

Summary of laboratory means

Sample sample 1

Laboratory	i-Butyl acetate	Z score	n-Butyl acetate	Z score	o-Xylene	Z score
Measurement unit	mg/tube		mg/tube		mg/tube	
–	–	--	–	--	–	--
34	0,365	0,475	0,072	0,805	0,074	0,002
38	0,331	-0,698	0,060	-0,961	0,068	-0,857
68	0,363	0,422	0,066	-0,024	0,076	0,363
79					0,073	-0,174
82	0,386	1,207	0,076	1,406	0,077	0,461
85					0,074	-0,052
118	0,370	0,647	0,072	0,918	0,081	1,056
125					0,085	1,584
131	0,362	0,376	0,069	0,420	0,081	1,047
135	0,332	-0,656	0,062	-0,582	0,070	-0,546
137						
162	0,335	-0,548	0,061	-0,714	0,070	-0,564
197	0,300	-1,784	0,057	-1,306	0,059	-2,224 E
202	0,403	1,782	0,077	1,589	0,081	0,988
224	0,361	0,324	0,064	-0,320	0,075	0,095
272	0,516	5,699 BE	0,095	4,266 BE	0,103	4,269 BE
281					0,078	0,578
–	–	--	–	--	–	--
Method	ISO 5725		ISO 5725		ISO 5725	
Assessment	Z <=2,000		Z <=2,000		Z <=2,000	
Mean	0,351		0,066		0,074	
Reference value	0,364		0,071		0,081	
Reproducibility s.d.	0,029		0,007		0,007	
Rel. reproducibility s.d.	8,22 %		10,22 %		9,25 %	

RRT organic solvents NIOSH 2011

Laboratory	i-Butyl acetate	Z score	n-Butyl acetate	Z score	o-Xylene	Z score
Lower limit of tolerance	0,293		0,053		0,060	
Upper limit of tolerance	0,409		0,080		0,088	
Lower confidence limit	0,334		0,062		0,070	
Upper confidence limit	0,368		0,070		0,077	
Type B outliers	1		1		1	
No. of laboratories after elimination of outliers type A-D (without laboratories that only gave states but no measured values)	11		11		15	

Explanation

A: Single outlier

B: Differing laboratory mean

C: exc. lab-s.d.

D: changed manually

E: |Score|>Tol.

Summary of laboratory means

Sample sample 2

Laboratory	Ethyl acetate	Z score	n-Heptane	Z score	Toluene	Z score	m-Xylene	Z score
Measurement unit	mg/tube		mg/tube		mg/tube		mg/tube	
–	–	--	–	--	–	--	–	--
34	0,323	0,943	0,437	1,083	0,431	0,715	0,136	1,108
38	0,276	-0,301	0,384	-0,925	0,387	-0,875	0,115	-0,935
68	0,275	-0,318	0,409	0,037	0,406	-0,201	0,123	-0,109
79			0,364	-1,719	0,379	-1,164	0,109	-1,475
82	0,264	-0,628	0,423	0,575	0,421	0,340	0,130	0,527
85					0,421	0,352	0,131	0,622
118	0,288	0,009	0,419	0,421	0,444	1,178	0,134	0,930
125					0,430	0,665	0,138	1,289
131	0,295	0,204	0,419	0,408	0,428	0,605	0,129	0,431
135	0,275	-0,332	0,390	-0,725	0,395	-0,591	0,118	-0,589
137								
162	0,243	-1,187	0,412	0,126	0,396	-0,562	0,121	-0,299
197	0,247	-1,063	0,396	-0,463	0,364	-1,706	0,107	-1,665
202	0,331	1,159	0,465	2,177 E	0,469	2,067 E	0,134	0,870
224	0,298	0,284	0,422	0,505	0,444	1,165	0,125	0,002
272	0,369	2,180 E	0,534	4,844 BE	0,532	4,372 BE	0,173	4,656 BE
281	0,293	0,158	0,439	1,173	0,436	0,897	0,136	1,107
–	–	--	–	--	–	--	–	--
Method	ISO 5725		ISO 5725		ISO 5725		ISO 5725	
Assessment	Z <=2,000		Z <=2,000		Z <=2,000		Z <=2,000	
Mean	0,287		0,408		0,411		0,124	
Reference value	0,290		0,421		0,418		0,130	
Reproducibility s.d.	0,038		0,026		0,028		0,010	
Rel. reproducibility s.d.	13,09 %		6,37 %		6,74 %		8,43 %	

Ringversuch organic solvents NIOSH

Laboratory	Ethyl acetate	Z score	n-Heptane	Z score	Toluene	Z score	m-Xylene	Z score
Lower limit of tolerance	0,212		0,356		0,356		0,104	
Upper limit of tolerance	0,363		0,460		0,467		0,146	
Lower confidence limit	0,267		0,395		0,397		0,119	
Upper confidence limit	0,308		0,422		0,425		0,130	
Type B outliers	0		1		1		1	
No. of laboratories after elimination of outliers type A-D (without laboratories that only gave states but no measured values)	13		13		15		15	

Explanation

A: Single outlier

B: Differing laboratory mean

C: exc. lab-s.d.

D: changed manually

E: |Score|>Tol.

Summary of laboratory means

Sample sample 3

Laboratory	n-Heptane	Z score	n-Hexane	Z score	n-Octane	Z score
Measurement unit	mg/tube		mg/tube		mg/tube	
–	–	--	–	--	–	--
34	0,660	12,065 BE	0,402	-2,208 E	0,401	1,759
38	0,343	-1,271	0,604	-0,367	0,298	-1,899
68	0,374	0,005	0,649	0,050	0,358	0,252
79	0,351	-0,935	0,602	-0,379	0,345	-0,235
82	0,373	-0,037	0,655	0,099	0,349	-0,081
85			0,704	0,545		
118	0,381	0,329	0,644	0,001	0,358	0,240
125						
131	0,383	0,398	0,665	0,193	0,360	0,311
135	0,347	-1,107	0,669	0,231	0,324	-0,971
137						
162	0,376	0,089	0,652	0,075	0,357	0,204
197	0,411	1,576	0,551	-0,845	0,349	-0,069
202	0,429	2,312 E	0,764	1,094	0,388	1,316
224	0,378	0,187	0,694	0,463	0,345	-0,241
272	0,534	6,765 BE	0,880	2,155 E	0,497	5,206 BE
281	0,397	0,970	0,673	0,264	0,387	1,256
–	–	--	–	--	–	--
Method	ISO 5725		ISO 5725		ISO 5725	
Assessment	Z <=2,000		Z <=2,000		Z <=2,000	
Mean	0,374		0,644		0,351	
Reference value	0,373		0,648		0,365	
Reproducibility s.d.	0,024		0,109		0,028	
Rel. reproducibility s.d.	6,36 %		16,99 %		7,99 %	

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Laboratory	n-Heptane	Z score	n-Hexane	Z score	n-Octane	Z score
Lower limit of tolerance	0,326		0,425		0,295	
Upper limit of tolerance	0,421		0,863		0,407	
Lower confidence limit	0,360		0,587		0,336	
Upper confidence limit	0,387		0,700		0,366	
Type B outliers	2		0		1	
No. of laboratories after elimination of outliers type A-D (without laboratories that only gave states but no measured values)	12		15		13	

Explanation

A: Single outlier

B: Differing laboratory mean

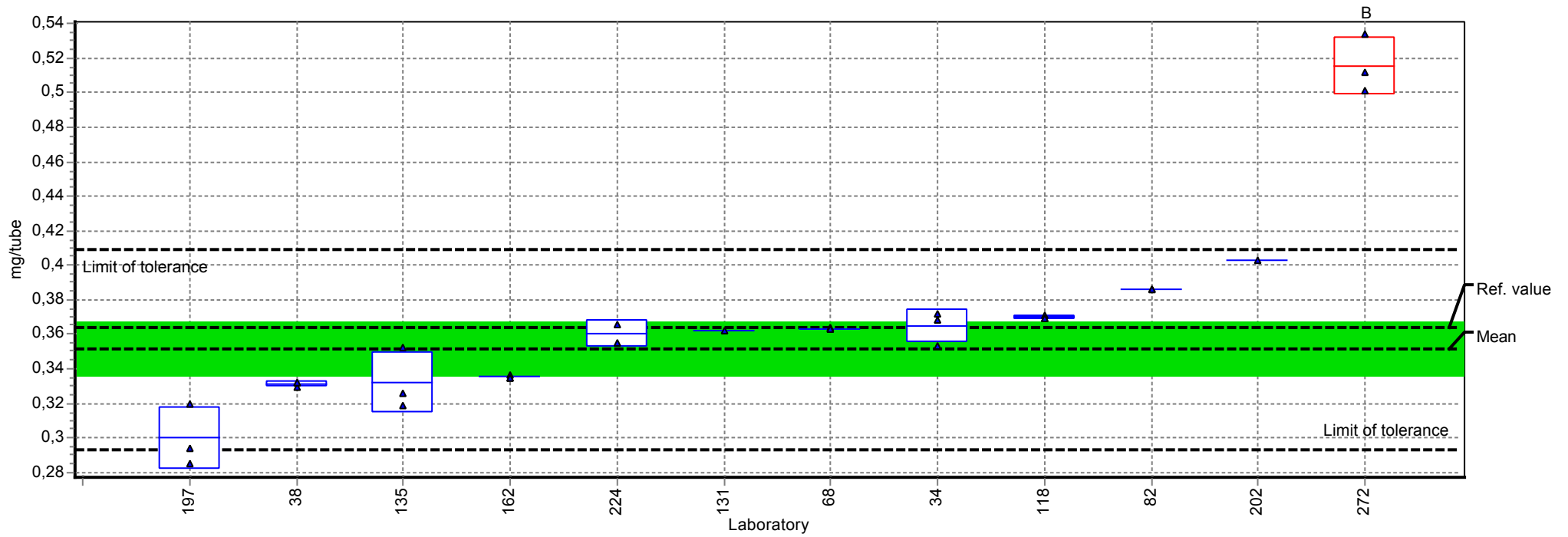
C: exc. lab-s.d.

D: changed manually

E: |Score|>Tol.

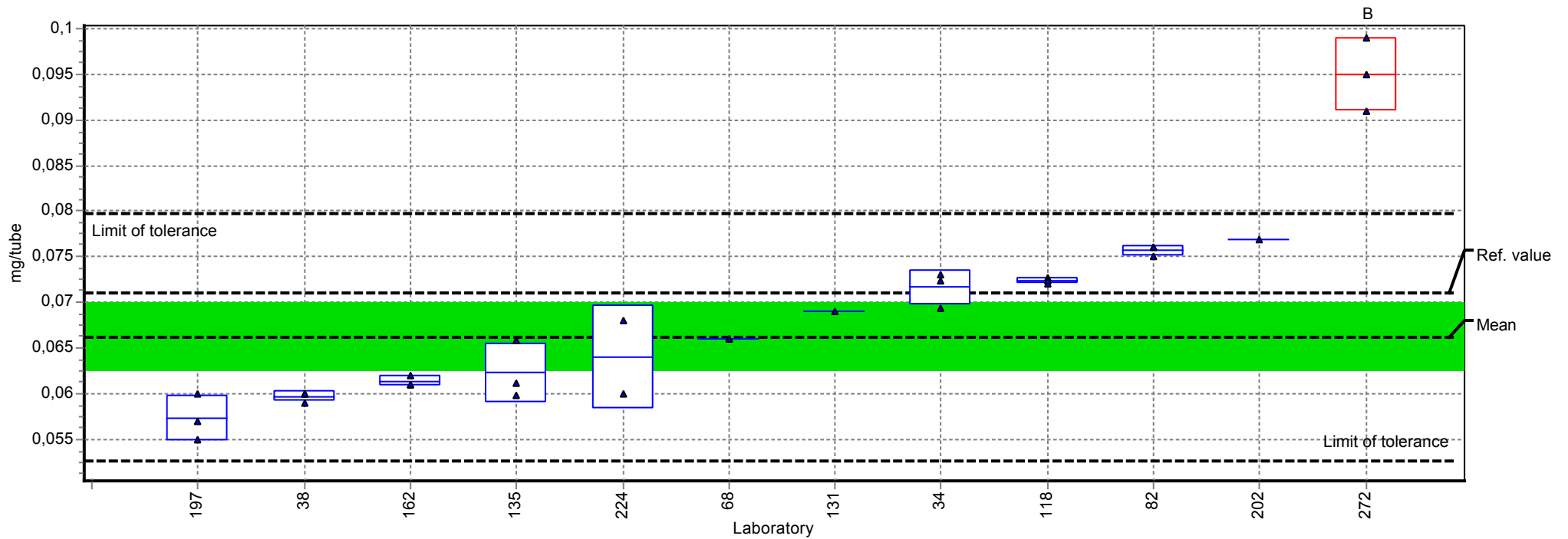
Summary results

Sample: sample 1 Mean: 0,351 mg/tube
Measurand: i-Butyl acetate Reproducibility s.d.: 0,029 mg/tube
Method: ISO 5725 Rel. reproducibility s.d.: 8,22%
No. of laboratories: 11 Tolerance limits: 0,293 - 0,409 mg/tube ($|Z \text{ score}| < 2,00$)



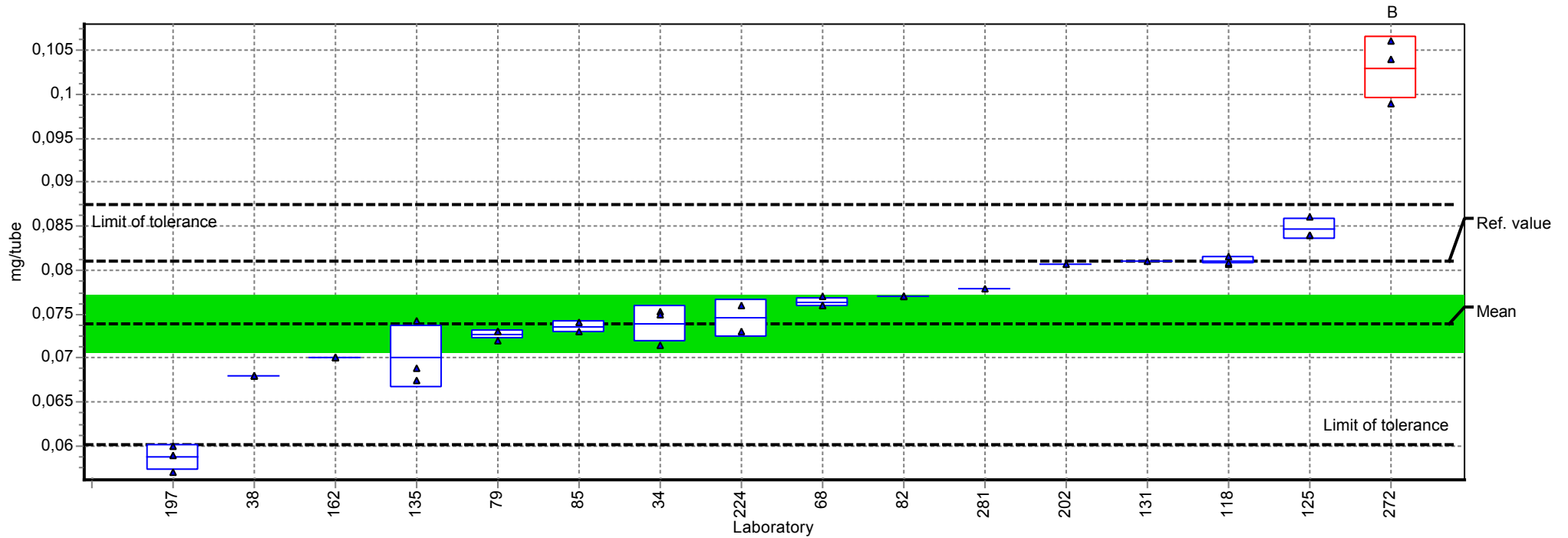
Summary results

Sample: sample 1 Mean: 0,066 mg/tube
Measurand: n-Butyl acetate Reproducibility s.d.: 0,007 mg/tube
Method: ISO 5725 Rel. reproducibility s.d.: 10,22%
No. of laboratories: 11 Tolerance limits: 0,053 - 0,080 mg/tube (|Z score| < 2,00)



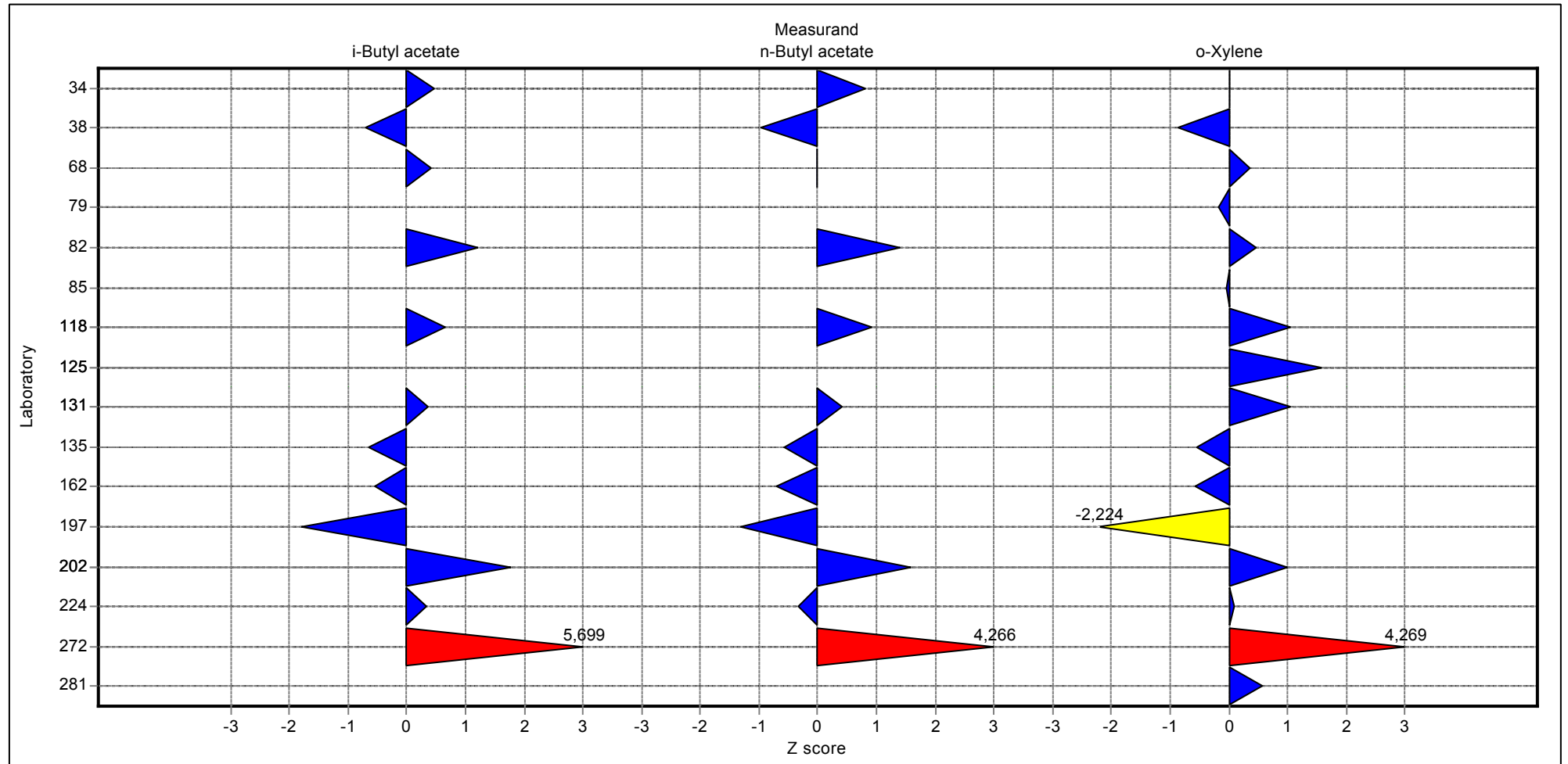
Summary results

Sample: sample 1 Mean: 0,074 mg/tube
Measurand: o-Xylene Reproducibility s.d.: 0,007 mg/tube
Method: ISO 5725 Rel. reproducibility s.d.: 9,25%
No. of laboratories: 15 Tolerance limits: 0,060 - 0,088 mg/tube ($|Z \text{ score}| < 2,00$)



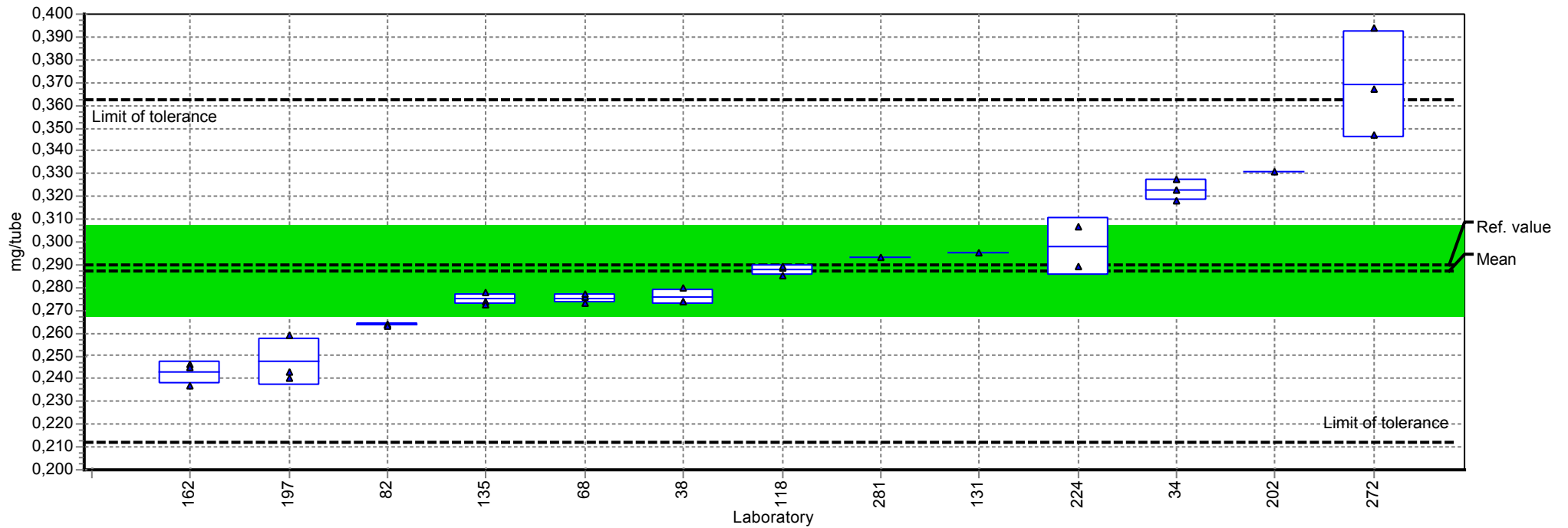
Sample chart of Z scores

Sample: sample 1



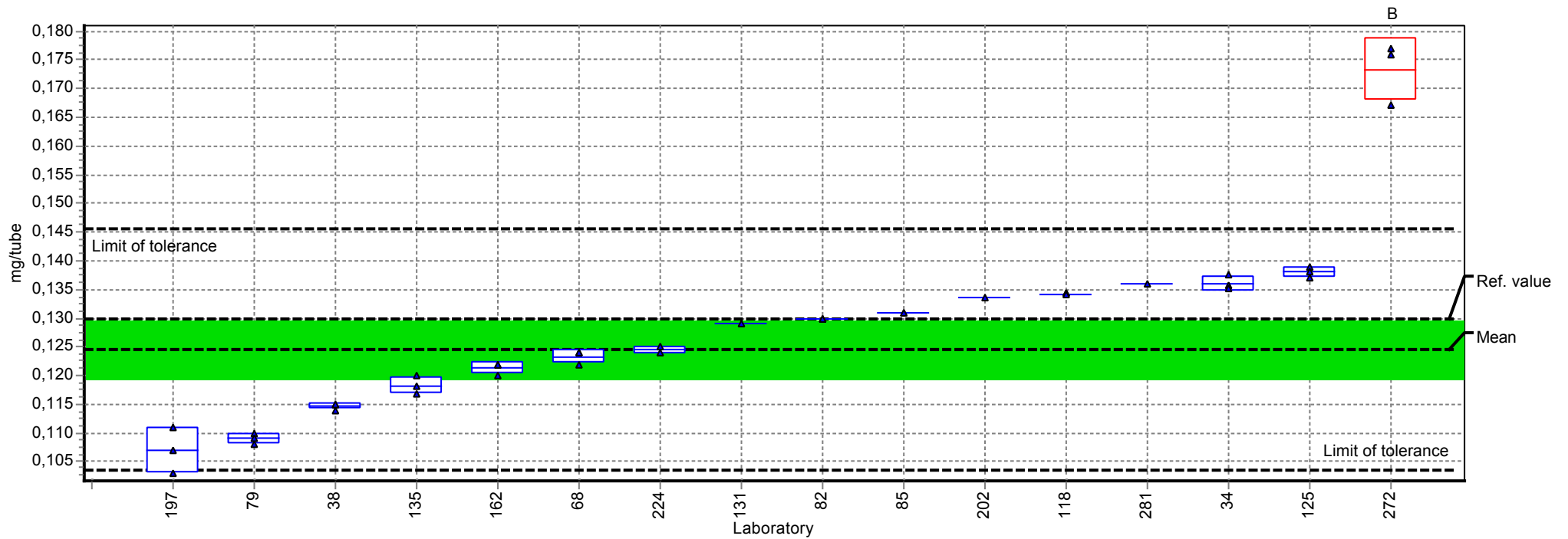
Summary results

Sample: sample 2 Mean: 0,287 mg/tube
Measurand: Ethyl acetate Reproducibility s.d.: 0,038 mg/tube
Method: ISO 5725 Rel. reproducibility s.d.: 13,09%
No. of laboratories: 13 Tolerance limits: 0,212 - 0,363 mg/tube ($|Z \text{ score}| < 2,00$)



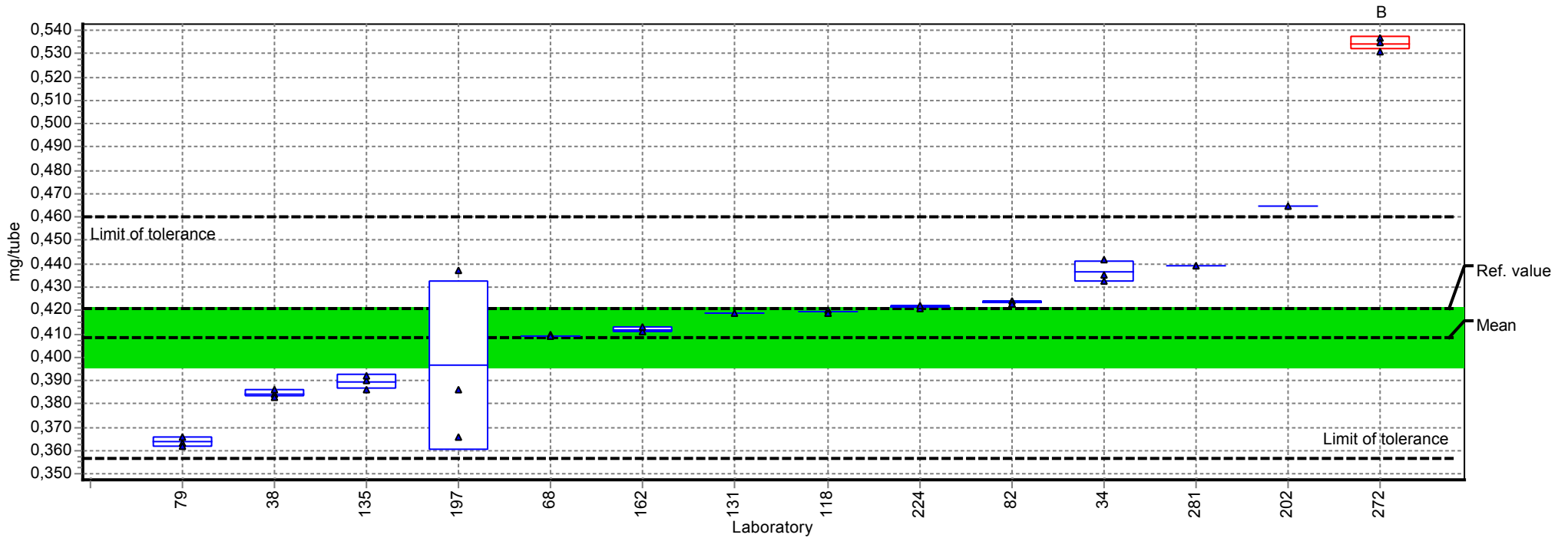
Summary results

Sample: sample 2 Mean: 0,124 mg/tube
Measurand: m-Xylene Reproducibility s.d.: 0,010 mg/tube
Method: ISO 5725 Rel. reproducibility s.d.: 8,43%
No. of laboratories: 15 Tolerance limits: 0,104 - 0,146 mg/tube (|Z score| < 2,00)



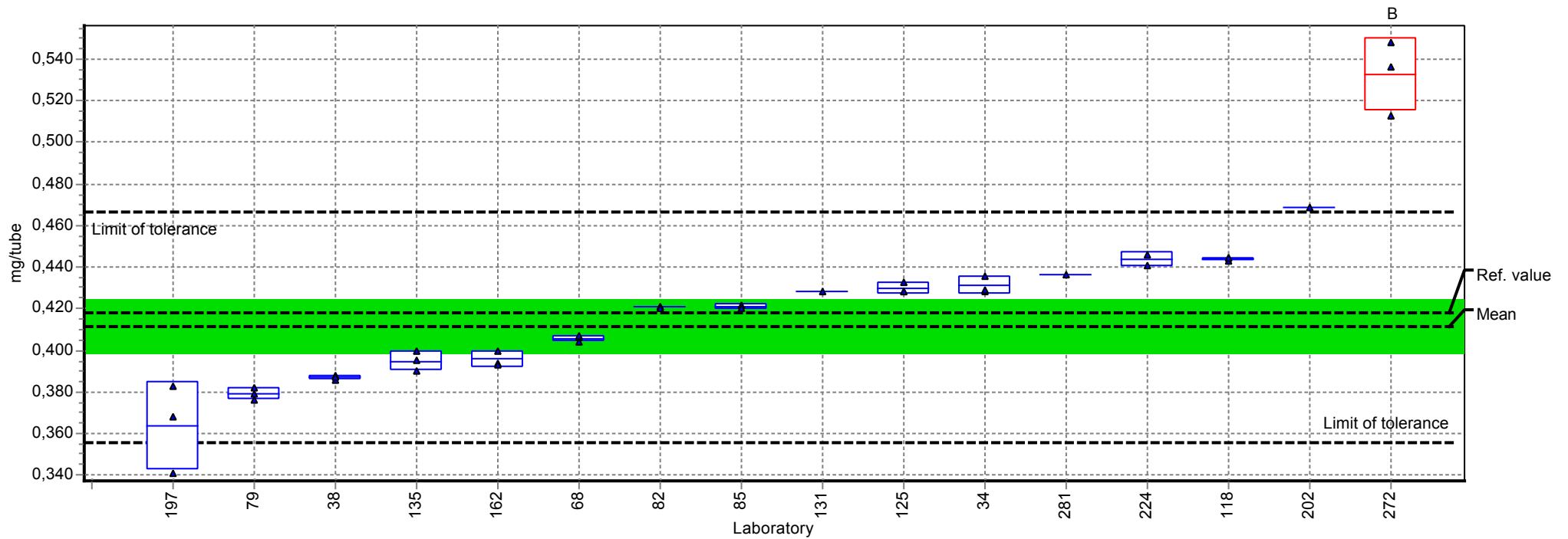
Summary results

Sample: sample 2 Mean: 0,408 mg/tube
Measurand: n-Heptane Reproducibility s.d.: 0,026 mg/tube
Method: ISO 5725 Rel. reproducibility s.d.: 6,37%
No. of laboratories: 13 Tolerance limits: 0,356 - 0,460 mg/tube ($|Z \text{ score}| < 2,00$)



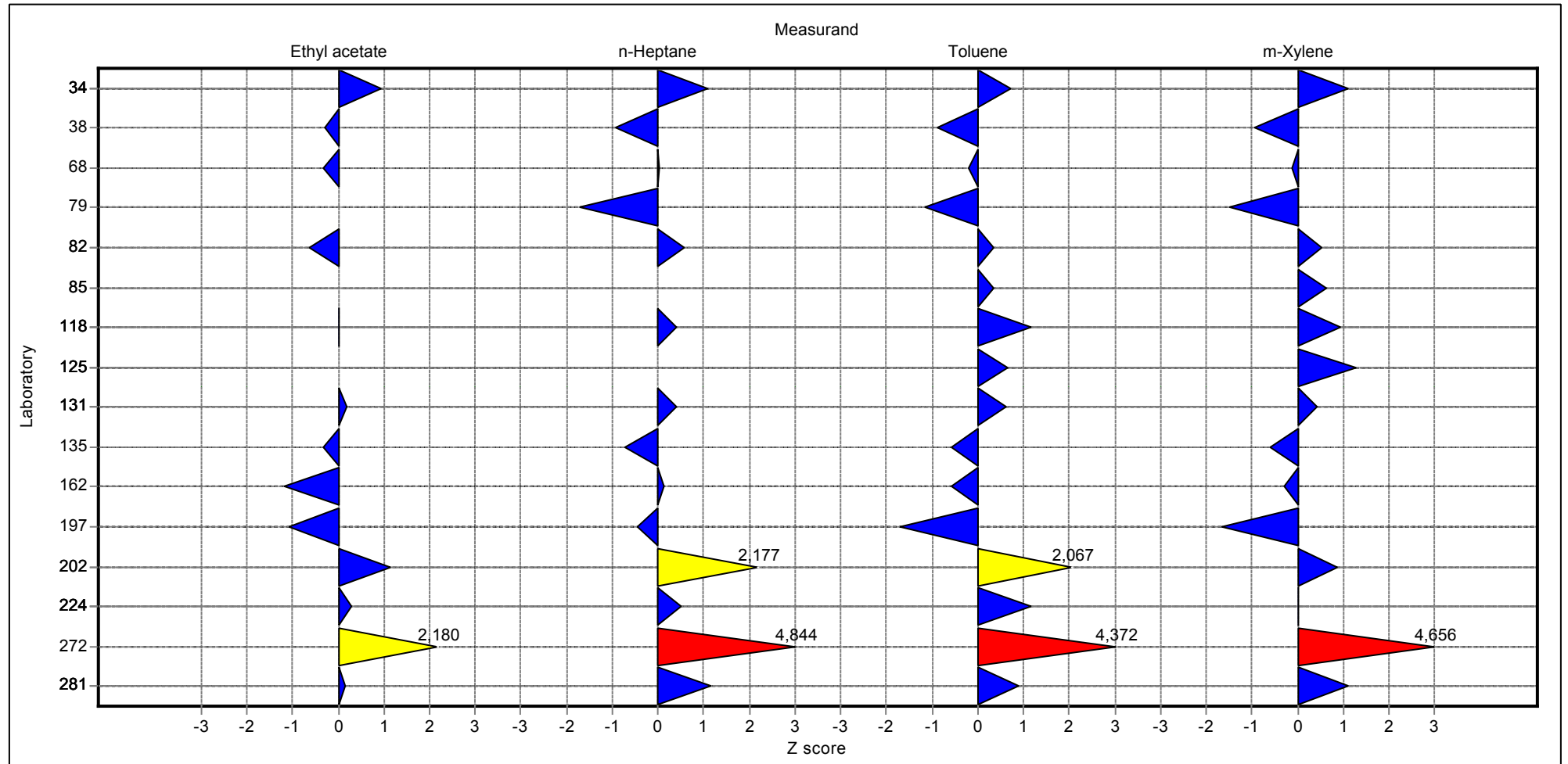
Summary results

Sample: sample 2 Mean: 0,411 mg/tube
Measurand: Toluene Reproducibility s.d.: 0,028 mg/tube
Method: ISO 5725 Rel. reproducibility s.d.: 6,74%
No. of laboratories: 15 Tolerance limits: 0,356 - 0,467 mg/tube ($|Z \text{ score}| < 2,00$)



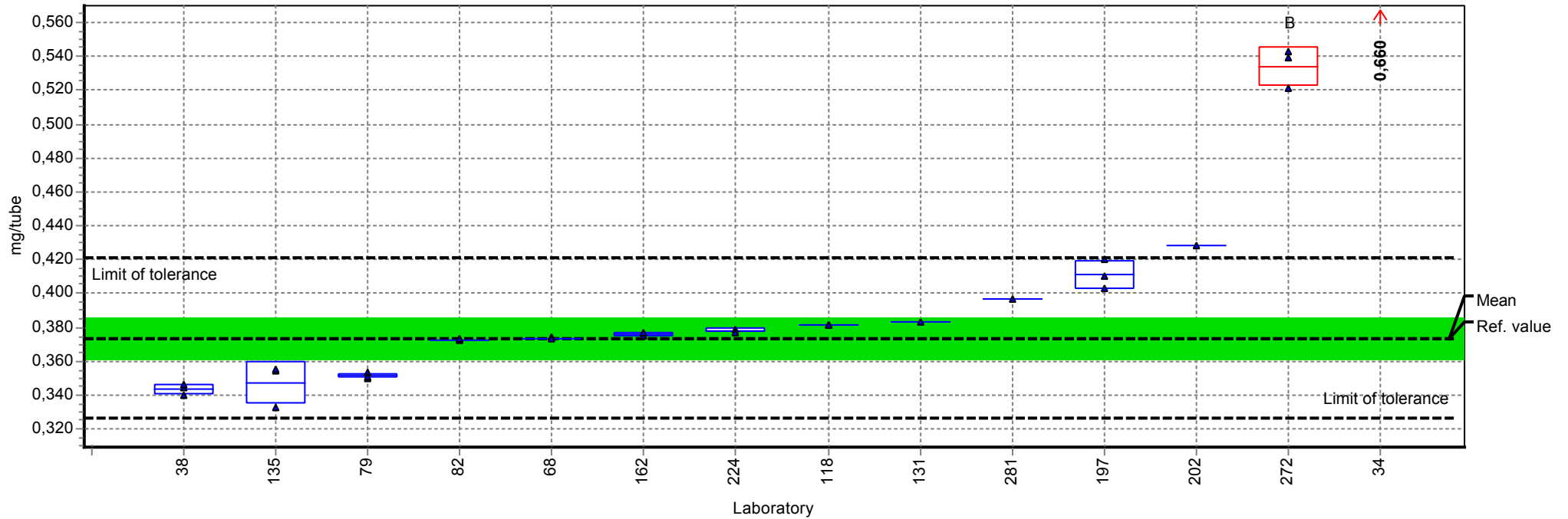
Sample chart of Z scores

Sample: sample 2



Summary results

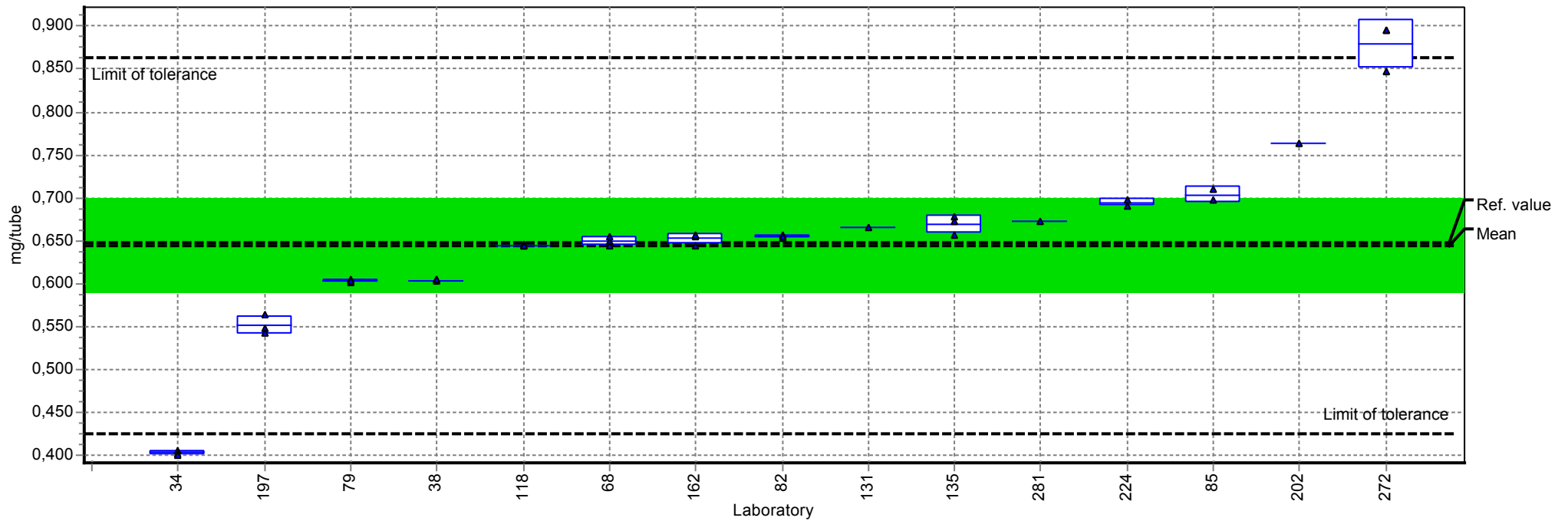
Sample: sample 3 Mean: 0,374 mg/tube
Measurand: n-Heptane Reproducibility s.d.: 0,024 mg/tube
Method: ISO 5725 Rel. reproducibility s.d.: 6,36%
No. of laboratories: 12 Tolerance limits: 0,326 - 0,421 mg/tube ($|Z \text{ score}| < 2,00$)



Summary results

Sample: sample 3
Measurand: n-Hexane
Method: ISO 5725
No. of laboratories: 15

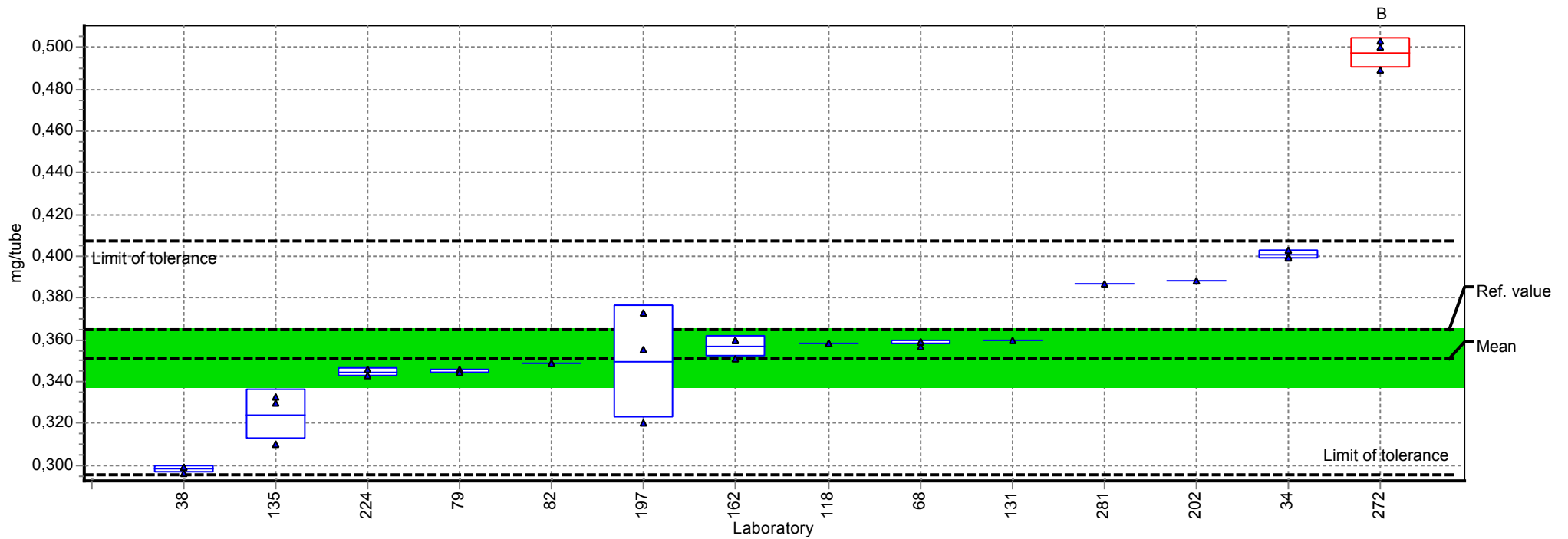
Mean: 0,644 mg/tube
Reproducibility s.d.: 0,109 mg/tube
Rel. reproducibility s.d.: 16,99%
Tolerance limits: 0,425 - 0,863 mg/tube ($|Z \text{ score}| < 2,00$)



Summary results

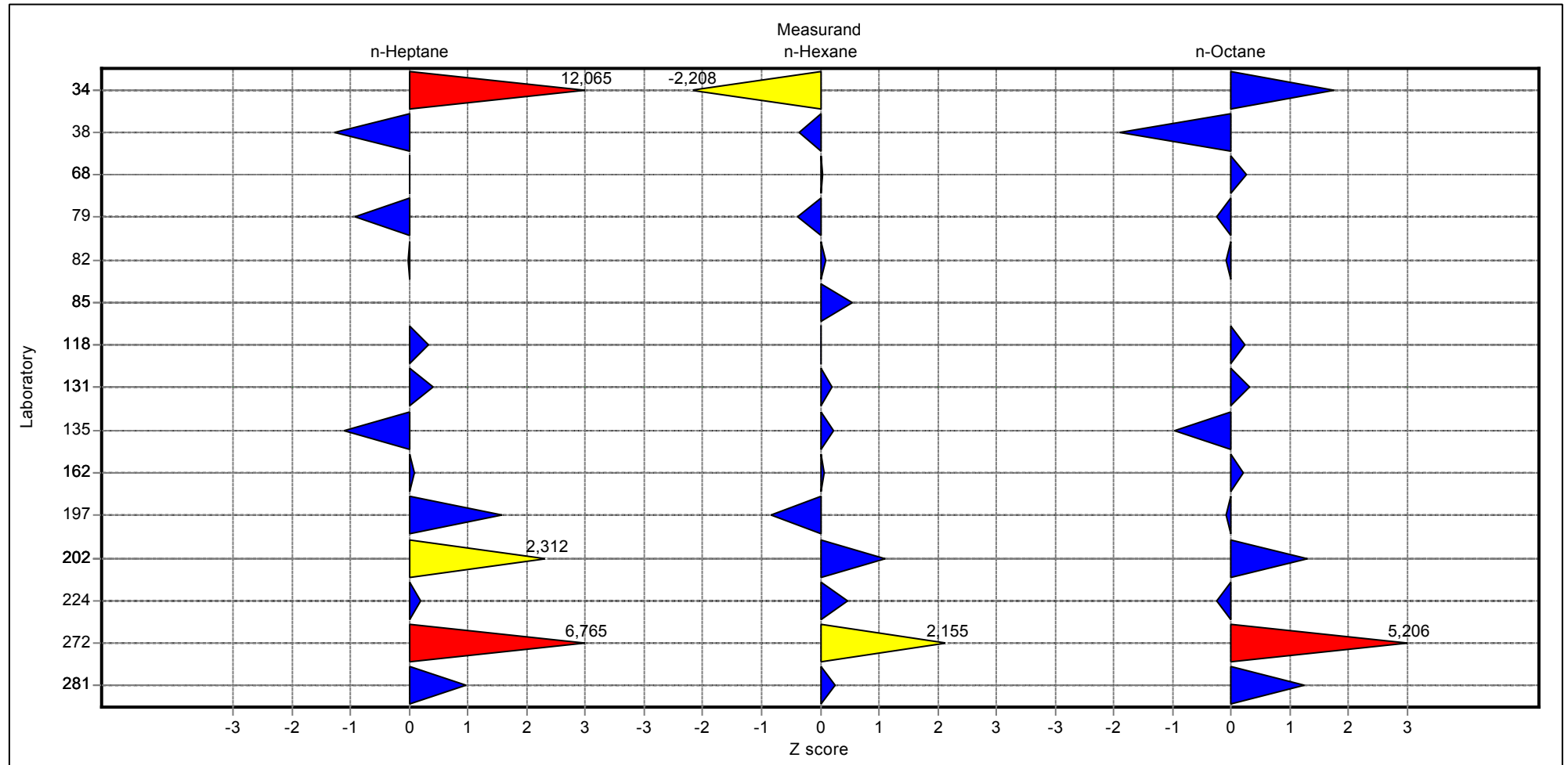
Sample: sample 3
Measurand: n-Octane
Method: ISO 5725
No. of laboratories: 13

Mean: 0,351 mg/tube
Reproducibility s.d.: 0,028 mg/tube
Rel. reproducibility s.d.: 7,99%
Tolerance limits: 0,295 - 0,407 mg/tube ($|Z \text{ score}| < 2,00$)



Sample chart of Z scores

Sample: sample 3



Questions and Answers

Participant	kind of tube (NIOSH or TYPE B)	Angaben zur analytischen Metho	solvent	volume
34	NIOSH Aktivkohle	Hausmethode	Schwefelkohlenstoff	1ml
38	Dräger Typ NIOSH	Nein, VDI 2100 Blatt 2	Schwefelkohlenstoff 2 + 2% Methanol	10 ml
68	NIOSH	Nein	CS2	1
79	NIOSH	BIA 6265	CS2	0,5 ml
82	NIOSH	Ja	Schwefelkohlenstoff/Isopropanol (8:2)	2 mL
85	NIOSH	Ja	CS2	1ml
118	NIOSH	in Anlehnung an VDI 2100 Blatt 2	CS2	2 ml
125	NIOSH		Schwefelkohlenstoff	2 ml
131	NIOSH	own, based on NIOSH and OSHA methods	carbon disulfide	1,5 ml
135	Niosh	Nein	Schwefelkohlenstoff/i-Propanol (100/1)	10
162	NIOSH	Nein	Kohlenstoffdisulfid	1
197	NIOSH	analog NIOSH mittels GCMS	CS2	10
224	NIOSH	ECO/AV/IAC/027	CS2	2 ml
272	Niosh	ja	Tenäres Gemisch	5 ml

Participant	carrier gas	injection	autosampler	kind of injection (solvent, he
34	He	split	ja	Lösung
38	Helium	Split	Ja	Flüssiginjektion
68	Sonstiges	split	Ja	Lösung
79	Wasserstoff	split	nein	Lösung
82	Helium	split	Ja	Lösung
85	Stickstoff	on column	Ja	Lösung
118	Stickstoff	on column	ja	Lösung
125	Helium	Split, 2 µl	Ja	Lösung
131	helium	split 1:10	yes	solvent
135	Helium	splitlos	ja	Lösung

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Participant	carrier gas	injection	autosampler	kind of injection (solvent, he
162	Wasserstoff	split	Ja	Lösung
197	Helium	split, splitlos	ja	Lösung
224	He	split	yes	
272	Helium	split	ja	Lösung

Participant	analytical column	detector	data evaluation
34	ZB-5 30 m 0,25mm df 0,50µm	FID	externer Standard
38	Varian VF1-MS 60m x 0,32mm x 1µm	MSD 5975C	Interne Standardisierung
68	Vocol von Supelco	FID	interner Standard
79	CP Sil 5 CB	FID	interner Standard
82	HP-5 30 m x 0,32 mm x 0,25 µm	FID	Interner Standard
85	DB5 - DB Wax	FID	interner Standard
118	CP-Wax 57 CB / CP Sil 5 CB	FID	interner Standard
125	Varian factor Four 624-ms 20m x 0,15 mm ID DF=0,84 µm	MS	interner Standard
131	Agilent HP-5 (30m x 0.320mm x 1.00µm), Agilent HP-INNOWAX (30m x 0.320mm x 0.50µm)	GC-FID	external standard
135	Restek RTX200; 60 m; 0,32 mm ID; 1,0 µm FD	FID	externer Standard
162	J&W Scientific PONA 19091S-001E; 50m x 0.2 mm x 0.5 µm	FID	interner Standard
197	HP 19091R-306 Agilent	MS 5975C Agilent	externer Std
224			
272	DB 5 ZB624	FID	externer Standard

Participant	date of analysis
34	11.03.2011
38	16. - 23.03.2011
68	25.3.2011
79	12. KW 2011
82	03.03.2011
85	14.03.2011
118	05.+06.04.2011
125	04.03.2011
131	23.03.2011
135	11.03.2011

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Participant	date of analysis
162	10.03.2011
197	30.3.2011
224	
272	23.03.11

Participant	comments
34	
38	keine
68	keine
79	keine
82	Während der Bearbeitung des Ringversuchs traten gerätetechnische Störungen auf, w eshalb ein Servicetechniker der Firma Agilent Teile der Detektor-Elektronik tauschte.
85	Es konnten nur zw ei Analysen pro Bestimmung ausgeführt w erden
118	
125	
131	-
135	
162	
197	
224	
272	