

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

Proficiency testing scheme: Aldehydes

November 2021

Summary of laboratory test results

Sample 1

Laboratory	Acetaldehyde	Z score	Formaldehyde	Z score	Propionaldehyde	Z score
Unit	mg/m ³		mg/m ³		mg/m ³	
13	0,37	0,32	0,164	0,29	0,51	-0,34
21	0,34	-0,58	0,167	0,48	0,53	-0,02
25	0,39	0,83	0,159	-0,01	0,58	0,96
29	0,36	0,15	0,160	0,04	0,56	0,59
37	0,34	-0,44	0,140	-1,21	0,51	-0,41
42	0,39	0,94	0,165	0,36	0,58	0,96
45	0,41	1,59	0,185	1,59	0,69	2,93 E
46	0,29	-1,85	0,130	-1,84	0,44	-1,73
48			0,161	0,11		
50	0,28	-2,07 E	0,163	0,23	0,49	-0,71
51	0,35	-0,16	0,150	-0,58	0,56	0,53
52	0,40	1,19	0,182	1,42	0,52	-0,22
53	0,37	0,32	0,161	0,11	0,53	-0,11
56	0,35	-0,16	0,150	-0,58	0,50	-0,60
58	0,37	0,40	0,164	0,29	0,52	-0,22
62	0,33	-0,72	0,143	-1,02	0,46	-1,37
67	0,33	-0,72	0,136	-1,46	0,48	-0,97
68	0,32	-1,00	0,130	-1,84	0,41	-2,29 E
69	0,33	-0,74	0,183	1,47	0,57	0,79
83	0,28	-1,99	0,149	-0,65	0,50	-0,65
94	0,36	0,07	0,156	-0,21	0,53	0,04
98	0,36	0,15	0,156	-0,21	0,49	-0,77
108	0,31	-1,34	0,160	0,04	0,51	-0,34
141	0,37	0,49	0,160	0,04	0,56	0,55
165	0,36	0,23	0,158	-0,08	0,50	-0,64
167	0,37	0,42	0,155	-0,24	0,55	0,36
182	0,35	-0,05	0,161	0,11	0,51	-0,39
184	0,34	-0,52	0,159	-0,02	0,54	0,12
186	0,34	-0,52	0,155	-0,27	0,43	-1,86

Laboratory	Acetaldehyde	Z score	Formaldehyde	Z score	Propionaldehyde	Z score
190	0,35	-0,02	0,162	0,17	0,54	0,08
192	0,36	0,15	0,155	-0,27	0,55	0,36
195	0,42	1,82	0,194	2,18 E	0,62	1,74
199	0,34	-0,30	0,151	-0,52	0,52	-0,28
201	0,40	1,22	0,179	1,24	0,63	1,77
207	0,36	0,01	0,158	-0,08	0,53	-0,05
208	0,35	-0,27	0,158	-0,08	0,54	0,06
211	0,36	0,12	0,160	0,04	0,49	-0,79
216	0,34	-0,54	0,153	-0,38	0,54	0,18
230	0,40	1,22	0,163	0,23	0,60	1,32
248	0,40	1,30	0,170	0,67	0,56	0,47
256	0,37	0,49	0,166	0,42	0,58	1,00
258	0,36	0,18	0,156	-0,21	0,48	-0,88
267	0,37	0,39	0,163	0,23	0,58	0,82
-	-	--	-	--	-	--
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	42		43		42	
Mean	0,36		0,159		0,53	
Reproducibility s.d.	0,03		0,013		0,05	
Rel. reproducibility s.d.	8,90 %		8,12 %		10,00 %	
Reference value	0,35		0,148		0,55	
Target s.d.	0,04		0,016		0,05	
Rel. target s.d.	10,00 %		10,00 %		10,00 %	
Lower limit of tolerance	0,28		0,127		0,43	
Upper limit of tolerance	0,43		0,191		0,64	
Type E outliers	1		1		2	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	42		43		42	
Explanation of outlier types						
A: Single outlier	Grubbs					
B: Differing laboratory mean	Grubbs					

Laboratory	Acetaldehyde Z score	Formaldehyde Z score	Propionaldehyde Z score
C: Excessive laboratory s.d.	Cochran		
D: Excluded manually			
E: mean outside tolerance limits			
F: Z-Score >3,5			

Summary of laboratory test results

Sample 2

Laboratory	Acetaldehyde	Z score	Butyraldehyde	Z score	Formaldehyde	Z score
Unit	mg/m ³		mg/m ³		mg/m ³	
13	0,92	0,29	0,26	-0,03	0,109	-0,09
21	0,84	-0,59	0,28	0,61	0,114	0,37
25	0,94	0,47			0,108	-0,16
29	0,87	-0,27			0,106	-0,36
30	0,99	1,05	0,34	2,99 E	0,136	2,37 E
37	0,89	-0,05	0,27	0,19	0,100	-0,91
42	1,00	1,16	0,31	1,85	0,117	0,64
45	0,89	-0,08	0,23	-1,14	0,107	-0,31
46	0,76	-1,51	0,25	-0,56	0,090	-1,82
48					0,111	0,09
50	0,68	-2,37 E	0,23	-1,17	0,102	-0,73
51	0,90	0,06	0,29	0,95	0,100	-0,91
52	1,04	1,65	0,32	1,93	0,135	2,28 E
53	0,92	0,25	0,26	-0,26	0,113	0,27
56	0,89	-0,05	0,25	-0,56	0,110	0,00
58	0,91	0,11	0,25	-0,41	0,108	-0,18
62	0,83	-0,71	0,23	-1,32	0,097	-1,18
67	0,81	-0,97			0,095	-1,36
68	0,79	-1,17	0,21	-2,07 E	0,090	-1,82
69	0,80	-1,02			0,121	1,05
83	0,69	-2,27 E	0,25	-0,41	0,113	0,27
94	0,90	0,09	0,26	-0,03	0,105	-0,45
98	0,90	0,01	0,25	-0,55	0,107	-0,26
108	0,78	-1,34	0,26	-0,11	0,111	0,09
141	0,93	0,40	0,21	-2,07 E	0,111	0,09
165	0,90	0,04	0,25	-0,45	0,109	-0,09
167	0,92	0,30	0,30	1,14	0,109	-0,05
182	0,89	-0,05	0,24	-0,86	0,106	-0,36
184	0,85	-0,55	0,28	0,57	0,109	-0,09

Laboratory	Acetaldehyde	Z score	Butyraldehyde	Z score	Formaldehyde	Z score
186	0,83	-0,67	0,20	-2,34 E	0,105	-0,45
190	0,92	0,23	0,27	0,04	0,113	0,27
192	0,93	0,34	0,29	1,06	0,109	-0,09
195	1,09	2,23 E			0,134	2,18 E
199	0,87	-0,25	0,27	0,08	0,103	-0,63
201	1,06	1,82	0,37	4,08 FE	0,130	1,82
207	0,89	-0,09	0,27	0,23	0,108	-0,18
208	0,89	-0,02	0,28	0,57	0,110	0,00
211	0,90	0,06	0,25	-0,56	0,110	0,00
216	0,85	-0,55	0,27	0,36	0,104	-0,53
230	1,05	1,73	0,32	2,12 E	0,115	0,46
248	1,03	1,51	0,29	0,95	0,119	0,82
256	0,93	0,42	0,26	-0,03	0,112	0,18
258	0,90	0,08	0,25	-0,71	0,106	-0,36
267	0,92	0,28	0,37	4,01 FE	0,111	0,11
-	-	--	-	--	-	--
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	43		38		44	
Mean	0,89		0,26		0,110	
Reproducibility s.d.	0,09		0,03		0,010	
Rel. reproducibility s.d.	9,77 %		11,66 %		9,08 %	
Reference value	0,89		0,26		0,101	
Target s.d.	0,09		0,03		0,011	
Rel. target s.d.	10,00 %		10,00 %		10,00 %	
Lower limit of tolerance	0,72		0,21		0,088	
Upper limit of tolerance	1,07		0,32		0,132	
Type E outliers	3		7		3	
Type F outliers			2			
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	43		36		44	
Explanation of outlier types						

Laboratory	Acetaldehyde Z score	Butyraldehyde Z score	Formaldehyde Z score
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			

Summary of laboratory test results

Sample 3

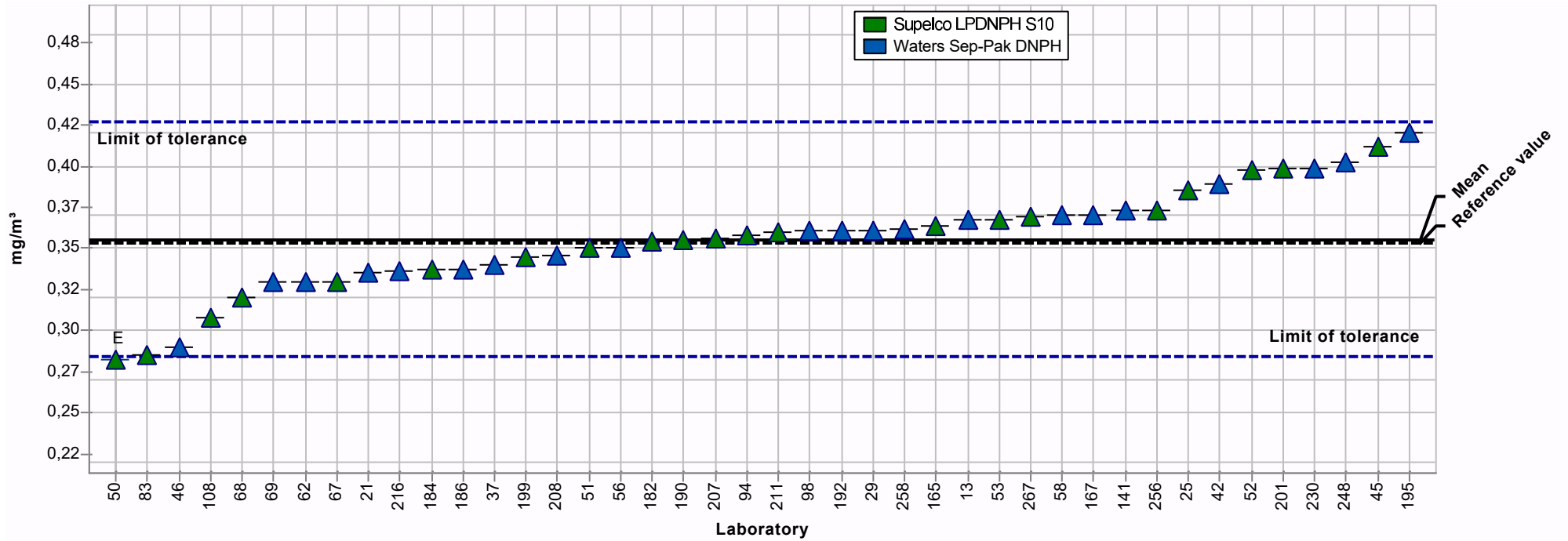
Laboratory	Acetaldehyde	Z score	Butyraldehyde	Z score	Formaldehyde	Z score	Propionaldehyde	Z score
Unit	mg/m ³		mg/m ³		mg/m ³		mg/m ³	
13	0,26	0,25	0,54	-0,10	0,078	1,20	0,27	-0,30
21	0,23	-1,08	0,55	0,12	0,068	-0,24	0,27	-0,52
25	0,28	1,15			0,068	-0,21	0,32	1,49
29	0,26	0,14			0,069	-0,17	0,29	0,56
30	0,26	0,29	0,67	2,33 E	0,083	1,92	0,34	2,35 E
37	0,25	-0,22	0,54	-0,03	0,060	-1,39	0,28	0,02
42	0,28	1,12	0,64	1,82	0,072	0,34	0,31	1,17
45	0,30	1,56	0,56	0,30	0,083	1,94	0,34	2,22 E
46	0,20	-2,17 E	0,47	-1,32	0,050	-2,82 E	0,22	-2,13 E
48					0,070	0,05		
50	0,20	-2,33 E	0,50	-0,79	0,068	-0,24	0,26	-0,77
51	0,24	-0,61	0,60	1,08	0,060	-1,39	0,29	0,38
52	0,28	1,08	0,66	2,20 E	0,077	1,05	0,27	-0,23
53	0,27	0,41	0,53	-0,21	0,070	0,05	0,27	-0,48
56	0,25	-0,22	0,52	-0,40	0,070	0,05	0,26	-0,70
58	0,27	0,45	0,53	-0,16	0,072	0,34	0,28	-0,16
62	0,24	-0,72	0,47	-1,41	0,060	-1,39	0,24	-1,52
67	0,24	-0,76			0,060	-1,39	0,25	-0,98
68	0,24	-0,61	0,44	-1,88	0,060	-1,39	0,22	-2,13 E
69	0,24	-0,54			0,080	1,53	0,30	0,59
83	0,20	-2,05 E	0,51	-0,57	0,064	-0,81	0,26	-0,66
94	0,25	-0,06	0,55	0,08	0,067	-0,38	0,28	-0,05
98	0,26	0,04	0,50	-0,69	0,066	-0,48	0,25	-0,89
108	0,22	-1,31	0,53	-0,23	0,070	0,08	0,26	-0,55
141	0,28	0,76	0,41	-2,34 E	0,075	0,72	0,29	0,56
165	0,26	0,22	0,52	-0,38	0,069	-0,09	0,26	-0,70
167	0,26	0,33	0,60	1,07	0,071	0,21	0,29	0,40
182	0,25	-0,25	0,50	-0,84	0,065	-0,67	0,26	-0,59
184	0,25	-0,25	0,59	0,87	0,073	0,48	0,29	0,34

Laboratory	Acetaldehyde	Z score	Butyraldehyde	Z score	Formaldehyde	Z score	Propionaldehyde	Z score
186	0,24	-0,45	0,43	-2,01 E	0,068	-0,24	0,23	-1,91
190	0,25	-0,10	0,55	0,08	0,069	-0,05	0,28	-0,09
192	0,26	0,22	0,59	0,93	0,070	0,05	0,29	0,41
195	0,30	1,94			0,083	1,84	0,33	1,63
199	0,25	-0,22	0,55	0,23	0,066	-0,52	0,27	-0,23
201	0,29	1,39	0,75	3,87 FE	0,080	1,48	0,33	1,88
207	0,25	-0,14	0,55	0,21	0,068	-0,24	0,27	-0,19
208	0,25	-0,33	0,56	0,30	0,066	-0,52	0,28	-0,02
211	0,27	0,57	0,52	-0,40	0,070	0,05	0,27	-0,34
216	0,24	-0,66	0,57	0,52	0,071	0,16	0,28	0,07
230	0,29	1,35	0,64	1,89	0,072	0,34	0,32	1,38
248	0,29	1,39	0,59	0,99	0,076	0,91	0,29	0,38
256	0,26	0,33	0,52	-0,45	0,072	0,34	0,30	0,81
258	0,25	-0,29	0,50	-0,81	0,065	-0,67	0,24	-1,30
267	0,27	0,39	0,75	3,80 FE	0,071	0,16	0,30	0,81
-	-	--	-	--	-	--	-	--
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	43		38		44		43	
Mean	0,26		0,54		0,070		0,28	
Reproducibility s.d.	0,02		0,06		0,007		0,03	
Rel. reproducibility s.d.	9,52 %		11,08 %		9,70 %		10,59 %	
Reference value	0,26		0,55		0,065		0,29	
Target s.d.	0,03		0,05		0,007		0,03	
Rel. target s.d.	10,00 %		10,00 %		10,00 %		10,00 %	
Lower limit of tolerance	0,20		0,43		0,056		0,22	
Upper limit of tolerance	0,31		0,65		0,084		0,34	
Type E outliers	3		6		1		4	
Type F outliers			2					
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	43		36		44		43	
Explanation of outlier types								

Laboratory	Acetaldehyde Z score	Butyraldehyde Z score	Formaldehyde Z score	Propionaldehyde Z score
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				

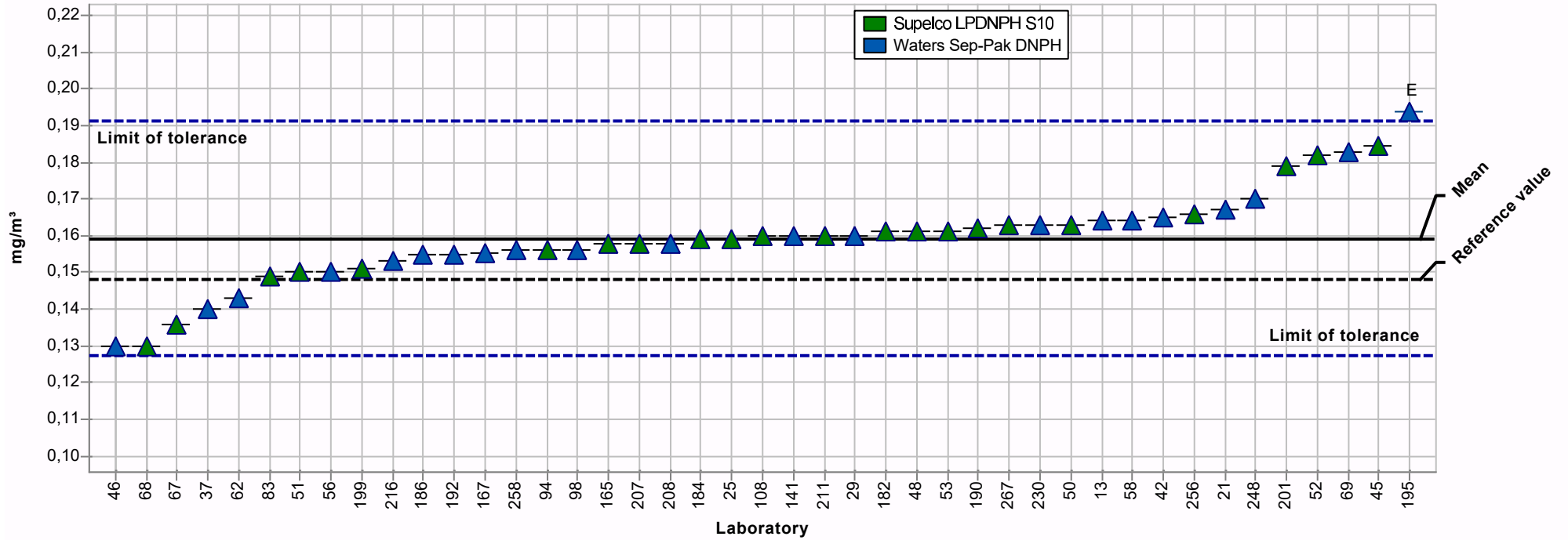
Summary results

Sample:	1	Mean:	0,36 mg/m ³
Measurand:	Acetaldehyde	Reproducibility s.d.:	0,03 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	8,90%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,35 mg/m ³
Number of laboratories in calculation:	42	Range of tolerance:	0,28 - 0,43 mg/m ³ (Z-Score <= 2,0)



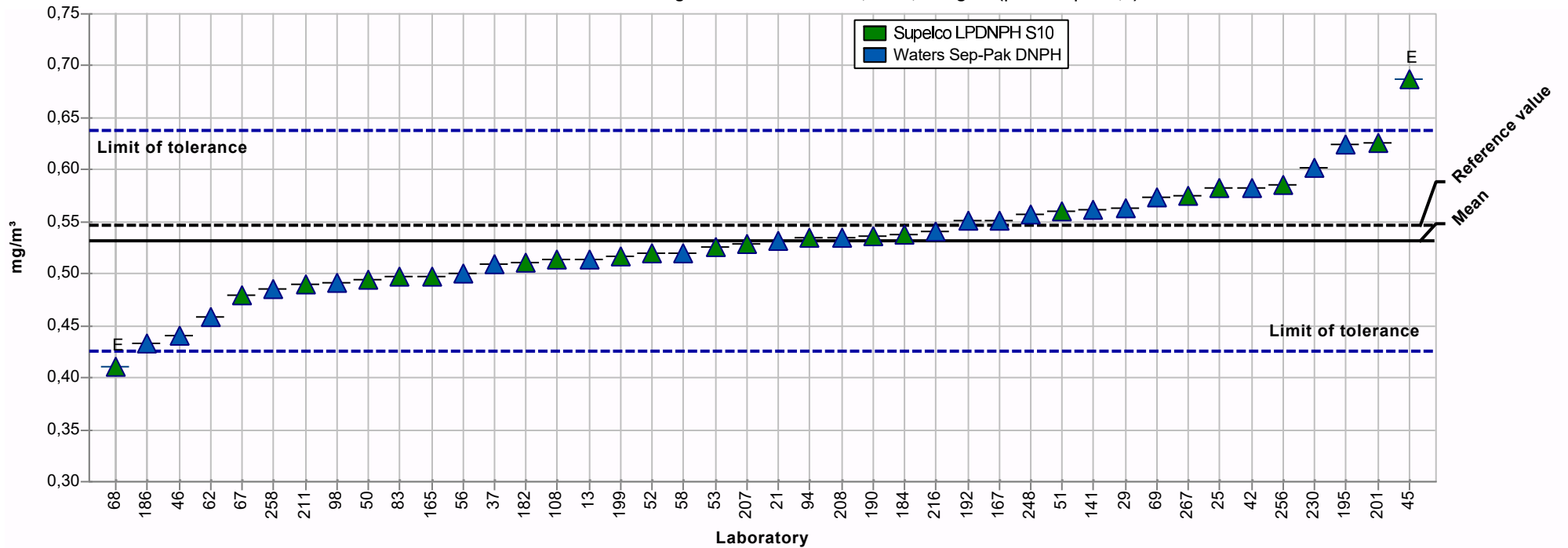
Summary results

Sample:	1	Mean:	0,159 mg/m ³
Measurand:	Formaldehyde	Reproducibility s.d.:	0,013 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	8,12%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,148 mg/m ³
Number of laboratories in calculation:	43	Range of tolerance:	0,127 - 0,191 mg/m ³ (Z-Score <= 2,0)



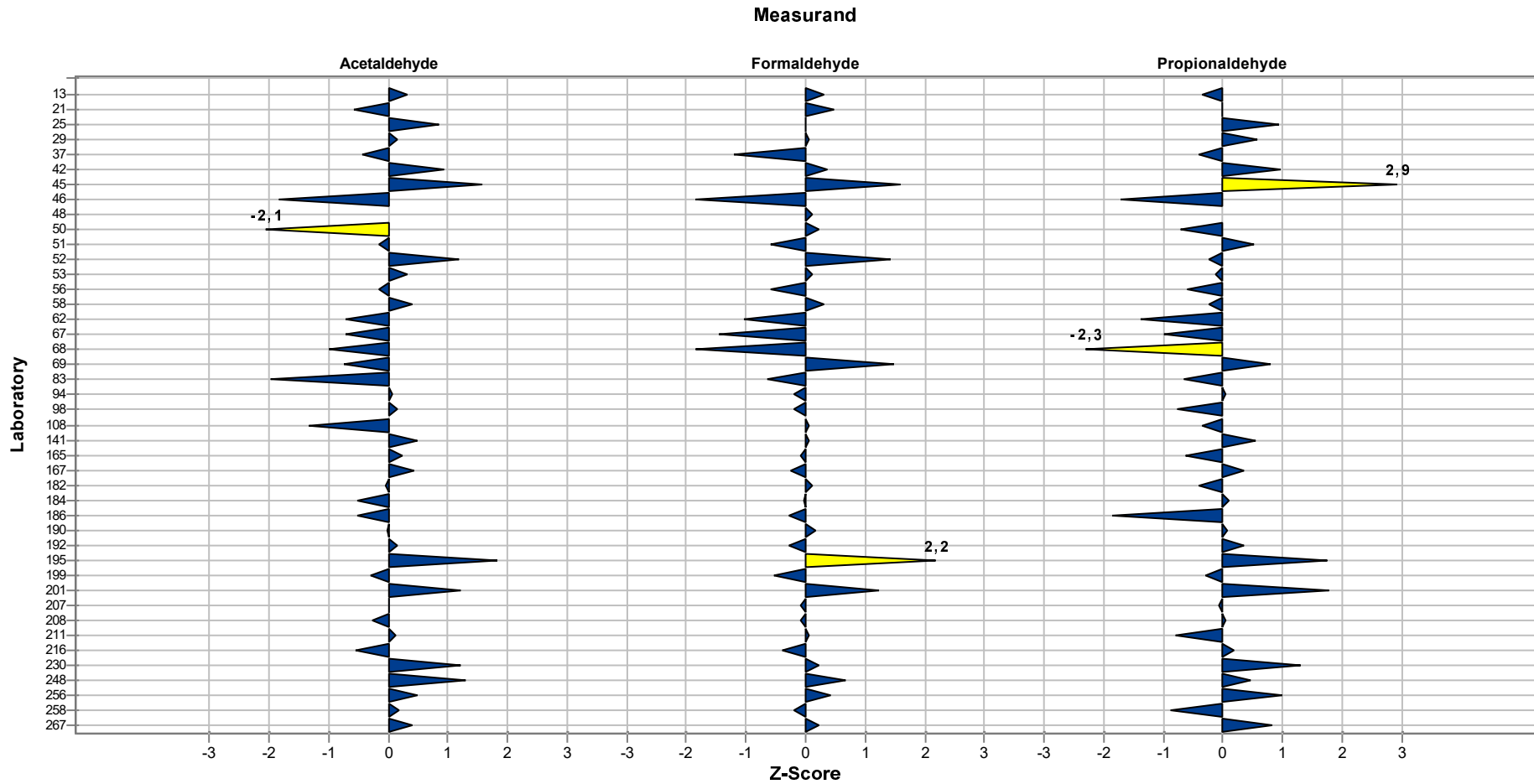
Summary results

Sample:	1	Mean:	0,53 mg/m ³
Measurand:	Propionaldehyde	Reproducibility s.d.:	0,05 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	10,00%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,55 mg/m ³
Number of laboratories in calculation:	42	Range of tolerance:	0,43 - 0,64 mg/m ³ (Z-Score ≤ 2,0)



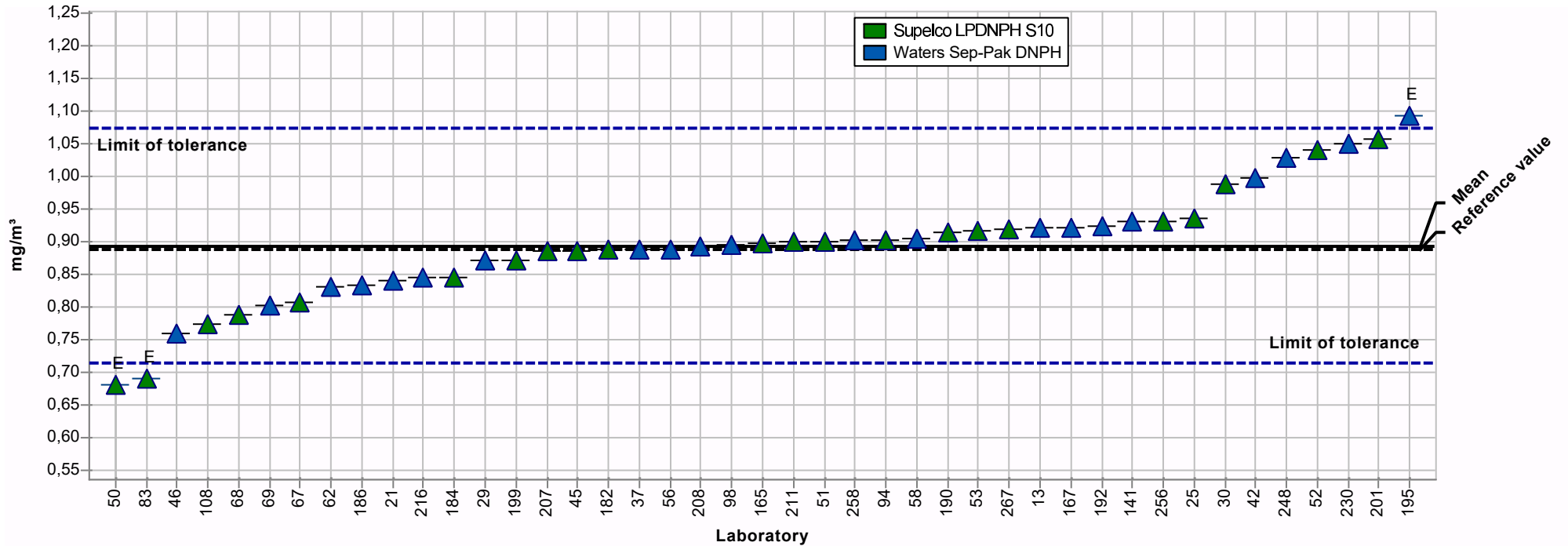
Sample chart of Z-Scores

Sample: 1



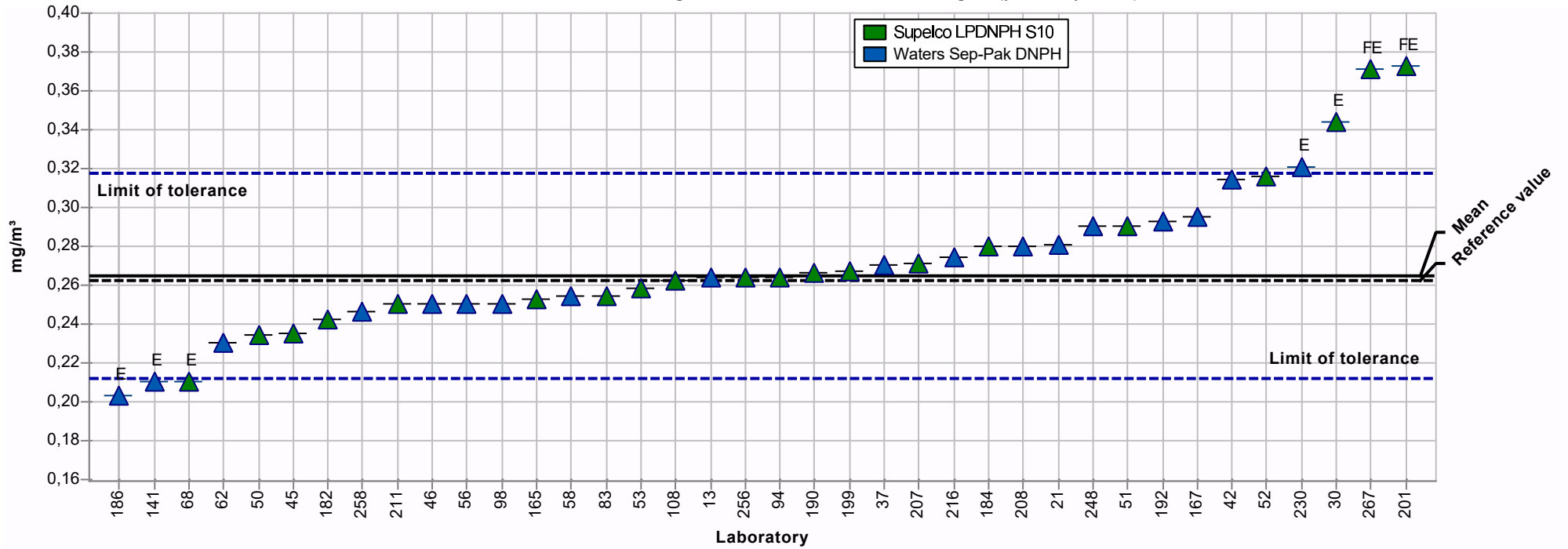
Summary results

Sample:	2	Mean:	0,89 mg/m ³
Measurand:	Acetaldehyde	Reproducibility s.d.:	0,09 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	9,77%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,89 mg/m ³
Number of laboratories in calculation:	43	Range of tolerance:	0,72 - 1,07 mg/m ³ (Z-Score <= 2,0)



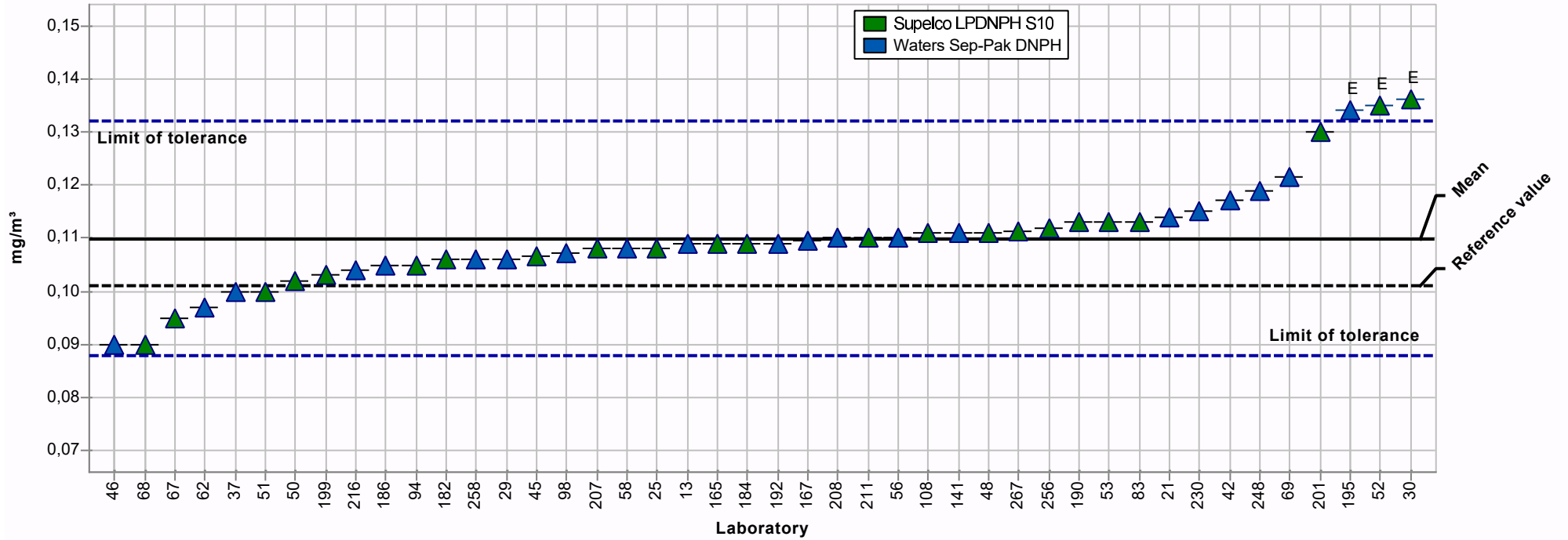
Summary results

Sample:	2	Mean:	0,26 mg/m ³
Measurand:	Butyraldehyde	Reproducibility s.d.:	0,03 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	11,66%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,26 mg/m ³
Number of laboratories in calculation:	36	Range of tolerance:	0,21 - 0,32 mg/m ³ (Z-Score ≤ 2,0)



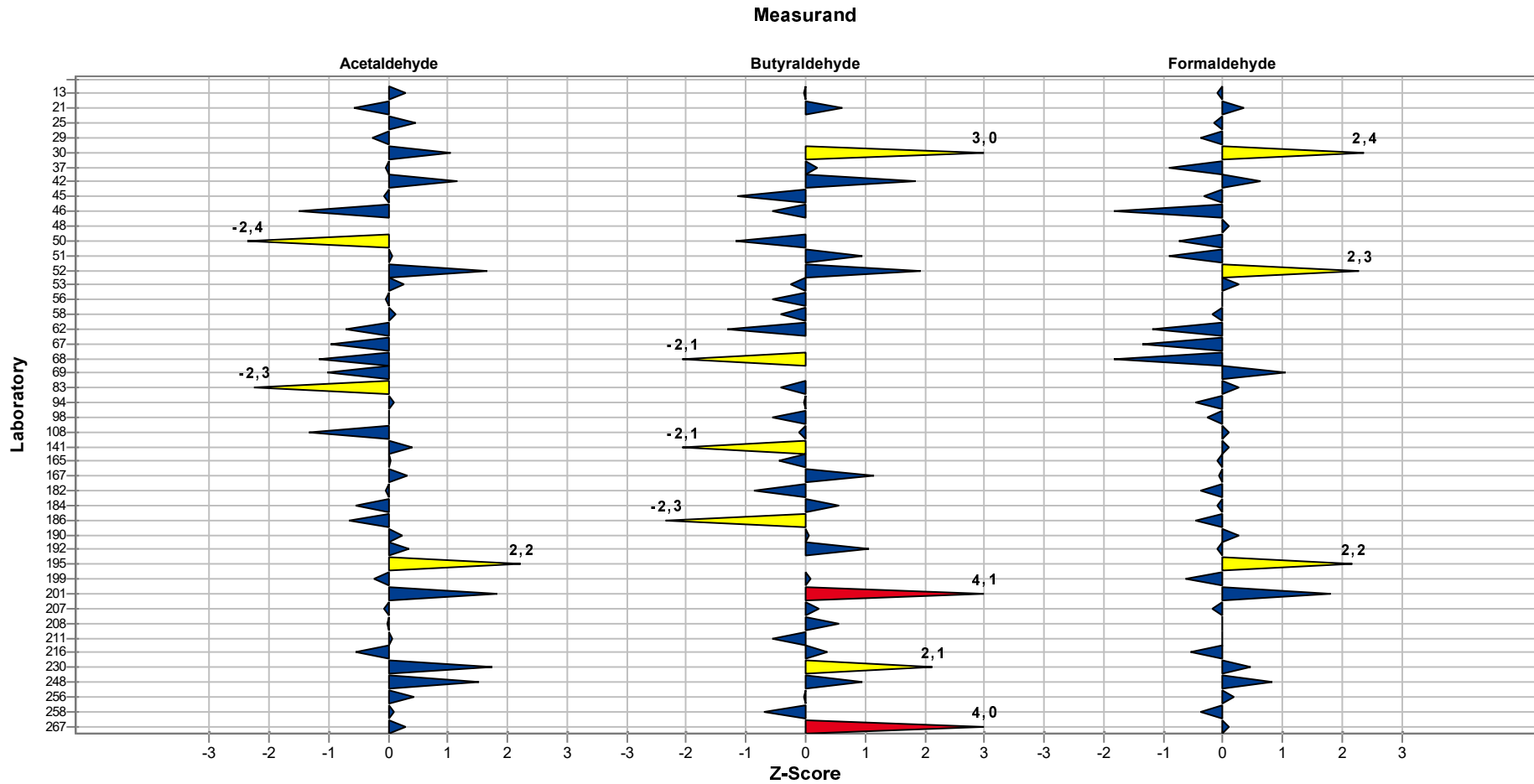
Summary results

Sample:	2	Mean:	0,110 mg/m ³
Measurand:	Formaldehyde	Reproducibility s.d.:	0,010 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	9,08%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,101 mg/m ³
Number of laboratories in calculation:	44	Range of tolerance:	0,088 - 0,132 mg/m ³ (Z-Score <= 2,0)



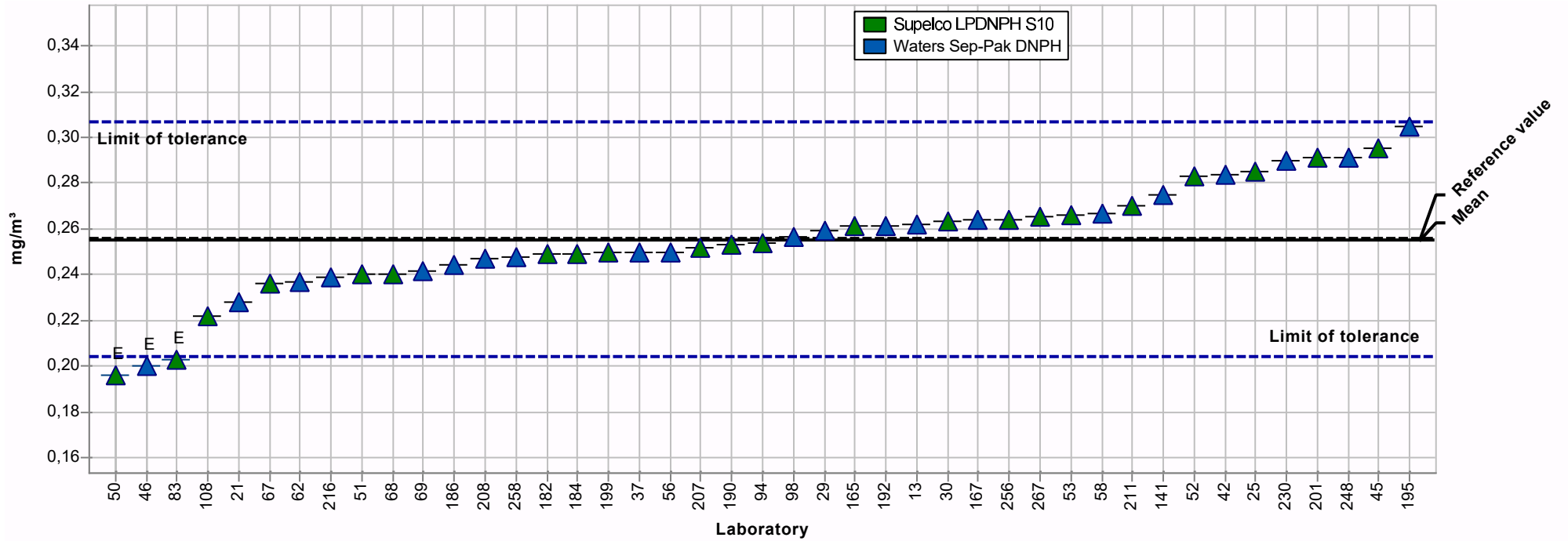
Sample chart of Z-Scores

Sample: 2



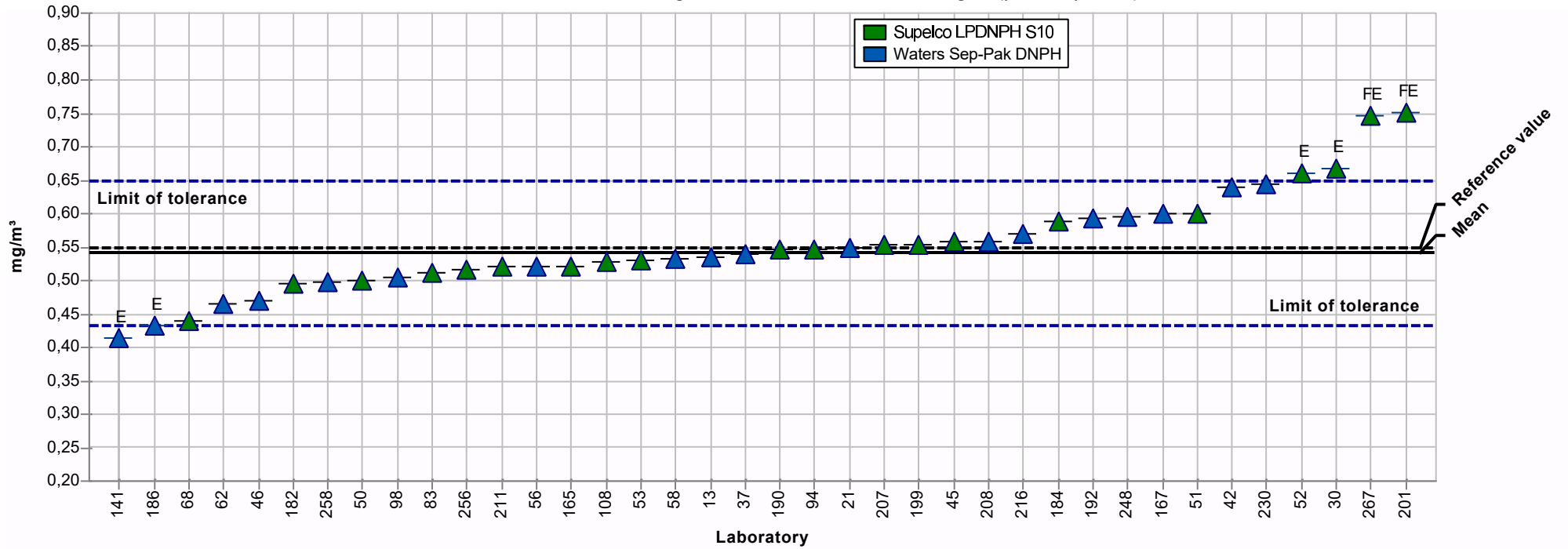
Summary results

Sample:	3	Mean:	0,26 mg/m ³
Measurand:	Acetaldehyde	Reproducibility s.d.:	0,02 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	9,52%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,26 mg/m ³
Number of laboratories in calculation:	43	Range of tolerance:	0,20 - 0,31 mg/m ³ (Z-Score <= 2,0)



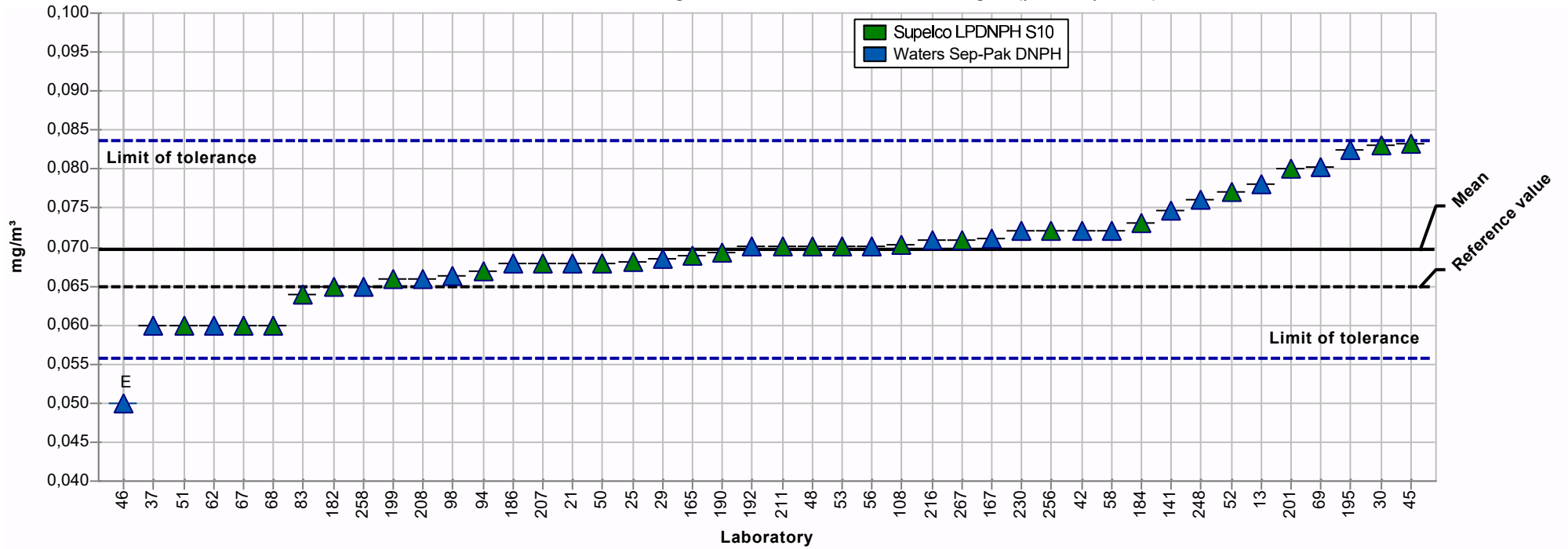
Summary results

Sample:	3	Mean:	0,54 mg/m ³
Measurand:	Butyraldehyde	Reproducibility s.d.:	0,06 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	11,08%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,55 mg/m ³
Number of laboratories in calculation:	36	Range of tolerance:	0,43 - 0,65 mg/m ³ (Z-Score <= 2,0)



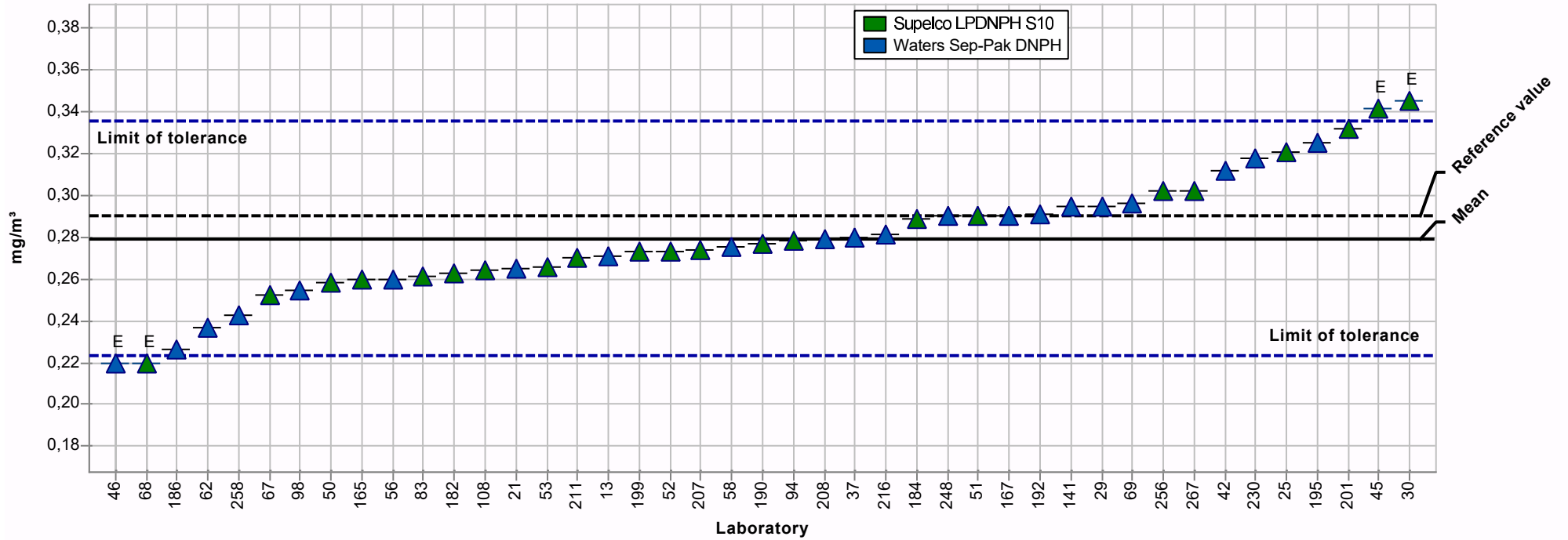
Summary results

Sample:	3	Mean:	0,070 mg/m ³
Measurand:	Formaldehyde	Reproducibility s.d.:	0,007 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	9,70%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,065 mg/m ³
Number of laboratories in calculation:	44	Range of tolerance:	0,056 - 0,084 mg/m ³ (Z-Score <= 2,0)



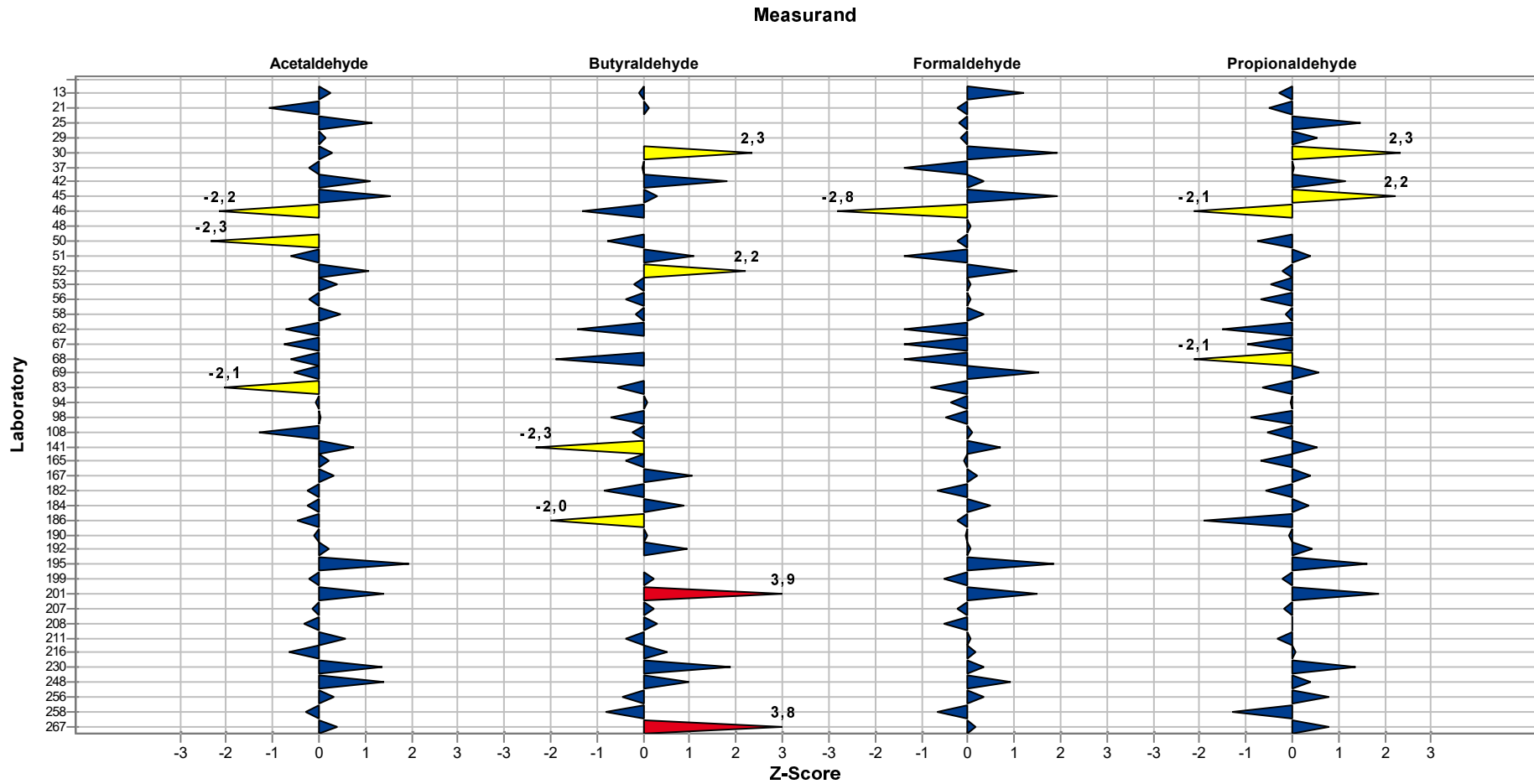
Summary results

Sample:	3	Mean:	0,28 mg/m ³
Measurand:	Propionaldehyde	Reproducibility s.d.:	0,03 mg/m ³
Method:	ISO 5725-2	Rel. reproducibility s.d.:	10,59%
Rel. target s.d.:	10,00% (Limited)	Reference value:	0,29 mg/m ³
Number of laboratories in calculation:	43	Range of tolerance:	0,22 - 0,34 mg/m ³ (Z-Score ≤ 2,0)



Sample chart of Z-Scores

Sample: 3



Questions and Answers

Participant	Analytical method	Start sample preparation
13	HPLC-DAD	13/01/2022
21	UHPLC	15/12/2021
25		24.11.2021
29	Arbeitsmappe 6045,	29.11.2021
30	ISO 16000-3 / EN 16516	09/12/2021
37	interne Vorschrift für Aldehyde-Bestimmung	02.12.2021
42	IFA Arbeitsmappe 6045	23.11.21
45	NIOSH 2016 e EPA 8315A	two weeks after reception desorption
46	DIN ISO 16000-3	29.11.2021
48	Formaldehyde Emission - acc PN EN 16516 + A1:2020-12	29.11.2021
50	DIN ISO 16000-3:2013-01	29.11.2021
51	Internal method derived from DIN ISO 16000-3:2011	02/12/2021
52	Bestimmung nach Derivatisierung mit Dinitrophenylhydrazin mittels HPLC	01.12.2021
53	in Anlehnung an Compendium Method TO-11A	25.11.2021
56	HPLC	24/11/2021
58	HPLC-UV	23-11-2021
62	HPLC-UV	29/11/2021
67	NIOSH 2016:2016 and NIOSH 2018:2003	I started on the 30th of novembre 2021
68	interne Arbeitsanweisung	24.11.2021
69	HPLC	03/12/21
83	NF X43-264	29/11/2021
94	ISO 16000-3/ EN 16516	01.12.2021
98	analog IFA6045	25.11.2021
108	DIN ISO 16000-3:2013-01	08.12.2021
141	HPLC	06-12-2021
165	DIN-ISO 16000-3	29/11/2021
167	HPLC / UPLC	13.Dec.2021
182	DIN EN ISO 16000-3:2013-01	24.11.2021
184	IFA 6045	24.11.2021
186	NF ISO 16000-3	29/11/2021
190	IFA-Arbeitsmappe	03.12.2021

Aldehydes 2021

Participant	Analytical method	Start sample preparation
192	ISO16000-3	December 06,2021
195	MTA/MA-062	25/11/21
199	DIN ISO 16000-3	23.11.2021
201	IFA 6045	02.12.2021
207	In Anlehnung an ISO-16000-3	23.11.2021
208	ISO 16000-3	01.12.2021
211	Hausinterne Prüfvorschrift PV 250	06.12.21
216	High Performance Liquid Chromatography	30 Nov 2021
230	DIN EN ISO 16000-3	24.11.2021
248	IFA 6045 (11-2007)	23.11.2021
256	Geopro nach EPA TO-11A	24.11.2021
258	ISO16000-3	25-11-2021
267	ISO 16000-3	29/11/2021

Participant	Storage time after desorption
13	Analysis took place immediately after desorption. Parts of the samples were stored in the refrigerator after desorption in case something went wrong during the analysis.
21	4h, refrigerator
25	nein
29	nein
30	09/12/2021 / refrigerator + room temperature
37	24 Std im Kühlschrank
42	14 Tage (8°C)
45	refrigerator -18°C, two weeks
46	Nein, wurden sofort analysiert
48	Samples were analyzed immediately after desorption
50	nein
51	45 minutes at room temperature
52	ja, 1 Tag im Kühlschrank
53	nein
56	no storage, analysed just after desorption
58	0 dys
62	0 days at 4 °C
67	I desorbed on 30th of november 2021 and i stored at 4 °C

Aldehydes 2021

Participant	Storage time after desorption
68	Ja, im Kühlschrank, etw a 3 Wochen
69	0 days
83	0
94	nein
98	Nein. Kühlschrank.
108	Im Kühlschrank (2-8°C), gelagert bis Abgabe der Ergebnisse
141	2 weeks, refrigerator
165	Kühlschrank, 4°C,
167	30 min at room temp
184	Kühlschrank, 2 Tage
186	No storage after desorption
190	ja, 66 h in Kühlschrank
192	No storage after desorption.
195	1 day in refrigerator
199	nein
201	nein
207	-
208	7 d in refrigerator
211	2 Tage im Kühlschrank
216	1 WEEK
230	1 Tag - Kühlschrank
248	Ja/2 Tage im Kühlschrank bei < 10°C
256	Direkte Analyse, danach Aufbewahrung im Kühlschrank
258	<4 hours at roomtemperature
267	Extract analyzed the day of desorption for undiluted results and extract stored 10 days in the fridge analyzed for dilutions.

Participant	Date of analysis	Desorption solution
13	13/01/2022, samples and dilutions	Acetonitrile
21	15/12/2021	Acetonitrile
25	24.11.2021	Acetonitril
29	29.11.2021	Acetonitril
30	22/12/2021	Acetonitrile
37	03.12.2021	100% Acetonitril

Aldehydes 2021

Participant	Date of analysis	Desorption solution
42	07.12.21	Acetonitril
45	25/1/2022	Acetonitrile
46	29.11.2021	ACN
48	29.11.2021	100% acetonitrile
50	29.11.2021	Acetonitril
51	02-03/12/2021	Acetonitrile
52	02.12.2021 (Verdünnungen am 03.12.2021)	Acetonitril
53	25.11.2021	Acetonitril
56	24/11/2021	Solvent : Acetonitril
58	29-11-2021	Acetonitrile
62	29/11/2021	Acetonitrile
67	I desorbed and analyzed the samples on 30th of november 2021	A solution of acetonitrile acetonitrile w as used
68	27.12.2021	Acetonitril
69	03/12/21	Acetonitrilo
83	29/11/21	ACN
94	01.12.2021	Acetonitril
98	25.11.	Acetonitril
108	08.12.2021	Acetonitril
141	07-12-2021	acetonitrile
165	01/12/2021	acetonitril
167	13.Dec.2021	Acetonitrile
182	24.11.2021	
184	25.11.2021	Acetonitril
186	29/11/2021	Acetonitrile
190	06.12.2021	Acetonitril
192	December 06,2021	Acetonitrile
195	25/11/21	ACN
199	23.11.2021	Acetonitril
201	02.12.2021	Acetonitril
207	23.11.2021	ACN 60/H2O 40 /NH4HCO3
208	01.12.2021	Acetonitrile
211	08.12.21	Acetonitril
216	6/12/2021	Acetonitrile
230	25.11.2021, ,	Acetonitril

Aldehydes 2021

Participant	Date of analysis	Desorption solution
248	06.12.2021	Acetonitril
256	24.-25.11.2021	ACN
258	25-11-2021	Acetonitrile
267	29/11/2021-09/12/2021	Acetonitrile

Participant	Desorption volume
13	5 ml
21	3
25	10 ml
29	5
30	5 ml
37	10 ml
42	10
45	10
46	5 mL
48	5 ml
50	5
51	5 mL
52	5ml
53	2 x 2mL und auf 5mL aufgefüllt
56	5 mL
58	10 ml
62	5 mL
67	10 ml
68	2mL
69	5 ml
83	10
94	5
98	10 ml
108	5
141	10 ml
165	3 ml
167	6 mL filled to 10 mL with distilled water

Aldehydes 2021

Participant	Desorption volume
184	5 mL
186	10
190	6 mL
192	5ml
195	5 mL
199	3mL
201	1,0 mL
207	5
208	3 ml
211	10 ML
216	10
230	10 ml
248	5ml
256	2.5
258	5.00
267	5 mL

Participant	HPLC-system
13	Agilent 1290 system with G7104A 1290 Flexible pump, G7117A 1290 DAD FS and G7167 B 1290 multisampler
25	HPLC 1260 Infinity der Fa. Agilent: Pumpe: G1311B, Autosampler: G1329B, Detektor: G1365D MWD VL
29	LPG, UVD, Autosampler
30	Waters Alliance 2695 / PDA 2996
37	quaternäre Pumpe Agilent 1100, Detektor : UV Detektor Agilent 1100, Autosampler: Agilent 1100
42	Agilent Typ 1260 Infinity
45	UV 360 nm
46	Quat. Pumpe, DAD, HiP-Sampler von Agilent
48	Quaternary pump, Variable wavelength detector (VWD), Autosampler (Vialsampler)
50	Thermo Surveyor HPLC-System
51	Pump: Agilent 1260 Infinity II G7111B - Detector: Agilent UV 1260 Infinity II - G7114A
52	Perkin Elmer Series 200 Pump, Flexar LC autosampler, Flexar FX PDA UHPLC Detektor
53	VWR 5160, VWR 5430 DAD, VWR 5260+Thermostat
56	Pump LPG 3400 Detector VWD-3100
58	Agilent 100 series

Aldehydes 2021

Participant	HPLC-system
62	Quaternary pump + UV/Visible detector
67	I used a quaternary pump and UV/VIS/DAD detector
68	Agilent HPLC 1260 Infinity
69	Elite LabChrom Merck Hitachi, Pump L-2130 and Autosampler L-2200
94	Agilent HPLC 1260 Infinity mit Degasser, Quatpump, ALS, ColComp und DAD
98	HPLC-System LC-2030 Plus
108	Pumpe1260 Bin Pump, Detektor 1290 DAD, Autosampler 1260 ALS
141	Quaternary pump, diode array detector
165	HPLC Agilent 1100-DAD
167	Agilent 1290 Infinity System
184	Agilent 1100 Series (Pumpe+Sampler), Agilent 1290 Infinity DAD
186	Quaternary pump, HPLC-PAD
190	Agilent 1200
192	Agilent 1260 , Agilent 1260 II
195	Agilent 1260 Infinity II
199	Agilent
207	Quaternäre1260 Infinity LC-DAD (Agilent)
208	Acquity H-class, PDA-detector
211	Das HPLC-System Ultimate 3000 von Thermo Fisher
230	Fa. Agilent
248	Pumpe: LPG-3400SD, , -Detektor: DAD-3000(RS), , FLD 3x00(RS), , -Autosampler: WPS-3000(RS), ,
258	Waters Aqcuity H-Class
267	Agilent HPLC-DAD 1260

Participant	Refrigerated autosampler
13	18°C
21	no, 20°C
25	ja, 20°C
29	nein
30	no
37	nein
42	nein
45	refrigerated at 10°C

Aldehydes 2021

Participant	Refrigerated autosampler
46	Nein
48	no
50	22°C
51	No
52	nein
53	Ja 30 °C
56	15°C
58	no
62	No, ambient temperature
67	NO
68	Nein
69	No
83	oui 10°C
94	nein
98	Nein
108	Nein
141	no
165	nein
167	Agilent 1290 Infinity Autosampler, room temp.
184	nein
186	Yes, 4°C
190	ja, 20°C
192	No
195	No
199	nein
201	nein
207	-
208	15 °C
211	Die Temperatur lag bei 10°C
216	No
230	nein
248	Nein
256	nein
258	No

Aldehydes 2021

Participant	Refrigerated autosampler
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267	No, room temperature
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Participant	Analytical column
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13	Agilent Extend C18 4,6mm x 150mm 5µm
21	ACQUITY UPLC BEH Phenyl Column, 130Å, 1.7 µm, 2.1 mm X 100 mm
25	Zorbax Eclipse Plus C18
29	Waters Xbridge Phenyl 3,5µm 4.6x150mm
30	Allure AK 200 x 4.6 mm 5 µm
37	Refill-Säule Dimension 125 x 4,0mm Säulenmaterial: 100 C18, 5µm (Korngröße der Füllung)
42	Prontosil 120-5C 18 ace-EPS, 250x4,6 mm
45	C18 250 mm 4,6
46	C18-Silica Trennsäule
48	ZORBAX Eclipse Plus C18 4.6*250 mm, 5 um.
50	Restek Allure AK 5µm, 200 x 4,6 mm
51	J.T. Baker Octadecyl (C18) 250 x 4.6 mm - 5 µm
52	MZ Analysentechnik Kromasil 100 C18 5µm, 250X4,0mm
53	Merck Purospher STAR RP-18 ec (3µm) 250-3
56	Acclaim RSLC Carbonyl 2,1*100 mm (Thermo)
58	Zorbax
62	Ascentis RP-Amide HLPC Column
67	I used a ALLTECH-ALLTIMA C18 3µ particles, 150 mmx46 mm
68	Kinetex 2.6u C18 100A, 50x4.6mm
69	Ascentis RP-Amide 25 cm x 4,6 mm
83	Kinetex
94	Zorbax Eclipse Plus C18, 3.9 x 150 mm, 3.5 um, Agilent
98	LiChrospher 100RP18, 5 µm, 250x4 mm, Merck
108	Biphenyl Säule 2.7µm 150 x 3.0mm
141	Agilent Poroshell 120 EC-C18 50x4.6 mm, 2.7µm cat. no. 6999975-902,
165	LC18
167	Waters Symmetry C18, 3,5 µm
184	Phenomenex Gemini 3µm C18 110 A 100 x 3 mm
186	WATERS Nova-Pak C18/150nm*3.9nm*4µm
190	Hypersil GOLD C18 (Thermoscientific)

Aldehydes 2021

Participant	Analytical column
192	Formaldehyde,Acetaldehyde : InertSustain C18 HP , Propionaldehyde,Butyraldehyde : Inertsil ODS-HL
195	C18
199	C18
201	Zorbax Eclipse XDB C-18, 250 * 4,6 mm, 5 µm
207	Phenomenex Kinetex C18, 100 x 4.6, 2,6µ, 100A
208	HSS C18 1,8 µm, 2,1x100mm
211	Accalim Carbonyl C18
216	Restek C18 column
230	MZ PAH C18, 5 µm
248	Merck Purosphere (R)Star RP-18 endcapped (5µm)
256	Supelcosil LC-18, 25 cm x 4.6 mm, 5 um
258	Waters Acqquity BEH C18 2.1*50 mm, 1.7µm
267	Waters Symmetry C18, 250 mm x 4.6 mm x 5 µm

Participant	Mobile phase
13	Gradient composition milliQ:Acetonitrile
25	Lösung 1: Bidest. Wasser/Acetonitril/Tetrahydrofuran (60/30/10), Lösung 2: Bidest. Wasser/Acetonitril (40/60)
29	A: H ₂ O, ACN, THF (50:40:10), B: ACN
30	Acetonitrile / Water
37	Wasser/Acetonitril (Gradient)
45	C18
46	THF, ACN und ACN+Wasser, Gradientenverlauf
48	Water (H ₂ O) 40%, Acetonitrile (ACN) 60%
50	Acetonitril / Wasser, Gradient
51	C18 (RP18, ODS, Octadecyl)
52	Wasser/Methanol/AcCN (35/52/13, v/v/v)
53	ACN / Wasser
56	Solvent A : water - Solvent B : acetonitril , equilibration time 10 min at 55% A and 45 % B , , T = 0,00 min , 55 % A and 45 % B , , T = 8,00 min, 55 % A et 45 % B , , T = 18,00 min, 0 % A and 100 B , , T = 20,00 min, 0 % A and 100 % B
58	ACN-H ₂ O
62	Acetonitrile/Water 40/60 -> 75/25-> 100/0
67	Acetonitrile/w ater
68	60:40, Acetonitrile:Water
69	Acetonitrile-Water

Aldehydes 2021

Participant	Mobile phase
83	ACN/H2O/THF
94	ACN:H2O, gradient
98	Wasser - Acetonitrol 51:49 bis 20:80
108	Eluent A: VV 50%/50% Wasser/Methanol, Eluent B: 100% Methanol
141	Water/Acetonitril (45/55)
165	Wasser/Acetonitril 40/60
167	AcN with 0,1% phosphoric acid
186	Acetonitrile/Water/THF
190	Anfang 25% AcN in H2O, 20 min 50% AcN, 30 min 90% AcN
192	Water/Acetonitrile
195	ACN/H2O 60:40
199	Wasser/Acetonitril
201	Acetonitril / Wasser
207	ACN/THF80/20 H2O
208	ACN/THF/w ater
211	Wasser / Acetonitril
216	70% ACN/30% Water
230	dest. Wasser/Acetonitril, Gradientenprogramm
248	- (A) H2O / (B) ACN / (C) THF , , - 60%/24%/16% , ,
256	Startbedingungen: 30% ACN, 60% Wasser, 10% THF
258	Water and acetonitrile
267	Acetonitrile/Water

Participant	Flow rate HPLC	Wavelength	Column temperature
13	1.3	360 nm	40°C
21	0.5	360 nm	40°C
25	1,5 ml/min	360 nm	40°C
29	1,5	360	27°C
30	1.2	360 nm	30°C
37	1,5 ml/min	365 nm	Raumtemperatur
42	1	365 nm	23°C
45	1,3	360	30
46	1 mL/min	360	40 °C

Aldehydes 2021

Participant	Flow rate HPLC	Wavelength	Column temperature
48	1ml/min	360 nm	25 degrees Celsius
50	1,4	360 nm	30°C
51	1.9 mL/min	365 nm	25 °C
52	1ml/min	365nm	25°C
53	0,35	355	35°C
56	0.4 ml/min	360 nm	30°C
58	1 ml/min	360	30
62	1 mL/min	360 nm	30°C
67	0.6 ml/min	I used 360 nm w avelenght	28 °C
68	1 mL/min	360 nm	30°C
69	1,5 ml/min	UV-Visible (360 nm)	40 °C
83	1	360nm	40°C
94	1 ml/min	360 nm	30 °C
98	1,2	365 nm	25°C
108	0,550	350nm	42°C
141	1 ml/min	360 nm	30 gr C
165	1,3 ml/min	360 nm	25°C
167	0,25 mL/min	360 nm	30 oC
184	0,9 mL/min	360 nm	45 °C
186	1.5mL/min	360 nm	35°C
190	1,5 ml/min	365 nm	30 °C
192	Formaldehyde,Acetaldehyde : 0.4ml/min , Propionaldehyde,Butyraldehyde : 1.2ml/min	360nm	40 degC.
195	1.8 mL/min	365	30
199	0,8 ml/min.	370 nm	30°C
201	1,3 ml/min	360/390 nm	65 °C
207	1,5	360	30°C
208	0,42 ml/min	360 nm	40°C
211	0,6 mL/ min	360 nm	28°C
216	1	365	Nil
230	0,5 ml/min	362 nm	40°C
248	0,65ml/min	UV 360 nm	50°C
256	2.3 ml/min, ab 9.1 Minuten 2 ml/min	360 nm	25 °C
258	0.8	367	40°C
267	1.5 mL/min	365 nm	25 °C

Aldehydes 2021

Participant	Calibration standard	Recovery rates
13	TO11/IP-6A Aldehyde/Ketone DNPH mix from Sigma-Aldrich	No
21		no
25	DNPH-Einzelstandards, Fa. Supelco	nein
29	Supelco Carb 1004 Mix 2	nein
30	Mix standard (carbonyl DNPH Mix-1 Sigma Aldrich)	No
37	fertiger Mix von Supelco	w urde nicht bestimmt und nicht berücksichtigt
42	Mix (Supelco)	nein
45	Ready to mix Restek TO11 mix	No
46	Der Standard w urde aus Einzelstandards hergestellt	ja
48	We use ready-to-use-mix from Sigma Aldrich	no
50	Supelco Carbonyl-DNPH Mix 2,1x1ml, Product ID: CRM47671	nein
51	Custom Carbonyl-DNPH Standard - Restek	Yes
52	Aldehyde-DNPH-MIX 11, LGC-Standards, Lot: 29975-001	nein
53	TO11/IP-6A Aldehyde/Ketone-DNPH Mix, (CRM), Supelco®	
56	Custom Mix Ald_DNPH 100 µg/ml – Supelco	no
58	ready to use	no
62	Purchased at Restek	No
67	I used a mix ready-to-use purchase from the manufactureur ""o2si smart solution""	No, my result didn't include recovery rates
68	Fertiger Mix, Sigma-Aldrich	Formaldehyd: ja, Rest: nein.
69	Ready to use mix, Isostandards Material S.L.	No
83		oui
94	Aldehyde/Ketone-DNPH TO11/IP-6A Mix, Sigma-Aldrich CRM4M7285	nein
98	Mix, CRM47649, Sigma-Aldrich	Nein
108	Carbonyl-DNPH Mix 1 Sigma Aldrich, DNPH-Mix 9 Neochema	Teilw eise
141	produced from individual standards	no
165	supelco- CRM47285 - TO11/IP 6A Aldehyde/Ketone-DNPH Mix	nein
167	Produced from individual standards	Yes
184	DNPH Mix Sigma Aldrich	nein
186	From a ready-to-use mix Supelco	No
190	fertiger Mix, NEOCHEMA	nein
192	Ready-to-use mix manufactured by FUJIFILM Wako Pure Chemical Corporation.	No
195	Individual standards from Supelco CRM	Yes
199	Sigma-Aldrich Carbonyl-DNPH-Mix	nein
201	gekaufter Mix: Carb Method 1004 DNPH Mix 2Merck, Produktnummer CRM47651	nein
207	Einzelstandards Supelco	-

Aldehydes 2021

Participant	Calibration standard	Recovery rates
208	Sigma-Aldrich / CRM47651	No
211	TO11/IP-6A Aldehyd/Keton-DNPH-Mischung von Sigma Aldrich	nein
216		No
230	Herstellung aus Einzelstandfards, Fa. Supelco	nein
248	Mischstandard SEUPELCO	Nein
256	fertiger Mix: TO11/IP-6A Aldehyde/-Ketone-DNPH Mix (Sigma-Aldrich)	Nein
258	Ready to use mix, Supelco CRM 47285	No
267	Ready-to-use mix from Supelco	No