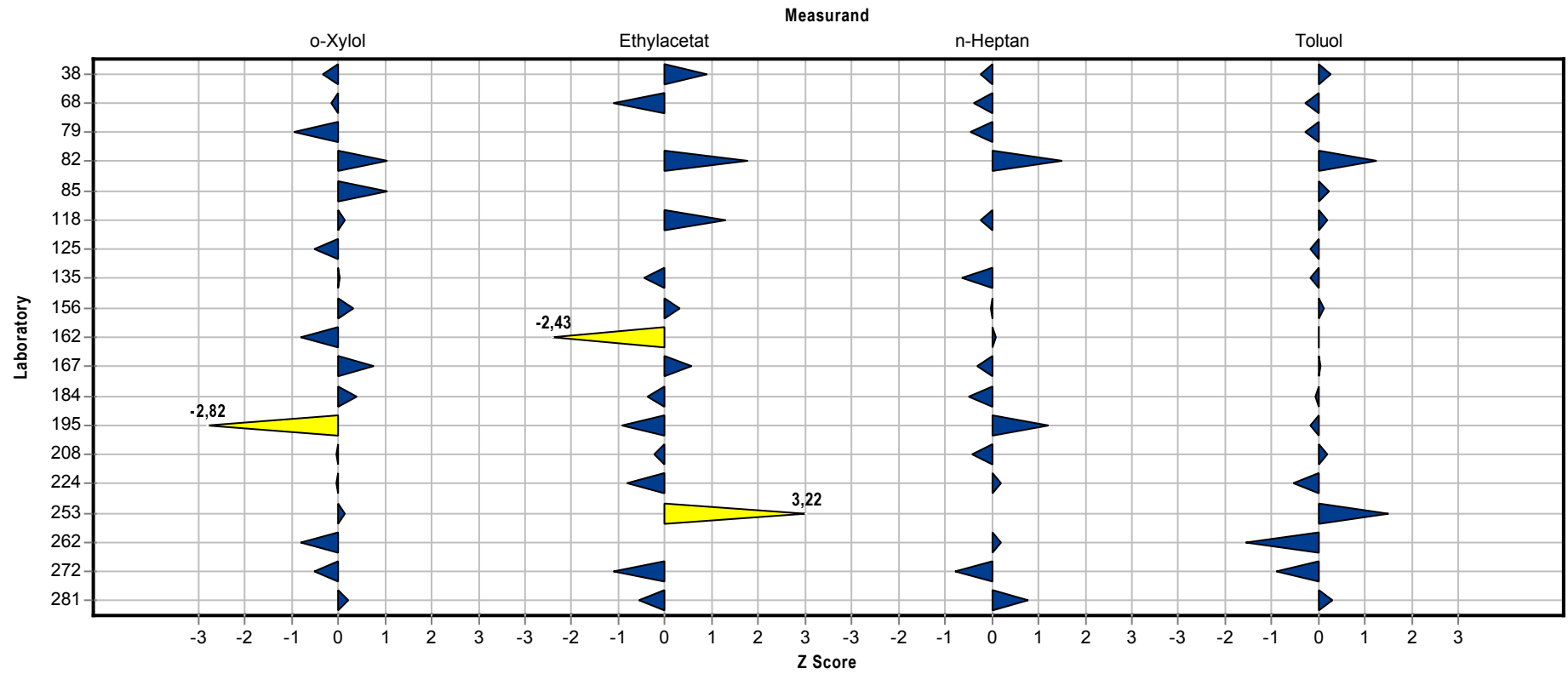
## Summary results

Measurand:	Toluene	Mean:	1,077 mg/tube
Sample:	2	Reproducibility s.d.:	0,071 mg/tube
Method:	ISO 5725-2	Rel. reproducibility s.d.:	6,60%
Rel. target s.d.:	10,00% (Limited)	Reference value:	1,109 mg/tube
No. of laboratories:	19	Range of tolerance:	0,862 - 1,293 mg/tube ( $ Z \text{ Score}  \leq 2,00$ )



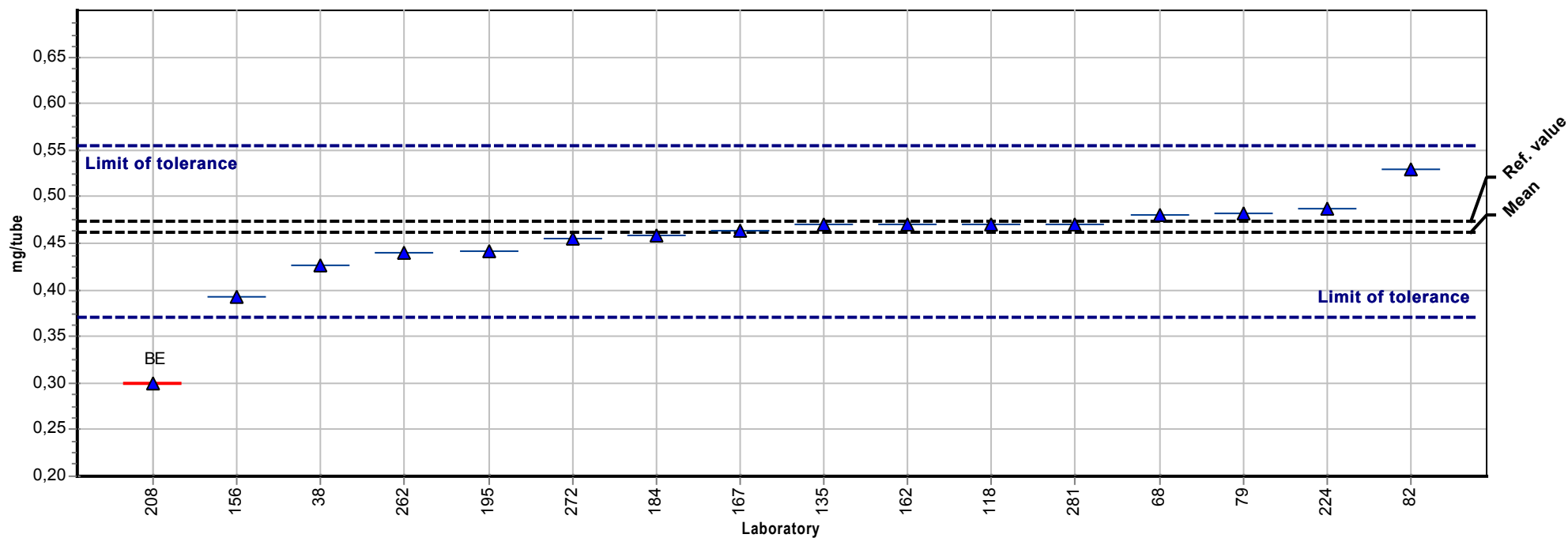
# Sample chart of Z Scores

Sample: 2



## Summary results

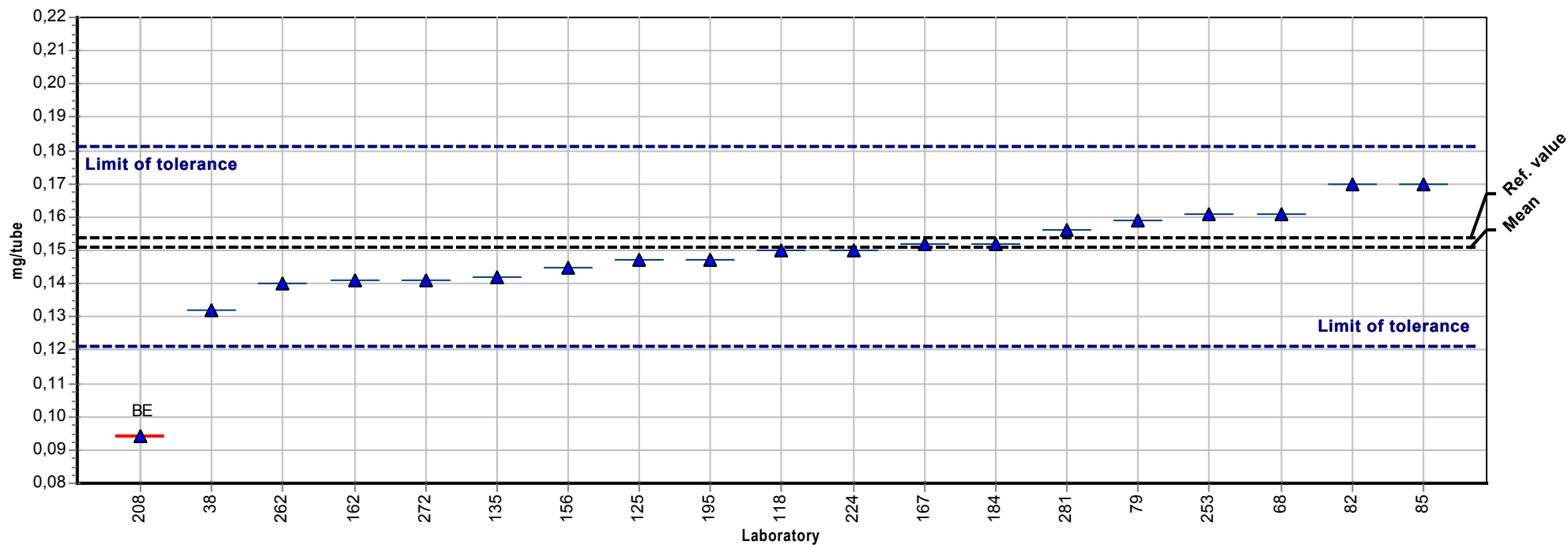
Measurand:	n-Octane	Mean:	0,463 mg/tube
Sample:	3	Reproducibility s.d.:	0,031 mg/tube
Method:	ISO 5725-2	Rel. reproducibility s.d.:	6,65%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,474 mg/tube
No. of laboratories:	15	Range of tolerance:	0,370 - 0,555 mg/tube ( Z Score  <= 2,00)





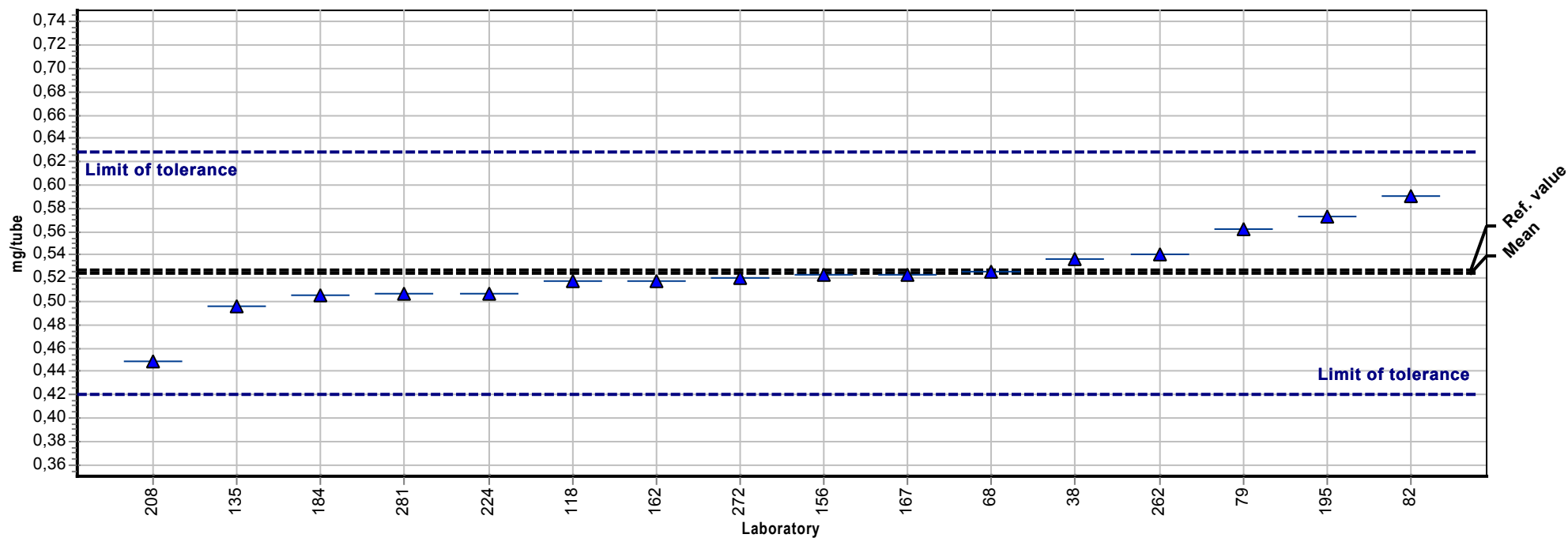
## Summary results

Measurand:	Ethylbenzene	Mean:	0,151 mg/tube
Sample:	3	Reproducibility s.d.:	0,010 mg/tube
Method:	ISO 5725-2	Rel. reproducibility s.d.:	6,91%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,154 mg/tube
No. of laboratories:	18	Range of tolerance:	0,121 - 0,181 mg/tube ( $ Z \text{ Score}  \leq 2,00$ )



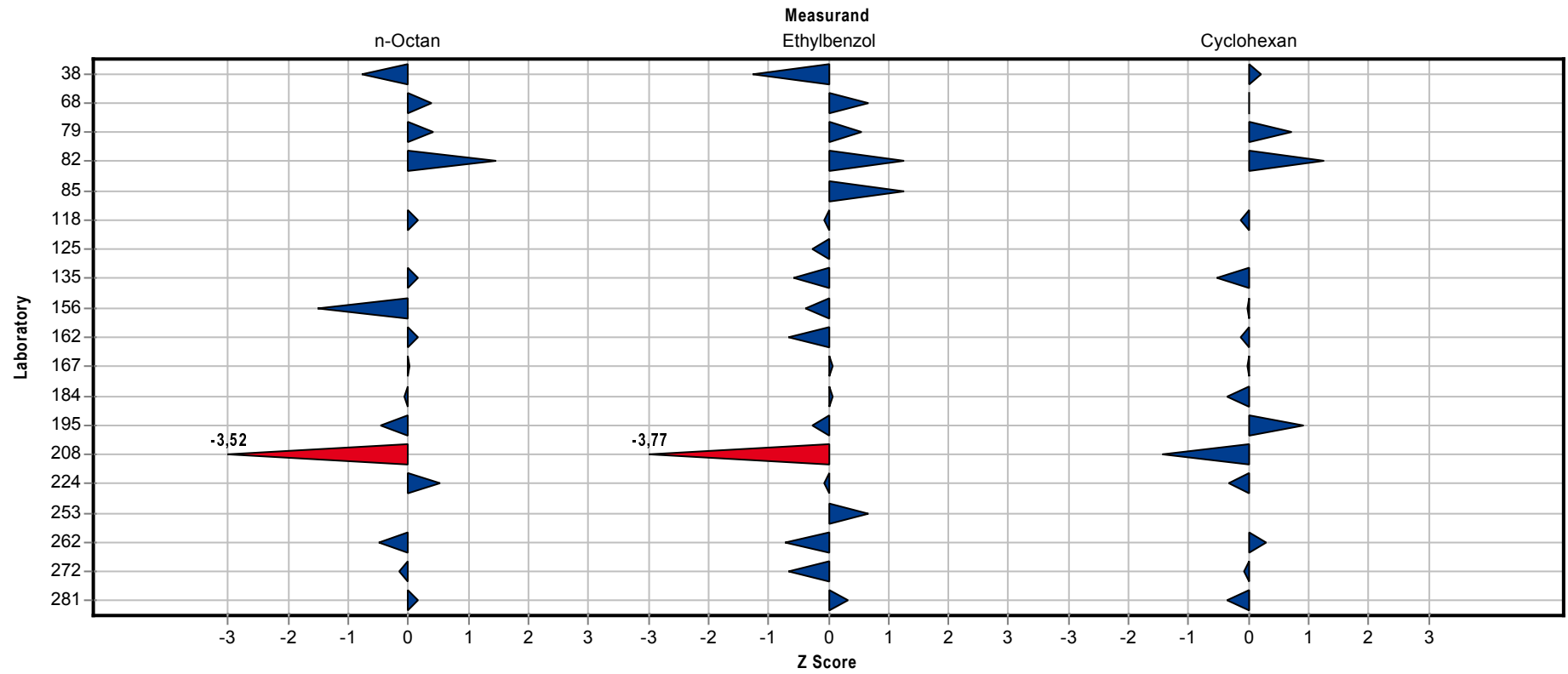
## Summary results

Measurand:	cyclohexane	Mean:	0,524 mg/tube
Sample:	3	Reproducibility s.d.:	0,033 mg/tube
Method:	ISO 5725-2	Rel. reproducibility s.d.:	6,24%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,527 mg/tube
No. of laboratories:	16	Range of tolerance:	0,420 - 0,629 mg/tube ( Z Score  <= 2,00)



# Sample chart of Z Scores

Sample: 3



## Questions and Answers

Participant	Kind of tube (NIOSH or TYP-B)	Analytical method	Desorption solution
38	Dräger Typ NIOSH	Hausmethode	Schwefelkohlenstoff + 2% Methanol
68	NIOSH	Weder DFG, noch IFA-Arbeitsmappe	CS <sub>2</sub>
79	Niosh	BIA 6265	CS <sub>2</sub>
82	NIOSH	Hausmethode, angelehnt an DFG, Nr.3	CS <sub>2</sub> /Isopropanol (80/20)
85	NIOSH	Ja	CS <sub>2</sub>
118	NIOSH	in Anlehnung an die VDI 2100 Blatt 2	CS <sub>2</sub>
125	NIOSH	NIOSH Nr. 1022	Schwefelkohlenstoff
135	Niosh	Hausmethode	Schwefelkohlenstoff
162	NIOSH	Hausmethode	Schwefelkohlenstoff
167	NIOSH	Internal	Carbondisulfide
184	Niosh	NIOSH 1501	CS <sub>2</sub>
195		Internal method	CS <sub>2</sub>
208	NIOSH	own, based on NIOSH and OSHA methods	CS <sub>2</sub>
224	NIOSH	inhouse method	Carbon Disulfide
253	NIOSH	GC/MS	CS <sub>2</sub>
272	Niosh	BIA 7732 DFG 3	Ternäres Gemisch
281	NIOSH	1500; 1501; 1457	CS <sub>2</sub>

Participant	Volume of desorption solution	Carrier gas	Injection
38	4 ml	Helium	Flüssiginjektion / Split
68	1 ml	Helium	split
79	0,5 ml	Wasserstoff	split
82	1 mL	Stickstoff	Split
85	1ml	Stickstoff	splitless
118	2mL	Stickstoff	on-column
125	1 ml	Helium	1 µl Split
135	10 ml	Helium	Split
162	1 ml	Wasserstoff	Split

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Participant	Volume of desorption solution	Carrier gas	Injection
167	1,5 mL	Helium	1,0 µL
184	5 ml	He	S/SL
195	1 mL	He	split
208	1,5 ml	helium	split 1:10
224	2 mL	He	1 µl
253	2.0 ml	Helium	Splitless
272	5 ml	Helium	split
281	1mL	He	1 and 2 uL

Participant	Analytical column	Detector	Data evaluation
38	Varian VF1-MS 60m x 0,32mm x 1µm	MSD 5975 Inert XL EI/CI	Interne Standardisierung
68	Vocol von Supelco	FID	interner Standard
79	CP Sil 5 CB	FID	interner Standard
82	Agilent HP-5 30m; 0,32 mm; 0,25 µm	FID	Interner Standard
85	DB5/ DBWax	FID	interener Standard
118	CP Sil 5 CB / CP-Wax 57 CB	FID	interner Standard
125	Varian Factor 4, 20 m * 0,15 mm ID * 0,84 µm FD	MSD	interner Standard
135	Restek RTX200; 60m; 0,25mmID; 0,5µmFD	MSD	Interner Standard
162	Varian CP Sil PONA CB 50m x 0,21 mm ID x 0,5 µm Filmdicke	FID	Interner Standard
167	Zebtron ZB-5MS	FID, 310 °C	
184	DB-624	MSD/FID	interner Standard Decan
195	élite DB-5	FID	Internal Standard
208	Agilent HP-5 (30m x 0,320mm x 1,00µm), Agilent HP-innow ax (30m x 0,320 mm x 0,50µm)	GC-FID	external standard
224	BPX5	MS	internal standard
253	ZB-1, 30m x 0.25 mm x 1.0 µm	Mass spectrometer	ChemStation
272	DB 5	FID	externer Standard
281	HP-1, HP-5; HP-INNOWAX	FID	

Participant	Recovery rate	Date of analysis
38	Flüssigdotierungen auf Dräger Typ NIOSH	21.-23./25.03.13
68	Nein	11.3.2013

Ring test Organic solvents NIOSH 2013

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Participant	Recovery rate	Date of analysis
79		11.KW 2013
82	nein	18.03.2013
85	ja	19.03.2013
118		
125	95-99%	11.03.2013
135	kalibriert	05.03.2013
162	ja	23.02.2013
167		
184	90-120 %	27.02.2013
195	>90% not applied	1/3/13
208	no	19.2.2013
224	no	12/3/2013
253	80-100 %	6 April
272	nein	08.03.13
281		