

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

## Round-robin test Aldehydes

October 2017

# Summary of laboratory test results

Sample 1

Unit	Formaldehyde Z score		Acetaldehyde Z score		Propionaldehyde Z score	
	mg/m <sup>3</sup>		mg/m <sup>3</sup>		mg/m <sup>3</sup>	
10	0,081	-0,34	0,283	-0,47	0,440	-0,84
11	0,090	0,69	0,300	0,10	0,490	0,20
30	0,087	0,33	0,289	-0,27	0,480	-0,01
37	0,090	0,69	0,350	1,78	0,620	2,90 BE
44	0,083	-0,14	0,307	0,34	0,491	0,22
47	0,082	-0,26				
55	0,088	0,45	0,269	-0,94	0,428	-1,09
56	0,090	0,69	0,300	0,10	0,470	-0,22
60	0,088	0,43	0,312	0,51	0,546	1,36
62	0,088	0,45	0,304	0,24	0,490	0,20
63	0,074	-1,21	0,267	-1,01	0,407	-1,53
67	0,079	-0,62	0,294	-0,10	0,489	0,18
68	0,087	0,33				
69	0,091	0,81	0,253	-1,49	0,518	0,79
81	0,121	4,37 BE	0,285	-0,40	0,562	1,69
86	0,088	0,45	0,302	0,17		
90	0,087	0,33	0,303	0,20	0,462	-0,39
94	0,083	-0,14	0,288	-0,30	0,472	-0,18
96	0,080	-0,50	0,280	-0,57		
99	0,082	-0,26	0,290	-0,24	0,470	-0,22
100	0,081	-0,38	0,280	-0,56	0,475	-0,12
107	0,090	0,69	0,308	0,37	0,506	0,53
111	0,084	-0,02	0,296	-0,03	0,473	-0,16
114	0,078	-0,74	0,273	-0,81	0,428	-1,09
123	0,034	-5,96 BE	0,357	2,02 E	0,507	0,55
131	0,087	0,33	0,296	-0,03	0,504	0,49
135	0,087	0,33	0,300	0,10	0,509	0,59
144	0,086	0,21	0,283	-0,47	0,507	0,55
147	0,079	-0,62	0,292	-0,17		
151	0,085	0,10	0,308	0,37	0,499	0,38
165	0,081	-0,38	0,292	-0,17	0,476	-0,10
167	0,078	-0,74	0,284	-0,44	0,497	0,34
168	0,080	-0,50	0,250	-1,58	0,501	0,43
174	0,080	-0,47	0,303	0,22	0,471	-0,20
186	0,080	-0,50	0,295	-0,07	0,480	-0,01
192	0,080	-0,50	0,300	0,10	0,422	-1,22
195	0,090	0,69	0,275	-0,74	0,475	-0,12
199	0,086	0,27	0,299	0,06	0,485	0,10
207	0,081	-0,38	0,287	-0,34	0,497	0,34
208	0,091	0,81	0,318	0,71	0,517	0,76
211	0,087	0,33	0,335	1,28	0,506	0,53
214	0,080	-0,50	0,290	-0,24	0,480	-0,01
216	0,088	0,45	0,283	-0,47	0,474	-0,14
224	0,085	0,10	0,324	0,91	0,435	-0,95
228	0,085	0,04	0,304	0,25	0,446	-0,71
256	0,086	0,21	0,285	-0,40	0,450	-0,64
263	0,087	0,33	0,305	0,27	0,488	0,15
264	0,080	-0,50	0,360	2,12 E	0,500	0,40
265	0,029	-6,56 BE	0,093	-6,87 BE	0,135	-7,19 BE

	Formaldehyde Z score		Acetaldehyde Z score		Propionaldehyde Z score	
267	0,081	-0,38	0,267	-1,01	0,441	-0,82
280	0,080	-0,50	0,330	1,11		
-	-	--	-	--	-	--
Method	ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	Z <=2,00		Z <=2,00		Z <=2,00	
Mean	0,084		0,297		0,481	
Reproducibility s.d.	0,004		0,023		0,032	
Rel. reproducibility s.d.	5,01 %		7,73 %		6,62 %	
Reference value	0,084		0,274		0,472	
Target s.d.	0,008		0,030		0,048	
Rel. target s.d.:	10,00 %		10,00 %		10,00 %	
Lower limit of tolerance	0,067		0,238		0,384	
Upper limit of tolerance	0,101		0,356		0,577	
Type B outliers	3		1		2	
Type E outliers	3		3		2	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	48		48		43	

## 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 >3,5	
L: Differing laboratory mean (Grubbs II)	Grubbs für 2

## Butyraldehyde Z score

Unit	mg/m <sup>3</sup>	
10	0,800	0,00
11	0,800	0,00
30	0,839	0,49
37	0,970	2,13 E
44	0,806	0,08
55	0,751	-0,61
56	0,790	-0,12
60	0,843	0,54
62	0,835	0,44
63	0,726	-0,92
81	0,703	-1,21
90	0,789	-0,13
94	0,795	-0,06
99	0,745	-0,68
100	0,762	-0,47
107	0,815	0,19
111	0,769	-0,38
114	0,797	-0,03
123	0,927	1,59
131	0,803	0,04
135	0,817	0,22
144	0,856	0,71

## Butyraldehyde Z score

151	0,714	-1,07
165	0,800	0,00
167	0,804	0,05
168	0,800	0,00
174	0,815	0,19
186	0,814	0,18
192	0,665	-1,68
199	0,872	0,91
207	0,792	-0,10
208	0,843	0,54
211	0,832	0,40
214	0,810	0,13
216	1,280	6,01 BE
224	0,841	0,52
228	0,709	-1,14
256	0,870	0,88
263	0,804	0,05
264	0,690	-1,37
265	0,249	-6,89 BE
267	0,772	-0,35
-	-	--
Method	ISO 5725-2	
Assessment	Z ≤2,00	
Mean	0,800	
Reproducibility s.d.	0,060	
Rel. reproducibility s.d.	7,45 %	
Reference value	0,805	
Target s.d.	0,080	
Rel. target s.d.:	10,00 %	
Lower limit of tolerance	0,640	
Upper limit of tolerance	0,960	
Type B outliers	2	
Type E outliers	3	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	40	

# Summary of laboratory test results

Sample 2

Unit	Formaldehyde Z score		Acetaldehyde Z score		Butyraldehyde Z score	
	mg/m <sup>3</sup>		mg/m <sup>3</sup>		mg/m <sup>3</sup>	
10	0,194	-0,38	0,918	-0,22	0,460	0,07
11	0,210	0,41	0,980	0,44	0,470	0,29
30	0,206	0,21	0,929	-0,11	0,492	0,77
37	0,180	-1,08	0,940	0,01	0,480	0,50
44	0,196	-0,28	0,973	0,36	0,464	0,15
47	0,190	-0,58				
55	0,205	0,16	0,845	-1,00	0,409	-1,05
56	0,200	-0,08	0,940	0,01	0,450	-0,15
60	0,205	0,17	0,972	0,35	0,478	0,45
62	0,204	0,11	0,937	-0,02	0,464	0,15
63	0,179	-1,12	0,920	-0,20	0,417	-0,87
67	0,190	-0,58	0,885	-0,57		
68	0,211	0,46				
69	0,233	1,56	0,848	-0,97		
81	0,263	3,04 BE	0,719	-2,34 E	0,421	-0,79
86	0,200	-0,08	0,950	0,12		
90	0,208	0,31	0,969	0,32	0,453	-0,09
94	0,200	-0,08	0,947	0,09	0,463	0,13
96	0,200	-0,08	0,890	-0,52		
99	0,214	0,61	1,015	0,81	0,475	0,40
100	0,196	-0,28	0,870	-0,73	0,427	-0,66
107	0,209	0,36	0,950	0,12	0,452	-0,11
111	0,204	0,11	0,964	0,27	0,453	-0,09
114	0,186	-0,78	0,855	-0,89	0,447	-0,22
123	0,094	-5,34 BE	1,130	2,04 E	0,470	0,29
131	0,208	0,31	0,963	0,26	0,462	0,11
135	0,212	0,51	0,974	0,37	0,480	0,50
144	0,202	0,02	0,886	-0,56	0,468	0,24
147	0,189	-0,63	0,930	-0,09		
151	0,203	0,07	0,982	0,46	0,413	-0,96
165	0,202	0,02	0,942	0,03	0,466	0,20
167	0,190	-0,58	0,923	-0,17	0,471	0,31
168	0,196	-0,28	0,787	-1,62	0,458	0,02
174	0,201	-0,04	0,994	0,59	0,478	0,46
186	0,192	-0,48	0,945	0,06	0,461	0,09
192	0,193	-0,43	0,956	0,18	0,383	-1,62
195	0,205	0,16	0,823	-1,24		
199	0,210	0,41	0,967	0,30	0,510	1,15
207	0,186	-0,78	0,924	-0,16	0,451	-0,13
208	0,222	1,01	1,029	0,96	0,490	0,72
211	0,211	0,46	1,041	1,09	0,479	0,48
214	0,200	-0,08	0,940	0,01	0,470	0,29
216	0,215	0,66	0,992	0,57	0,752	6,46 BE
224	0,203	0,07	0,980	0,44	0,495	0,83
228	0,208	0,30	0,978	0,42	0,409	-1,05
256	0,220	0,91	0,940	0,01	0,480	0,50
263	0,211	0,46	0,989	0,53	0,468	0,24
264	0,200	-0,08	1,200	2,78 BE	0,400	-1,25
265	0,072	-6,43 BE	0,304	-6,76 BE	0,145	-6,83 BE

	Formaldehyde Z score		Acetaldehyde Z score		Butyraldehyde Z score	
267	0,192	-0,48	0,848	-0,97	0,442	-0,33
280	0,190	-0,58	1,050	1,18		
-	-	--	-	--	-	--
Method	ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	Z <=2,00		Z <=2,00		Z <=2,00	
Mean	0,202		0,939		0,457	
Reproducibility s.d.	0,011		0,070		0,028	
Rel. reproducibility s.d.	5,33 %		7,48 %		6,13 %	
Reference value	0,222		1,000		0,452	
Target s.d.	0,020		0,094		0,046	
Rel. target s.d.:	10,00 %		10,00 %		10,00 %	
Lower limit of tolerance	0,161		0,751		0,366	
Upper limit of tolerance	0,242		1,127		0,548	
Type B outliers	3		2		2	
Type E outliers	3		4		2	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	48		47		40	
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 >3,5						
L: Differing laboratory mean (Grubbs II)	Grubbs für 2					

# Summary of laboratory test results

Sample 3

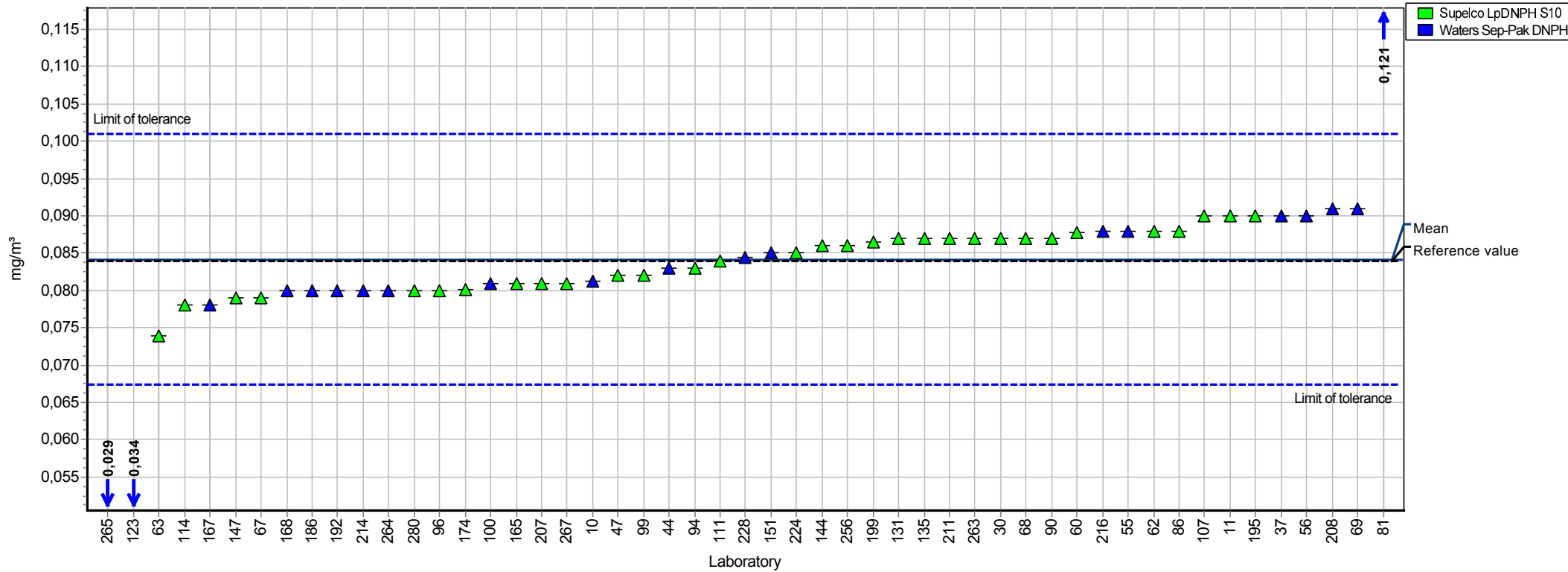
Unit	Formaldehyde Z score		Acetaldehyde Z score		Butyraldehyde Z score	
	mg/m <sup>3</sup>		mg/m <sup>3</sup>		mg/m <sup>3</sup>	
10	0,125	-0,54	0,498	-0,41	0,950	-0,29
11	0,140	0,60	0,540	0,40	1,010	0,33
30	0,135	0,22	0,512	-0,14	1,041	0,64
37	0,120	-0,91	0,520	0,01	1,100	1,25
44	0,130	-0,16	0,546	0,51	1,003	0,25
47	0,130	-0,16				
55	0,142	0,75	0,487	-0,62	0,930	-0,49
56	0,130	-0,16	0,520	0,01	0,930	-0,49
60	0,133	0,05	0,528	0,16	1,003	0,25
62	0,135	0,22	0,528	0,17	1,016	0,39
63	0,117	-1,14	0,483	-0,70	0,922	-0,57
67	0,125	-0,54	0,495	-0,47		
68	0,138	0,45				
69	0,149	1,31	0,458	-1,17		
81	0,181	3,70 BE	0,459	-1,16	0,843	-1,38
86	0,130	-0,16	0,524	0,09		
90	0,136	0,30	0,534	0,28	0,969	-0,09
94	0,131	-0,08	0,518	-0,03	0,979	0,01
96	0,130	-0,16	0,490	-0,57		
99	0,141	0,67	0,559	0,76	1,012	0,35
100	0,127	-0,36	0,477	-0,81	0,910	-0,70
107	0,141	0,67	0,541	0,42	1,007	0,29
111	0,133	0,07	0,528	0,17	0,958	-0,21
114	0,118	-1,07	0,463	-1,08	0,949	-0,30
123	0,043	-6,74 BE	0,601	1,57	1,029	0,52
131	0,137	0,37	0,526	0,13	0,999	0,21
135	0,138	0,45	0,532	0,24	1,019	0,42
144	0,134	0,14	0,490	-0,57	1,046	0,69
147	0,127	-0,39	0,519	-0,01		
151	0,135	0,22	0,544	0,47	0,886	-0,94
165	0,131	-0,08	0,518	-0,03	0,994	0,16
167	0,124	-0,61	0,503	-0,31	0,998	0,20
168	0,127	-0,39	0,433	-1,66	0,984	0,06
174	0,129	-0,26	0,541	0,42	1,010	0,33
186	0,123	-0,69	0,520	0,01	0,998	0,20
192	0,128	-0,31	0,534	0,28	0,828	-1,54
195	0,145	0,98	0,487	-0,61		
199	0,139	0,49	0,535	0,30	1,072	0,96
207	0,127	-0,39	0,517	-0,05	0,986	0,08
208	0,146	1,05	0,568	0,94	1,044	0,67
211	0,137	0,37	0,562	0,82	1,024	0,47
214	0,130	-0,16	0,520	0,01	1,030	0,53
216	0,138	0,45	0,530	0,21	1,581	6,16 BE
224	0,133	0,07	0,559	0,76	1,050	0,73
228	0,136	0,26	0,539	0,39	0,877	-1,04
256	0,130	-0,16	0,500	-0,37	0,950	-0,29
263	0,137	0,37	0,545	0,49	0,996	0,18
264	0,130	-0,16	0,600	1,55	0,840	-1,41
265	0,027	-7,96 BE	0,095	-8,17 BE	0,172	-8,24 BE

	Formaldehyde Z score		Acetaldehyde Z score		Butyraldehyde Z score	
267	0,124	-0,61	0,466	-1,03	0,936	-0,43
280	0,120	-0,91	0,530	0,21		
-	-	--	-	--	-	--
Method	ISO 5725-2		ISO 5725-2		ISO 5725-2	
Assessment	Z <=2,00		Z <=2,00		Z <=2,00	
Mean	0,132		0,519		0,978	
Reproducibility s.d.	0,007		0,034		0,063	
Rel. reproducibility s.d.	5,47 %		6,59 %		6,45 %	
Reference value	0,140		0,528		1,020	
Target s.d.	0,013		0,052		0,098	
Rel. target s.d.:	10,00 %		10,00 %		10,00 %	
Lower limit of tolerance	0,106		0,415		0,783	
Upper limit of tolerance	0,159		0,623		1,174	
Type B outliers	3		1		2	
Type E outliers	3		1		2	
No. of laboratories after elimination of outliers type A-D and F (without laboratories that only gave states but no measured values)	48		48		40	
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 >3,5						
L: Differing laboratory mean (Grubbs II)	Grubbs für 2					



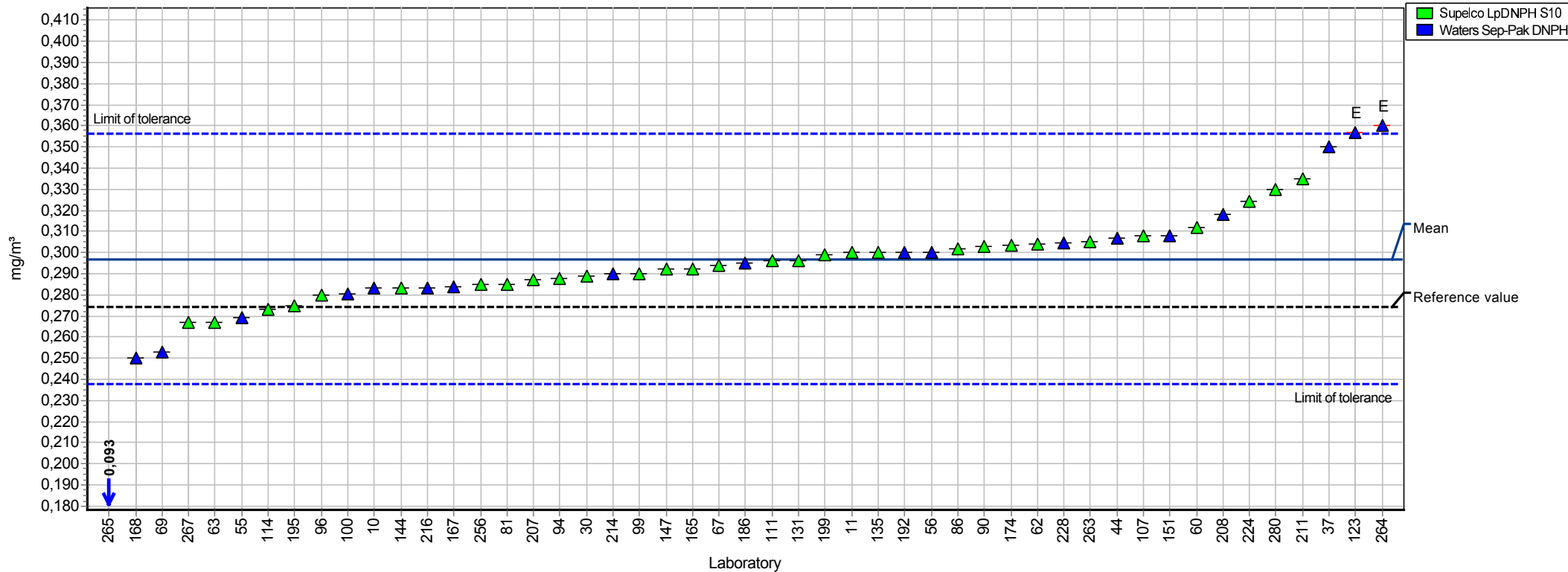
## Summary results

<b>Measurand:</b>	<b>Formaldehyde</b>	<b>Mean:</b>	<b>0,084 mg/m<sup>3</sup></b>
<b>Sample:</b>	<b>1</b>	<b>Reprod. s.d.:</b>	<b>0,004 mg/m<sup>3</sup></b>
<b>Method:</b>	<b>ISO 5725-2</b>	<b>Rel.reprod. s.d.:</b>	<b>5,01%</b>
<b>No. of laboratories:</b>	<b>48</b>	<b>Reference value:</b>	<b>0,084 mg/m<sup>3</sup></b>
<b>Rel.target s.d.:</b>	<b>10,00% (Limited)</b>	<b>Range of tolerance:</b>	<b>0,067 - 0,101 mg/m<sup>3</sup> ( Z-Score  &lt;= 2,00)</b>



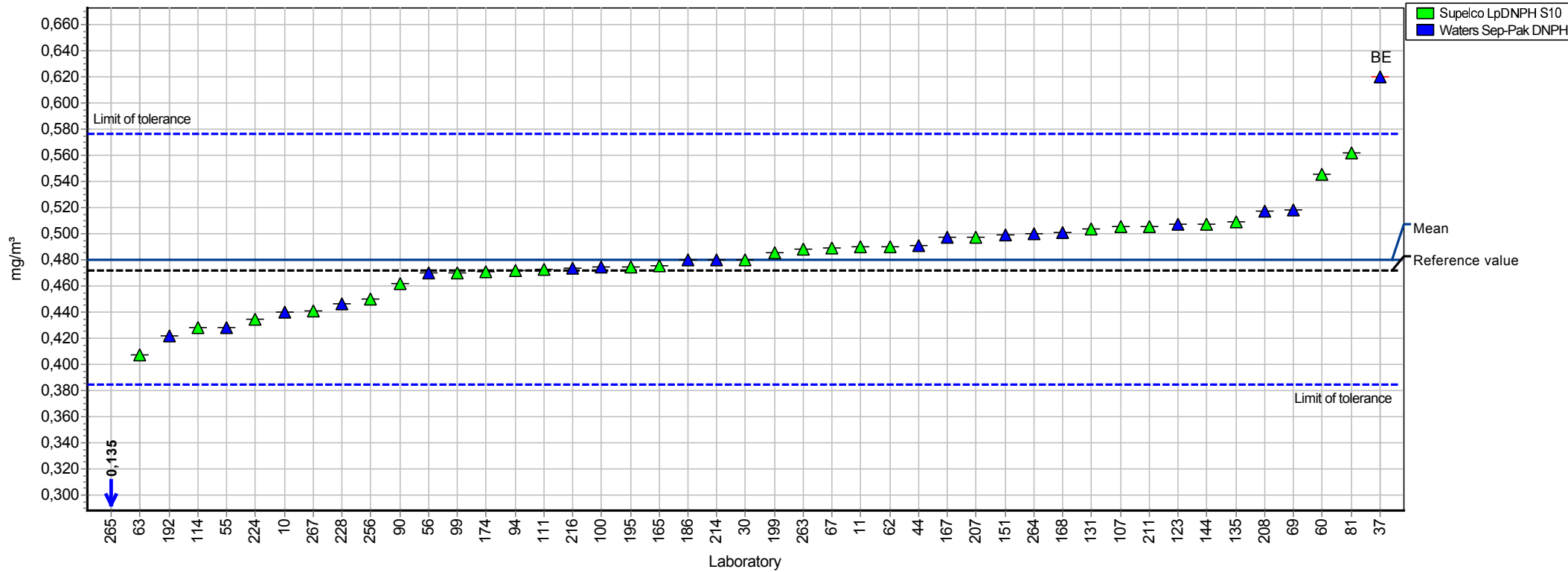
## Summary results

Measurand:	Acetaldehyde	Mean:	0,297 mg/m <sup>3</sup>
Sample:	1	Reprod. s.d.:	0,023 mg/m <sup>3</sup>
Method:	ISO 5725-2	Rel.reprod. s.d.:	7,73%
No. of laboratories:	48	Reference value:	0,274 mg/m <sup>3</sup>
Rel.target s.d.:	10,00% (Limited)	Range of tolerance:	0,238 - 0,356 mg/m <sup>3</sup> ( Z-Score  <= 2,00)



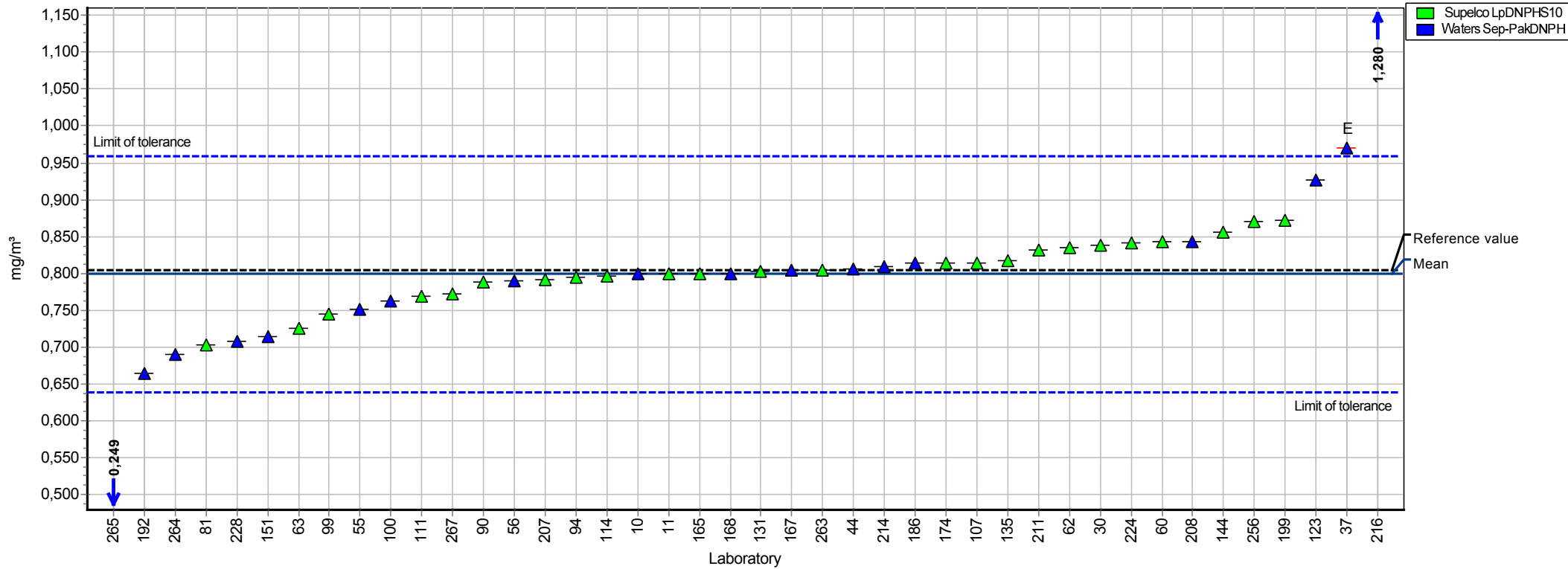
## Summary results

Measurand:	Propionaldehyde	Mean:	0,481 mg/m <sup>3</sup>
Sample:	1	Reprod. s.d.:	0,032 mg/m <sup>3</sup>
Method:	ISO 5725-2	Rel.reprod. s.d.:	6,62%
No. of laboratories:	43	Reference value:	0,472 mg/m <sup>3</sup>
Rel.target s.d.:	10,00% (Limited)	Range of tolerance:	0,384 - 0,577 mg/m <sup>3</sup> ( Z-Score  <= 2,00)



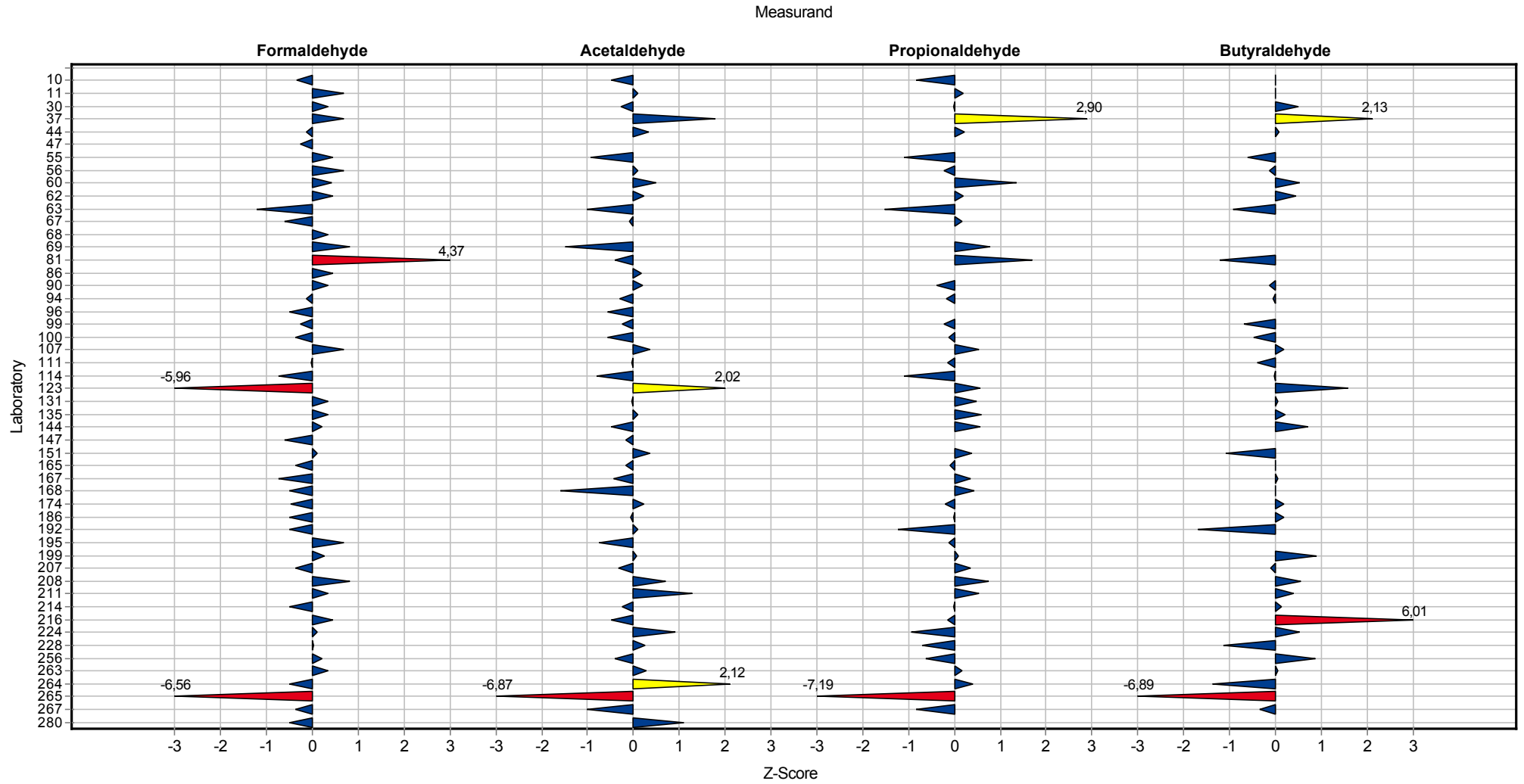
## Summary results

<b>Measurand:</b>	<b>Butyraldehyde</b>	<b>Mean:</b>	<b>0,800 mg/m<sup>3</sup></b>
<b>Sample:</b>	<b>1</b>	<b>Reprod. s.d.:</b>	<b>0,060 mg/m<sup>3</sup></b>
<b>Method:</b>	<b>ISO 5725-2</b>	<b>Rel.reprod. s.d.:</b>	<b>7,45%</b>
<b>No. of laboratories:</b>	<b>40</b>	<b>Reference value:</b>	<b>0,805 mg/m<sup>3</sup></b>
<b>Rel.target s.d.:</b>	<b>10,00% (Limited)</b>	<b>Range of tolerance:</b>	<b>0,640 - 0,960 mg/m<sup>3</sup> ( Z-Score  &lt;= 2,00)</b>



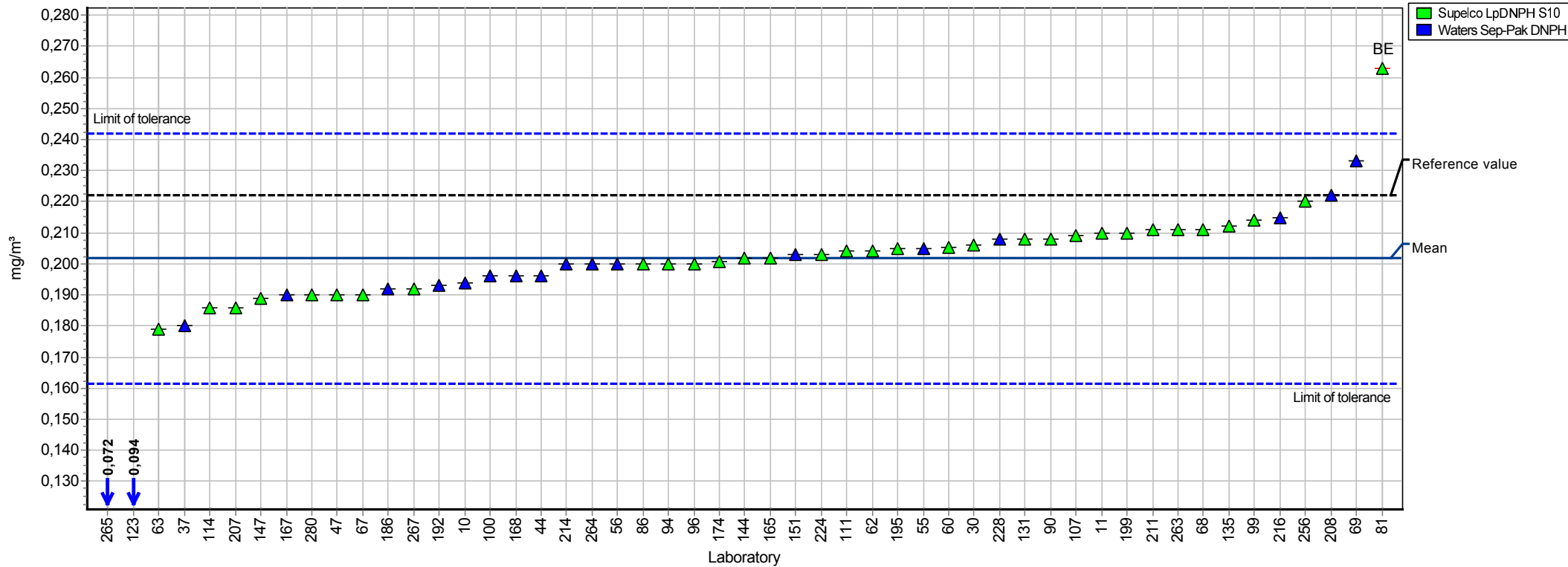
# Sample chart of Z-scores

Sample 1



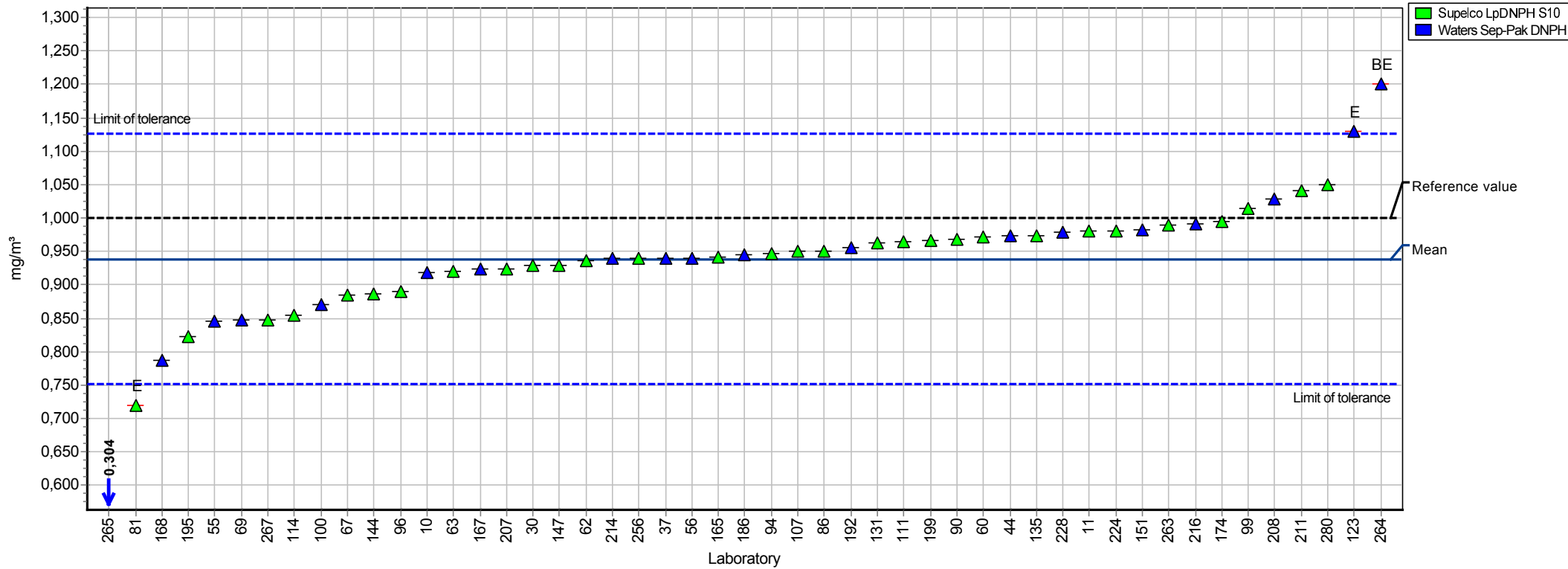
## Summary results

Measurand:	Formaldehyde	Mean:	0,202 mg/m <sup>3</sup>
Sample:	2	Reprod. s.d.:	0,011 mg/m <sup>3</sup>
Method:	ISO 5725-2	Rel.reprod. s.d.:	5,33%
No. of laboratories:	48	Reference value:	0,222 mg/m <sup>3</sup>
Rel.target s.d.:	10,00% (Limited)	Range of tolerance:	0,161 - 0,242 mg/m <sup>3</sup> ( Z-Score  <= 2,00)



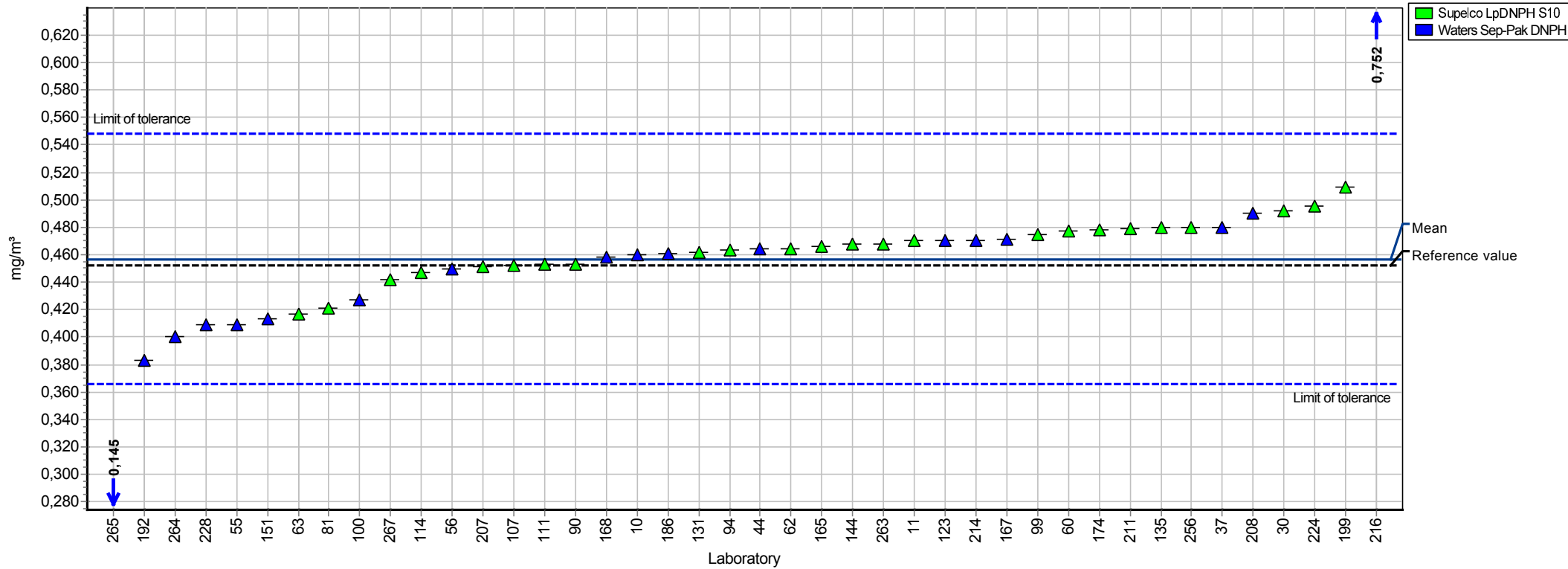
## Summary results

Measurand:	Acetaldehyde	Mean:	0,939 mg/m <sup>3</sup>
Sample:	2	Reprod. s.d.:	0,070 mg/m <sup>3</sup>
Method:	ISO 5725-2	Rel.reprod. s.d.:	7,48%
No. of laboratories:	47	Reference value:	1,000 mg/m <sup>3</sup>
Rel.target s.d.:	10,00% (Limited)	Range of tolerance:	0,751 - 1,127 mg/m <sup>3</sup> ( Z-Score  <= 2,00)



## Summary results

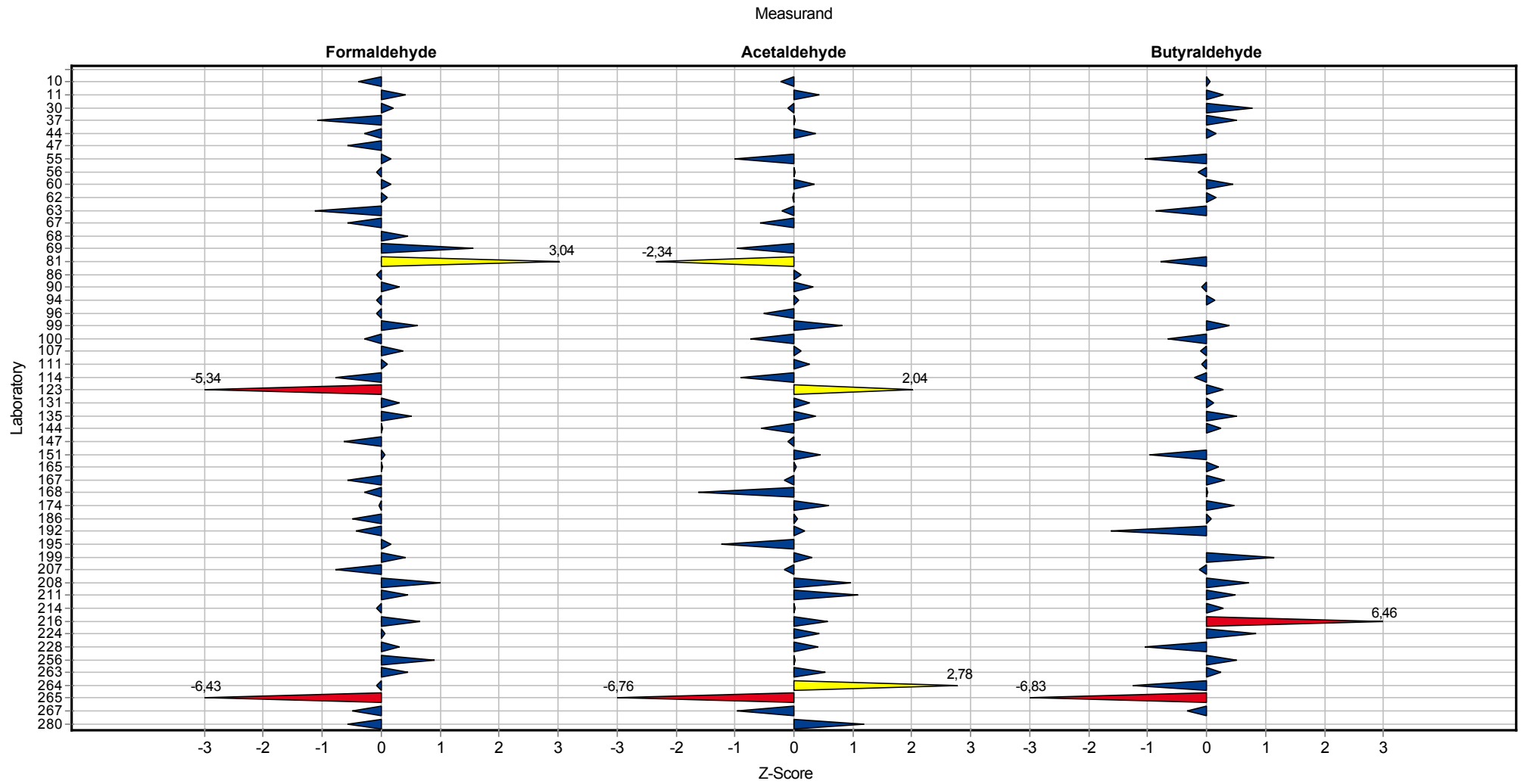
Measurand:	Butyraldehyde	Mean:	0,457 mg/m <sup>3</sup>
Sample:	2	Reprod. s.d.:	0,028 mg/m <sup>3</sup>
Method:	ISO 5725-2	Rel.reprod. s.d.:	6,13%
No. of laboratories:	40	Reference value:	0,452 mg/m <sup>3</sup>
Rel.target s.d.:	10,00% (Limited)	Range of tolerance:	0,366 - 0,548 mg/m <sup>3</sup> ( Z-Score  <= 2,00)





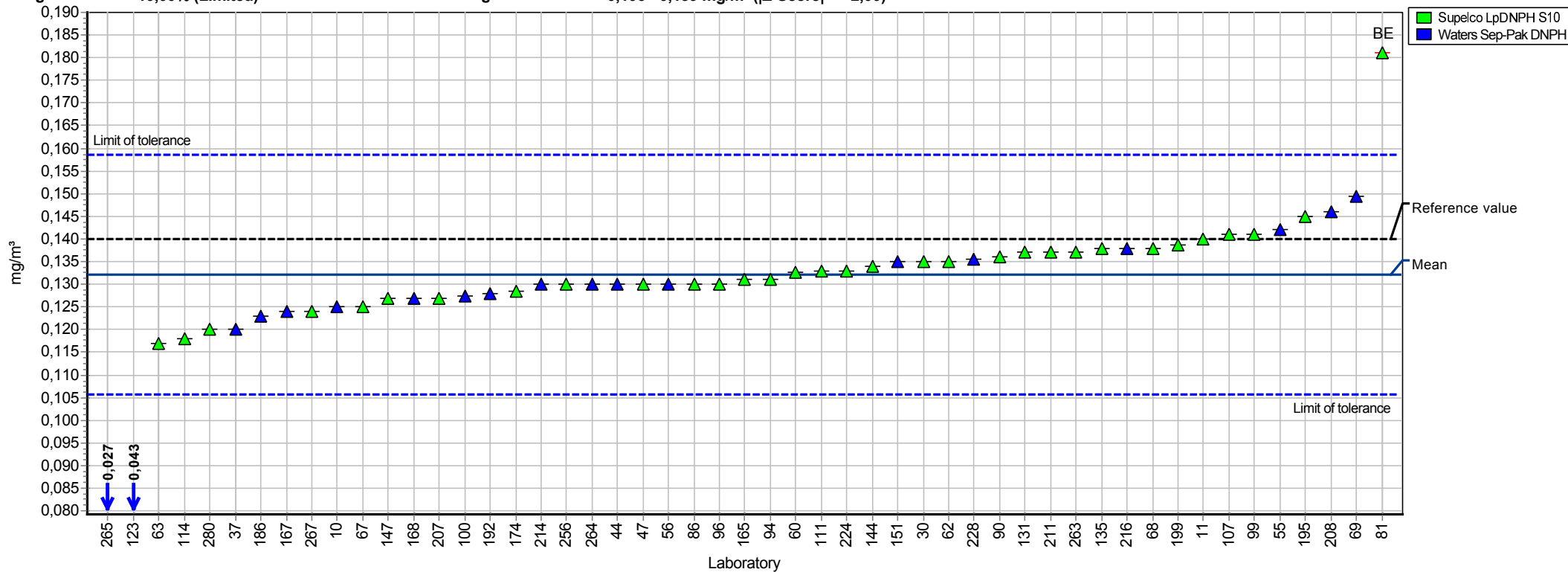
# Sample chart of Z-scores

Sample 2



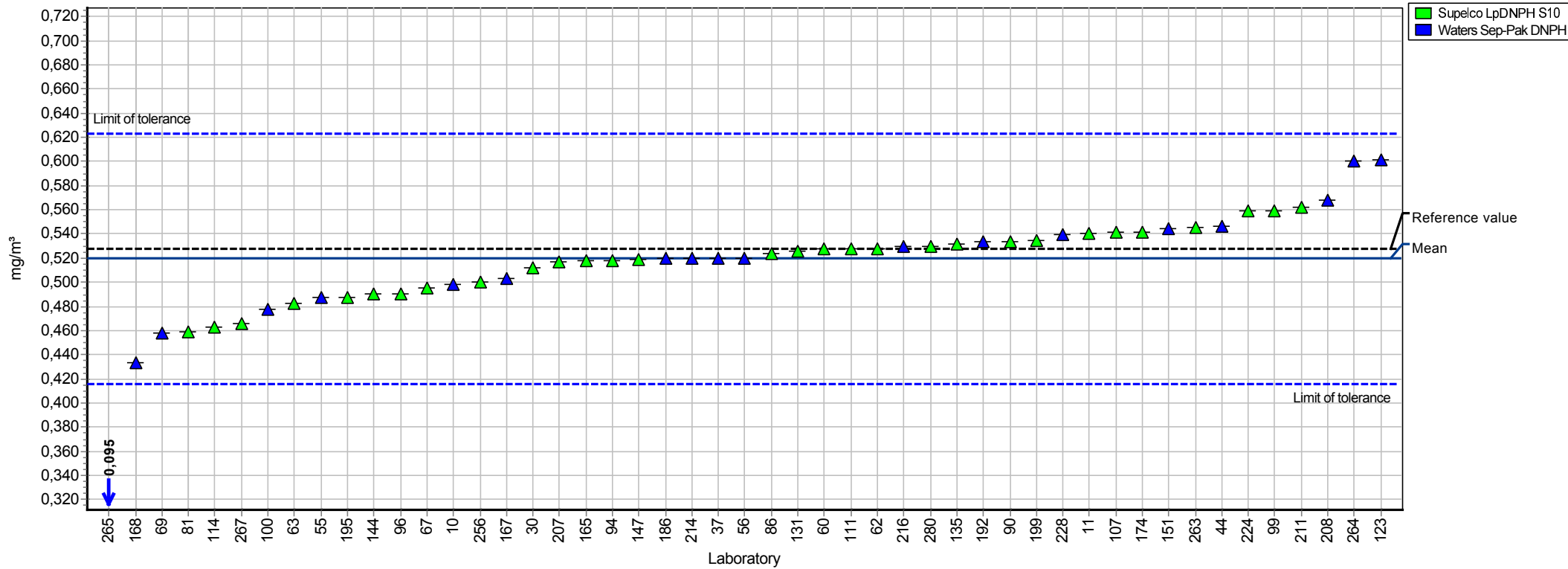
## Summary results

<b>Measurand:</b>	Formaldehyde	<b>Mean:</b>	0,132 mg/m <sup>3</sup>
<b>Sample:</b>	3	<b>Reprod. s.d.:</b>	0,007 mg/m <sup>3</sup>
<b>Method:</b>	ISO 5725-2	<b>Rel.reprod. s.d.:</b>	5,47%
<b>No. of laboratories:</b>	48	<b>Reference value:</b>	0,140 mg/m <sup>3</sup>
<b>Rel.target s.d.:</b>	10,00% (Limited)	<b>Range of tolerance:</b>	0,106 - 0,159 mg/m <sup>3</sup> ( Z-Score  <= 2,00)



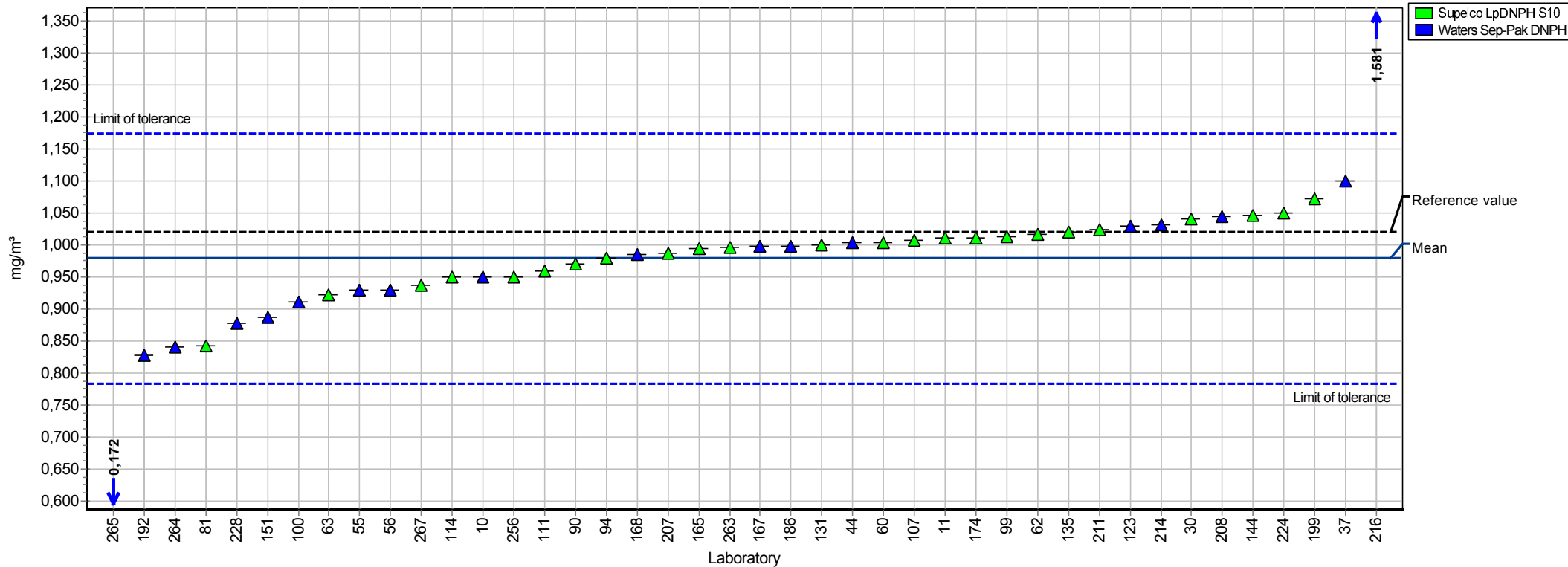
## Summary results

Measurand:	Acetaldehyde	Mean:	0,519 mg/m <sup>3</sup>
Sample:	3	Reprod. s.d.:	0,034 mg/m <sup>3</sup>
Method:	ISO 5725-2	Rel.reprod. s.d.:	6,59%
No. of laboratories:	48	Reference value:	0,528 mg/m <sup>3</sup>
Rel.target s.d.:	10,00% (Limited)	Range of tolerance:	0,415 - 0,623 mg/m <sup>3</sup> ( Z-Score  <= 2,00)



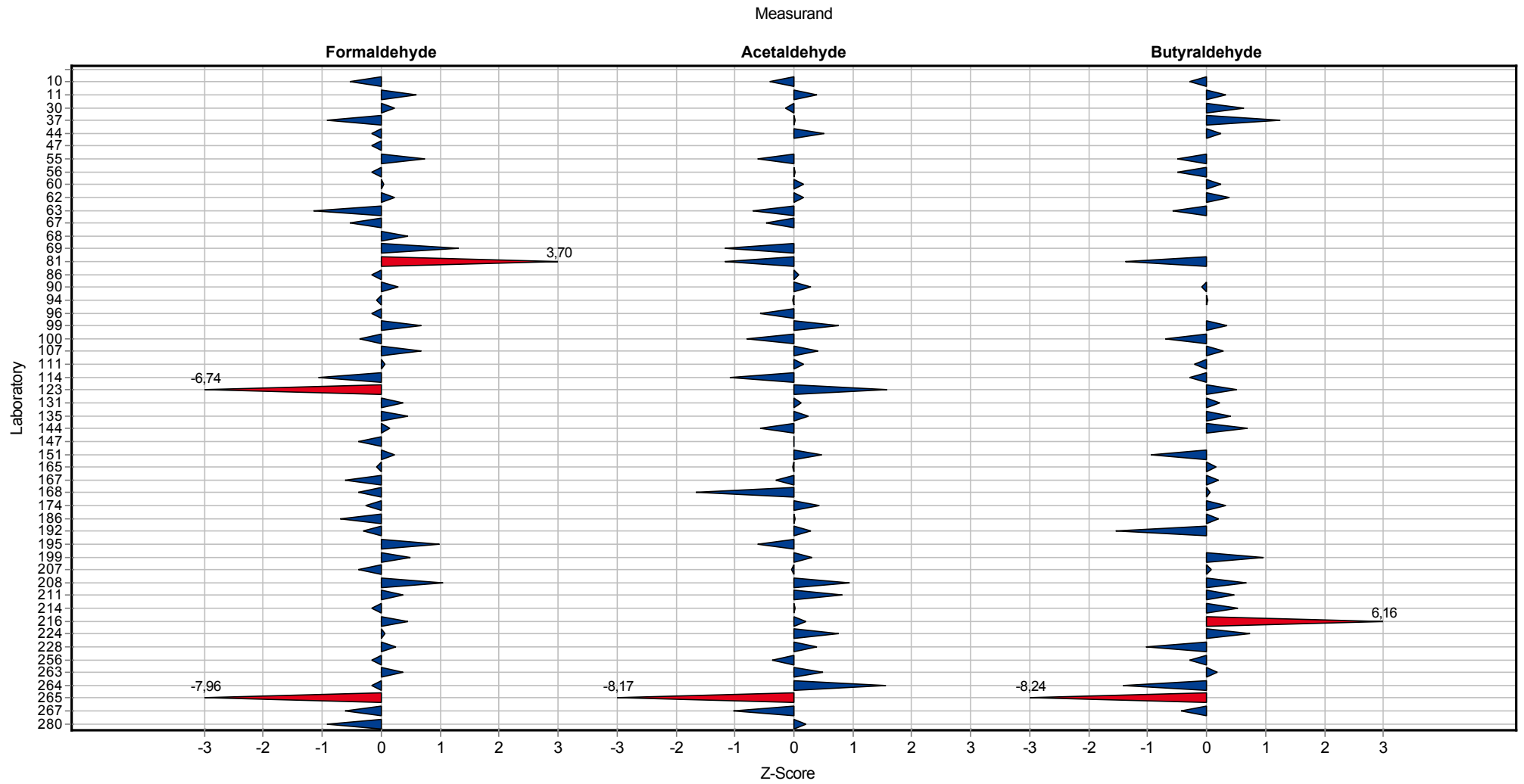
## Summary results

<b>Measurand:</b>	<b>Butyraldehyde</b>	<b>Mean:</b>	<b>0,978 mg/m<sup>3</sup></b>
<b>Sample:</b>	<b>3</b>	<b>Reprod. s.d.:</b>	<b>0,063 mg/m<sup>3</sup></b>
<b>Method:</b>	<b>ISO 5725-2</b>	<b>Rel.reprod. s.d.:</b>	<b>6,45%</b>
<b>No. of laboratories:</b>	<b>40</b>	<b>Reference value:</b>	<b>1,020 mg/m<sup>3</sup></b>
<b>Rel.target s.d.:</b>	<b>10,00% (Limited)</b>	<b>Range of tolerance:</b>	<b>0,783 - 1,174 mg/m<sup>3</sup> ( Z-Score  &lt;= 2,00)</b>



# Sample chart of Z-scores

Sample 3



## Questions and Answers

Participant	Analytical method	Start sample preparation	Storage time after desorption
10	NFX43-264	19/09/2017	1 Day refrigerator
11	ISO 16000-3	22/09/2017	no storage after desorption
30	ISO 16000-3	21/09/2017	< 12 h at room temp
37	In Anlehnung an IFA 6045	26.09.2017	Kühlschrank
44	ISO-16000-3:2011	2017-09-27	refrigerator, one week
47	BGIA 6045	20.09.2017	Kühlschrank, in der Zeit zwischen 2 Messungen
55	HPLC - Photodiode array detector	19/09/2017	8 days - 6°C
56	U-HPLC/UV	19/09/17	one day
60	16000-3	25/09/2017	1h
62	NF X43-264	28/09/2017	10 days in refrigerator
63	DIN ISO 16000-3	15.09.2017	gleich gemessen
67	method derived from NIOSH 2016 and NIOSH 2018	I started on the 25th of september 2017	I desorbed on 25th of september and I stored at 4 °C
68	interne Arbeitsanweisung	20.09.17	7 Tage im Kühlschrank
69	HPLC	26/09/2017	They were analyzed the same day that the desorption
81	LC-MS	11and 12/09/17	30 minutes at room temp
86	Métropol	19/09/2017	16h at room temperature
90	METROPOL M-4 + M-66	26/09/2017	0
94	ISO 16000-3	22.09.2017	Probeneingang 15.09.2017; Lagerung Kühlschrank bis 22.09.2017
96	Hausmethode	26.09.2017	nein
99	metropol M-4	26/09/2017	less than one day at room temperature
100	NF X43-264	15-09-2017	3 days at 4°C
107	Hausmethode in Anlehnung an IFA Methode 6045	20.09.2017	nein
111	IFA 6045	19.09.2017	10 Tage im Kühlschrank
114	HPLC/UV based on NF X43-264 and metropol M-4	14/09/17	some hours in the autosampler (10°C)
123	NF ISO 16000-3	19/09/2017	no storage
131	METROPOL 66	02/10/17	8 JOURS
135	HPLC-DAD IFA-Arbeitsmappe 6045	15.09.2017	1 Tag
144	METROPOL M4 & M66	20/09/2017	Analysed direct after désorption
147	Métropol M-4 et M-66	21/09/2017	0
151	HPLC UV DAD	19/09/2017	0
165	ISO 16000-3	19/09/2017	nein

## Round-robin test Aldehydes 2017

Participant	Analytical method	Start sample preparation	Storage time after desorption
167	HPLC	27.09.2017	30 min for first sample
168	METROPOL	12/10/2017	1 HEURE
174	HPLC/UV	04/10/17	none
186	N EN ISO 16000-3	19/09/2017	No storage after desorption / Direct analysis
192	ISO16000-3	2017/9/20	Set in the analyzer immediately after desorption. Roomtemp 20.7 degC
195	NIOSH 2016	25-09-17	4 DAYS AT +-10°C
199	in Anlehnung an DIN 16000-3:2013-01	25.11.2017	Tiefkühlschrank
207	DIN-ISO-16000-3	25.09.2017	-
208	ISO 16000-3	19.9.2017	2 h roomtemp. in sampler
211	Nach interner Methode PV 250	28.09.17	nein
214	DIN ISO 16000-3	15.09.2017	nein, sofort gemessen
216	High Performance Liquid Chromatography with UV detector	05 Oct 2017	1 week, refrigerated at -2 degree C
224	LC-UV	17/10/2017	Less than one day, roomtemperature
228	ISO 16000-3	29.9.2017	RT
256	Geopro nach EPA TO-11A	21.09.2017	1. Analyse direkt nach Extraktion, danach im Kühlschrank
263	IFA 6045	15.09.2017	6 Tage bei 6°C
264	INONIC CHROMATOGRAPHY	21/09/17	7 DAYS
265	DIN ISO 16000-3	20.09.2017	7 Tage / -18°C
267	interne Methode SOP-B-35	19/09/2017	0 Tage
280	HPLC/DAD	21 September 2017	Storage after desorption : 2h at RT

Participant	Date of analysis	Desorption solution	Volume of desorption solution
10	20/09/2017	Acetonitrile	2
11	22/09/2017	acetonitrile	5 mL
30	21/09/2017 and 04/10/2017	acetonitrile	5 ml
37	29.09.2017	Acetonitril	10 ml
44	2017-09-28	acetonitrile	5ml
47	20.09.2017, 09.10.2017	Acetonitrile	5
55	29/09/2017	acetonitrile	3
56	20/09/17	Acetonitril was used as desorption solution	5 mL
60	25/09/17	Acétonitrile	3 mL
62	10/10/2017	Acetonitrile	5 mL

## Round-robin test Aldehydes 2017

Participant	Date of analysis	Desorption solution	Volume of desorption solution
63	15.09.2017	Acetonitril	5
67	I analyzed the samples on the 29th of september	Acetonitrile was the desorption solution.	10 ml
68	27.09.17	Acetonitril	10mL
69	26/09/2017	Acetonitrile	5 ml
81	11 and 12/09/17	acetonitrile	10mL
86	20/09/17	ACN	5
90	26/09/2017	CH3CN	3 ml
94	22.09.2017	Acetonitril	5 ml
96	26.09.2017	Wasser/Acetonitril	5
99	27/09/2017	acetonitrile	5 ml
100	18-09-2017	acetonitrile	4 ml
107	20.09.2017	Acetonitril	20ml (10ml Acetonitril, anschl. 1zu2 mit Wasser verdünnt)
111	29.09.2017	Acetonitril	5
114	14/09/17	Desorption with acetonitrile	2 mL
123	19/09/2017	acetonitrile	5
131	10/10/17	ACETONITRILE	10 ML
135	15.09.2017	Acetonitril	2 ml
144	20/09/2017	Acetonitril	5
147	21/09/2017	Acétonitrile	10
151	19/09/2017	Acetonitrile	10
165	19/09/2017	Acetonitril	3 ml
167	27.09.2017	Acetonitdle (AcN)	6 mL (filled to 10 mLwith
168	12/10/201	ACETONITRILE	10
174	04/10/17	acetonitrile	5
186	19/09/2019	ACN	10mL
192	2017/9/20,21	Acetonitrile	5 mL
195	29-09-17	ACETONITRILE	5mL
199	25.11.2017	Acetonitril	3mL
207	25.09.2017	ACN/H2O 60/40 + 5 mmol (NH4)HCO3	5
208	19.9.2017	Acetonitrile	3 ml
211	28.09.17-29.09.17	Acetonitril	10 mL
214	15.09.2017	ACN	5 ml
216	05 Oct 2017	Acetonitrile, LCMS grade	5 ml / 10 ml



## Round-robin test Aldehydes 2017

Participant	Date of analysis	Desorption solution	Volume of desorption solution
224	17/10/2017	Acetonitrile	5 mL
228	29.9.2017	ACN	10 ml
256	21.-27.09.2017	Acetonitril	2.5
263	21.09.2017	Acetonitril	5 mL
264	21/09/17	WATER	10
265	20.09.2017	Acetonitril	2ml
267	19/09/2017	Acetonitrile	5 ml
280	21 September 2017	Acetonitrile	3 mL concentrated to 1 mL

Participant	Chromatography system
10	Perkin Elmer Series 200
11	HPLC-UV
30	Waters Alliance 2695 + PDA 2996
37	Agilent 1100 Series; DAD
44	PDA
47	Shimadzu LC-20AD, SPD-M20A, SIL-20AC
55	Acquity Waters UPLC system
56	[RS Pump, Rs Diode Array, Rs Autosampler] Ultimate 3000 (Dionex)
62	Perkin Elmer serie 200 with UV/Vis detector
63	Shimadzu, LC-20AT; SPD-M20A; SIL-10AF
67	I used a quaternary pump, a UV/VIS/DAD detector and an autosampler
68	Agilent HPLC 1260 Infinity
69	Elite La Chrom Merck Hitachi Pump: L-2130; Sampler: L-2200; Detector: UV-visible L-2420
81	waters Hclass and QDA
86	Agilent 1260
90	HITACHI pump L-2130, autosampler L-2200, DAD L-2455
94	Agilent 1260 Infinity
96	Agilent 1260 Infinity II
99	agilent 1200
100	LC-UV
107	Dionex Ultimate 3000
111	HPLC Thermo UltiMate 3000/Photodiodearraydetektor Thermo DAD-3000

## Round-robin test Aldehydes 2017

Participant	Chromatography system
114	Thermoscientific HPLC U3000, UV detector
123	HPLC/DAD
131	ISOCRATIQUE - DETECTEUR UV
135	Agilent 1290 Series
144	Agilent 1200 - DAD
147	Waters Alliance 2695 et DAD2998
151	WATERS Acuity H class
165	HPLC Agilent 1100-DAD
167	Perkin Elmer Series 200 LC system
168	waters alliance detecteur 2489
174	isocratic / UV
186	HPLC-PAD (Waters)
192	Agilent 1260, Agilent 1100 (Agilent Technologies)
195	Infinity 1290 Agilent
199	Agilent
207	Agilent 1260 Infinity LC DAD
208	Quaternary gradient pump, PDA detector
211	LPG-3400 SD binäre Gradientenpumpe ,WPS-3000TSL Autosampler, UV-Detektor DAD3000, Wellenlängenbereich: 190 - 800 nm von Thermo Fisher
214	Agilent 1100, binäre Hochdruck-Gradientenpumpe, DAD, Autosampler ja
216	UV Detector
224	LC-UV, Acquity Binary solvent manager
228	Agilent Infinity 1260
256	Agilent 1100 Series; Pumpe: G1311A Quaternary Pump, Detektor: G1315B, Autosampler: G1313A
263	Thermo Fisher LPG-3400SD, ThermoFisher DAD 3000, ThermoFisher,WPS-3000SL
265	Shimadzu
267	Agilent (Quat Pump) 1260, DAD
280	Agilent Technologies Infinity 1260 / G1315D (DAD) / G1311B (Quat Pump)

Participant	autosampler	Analytical column
10	No	Browlee C18 150x4,6mm 5µm
11	Perkin Elmer : 4 °C	Perkin Elmer : 1 column C18
30	Yes	Allure AK 200 x 4,6 mm 5 µm

Round-robin test Aldehydes 2017

Participant	autosampler	Analytical column
37	nein	Perfect Chrom 250 x 4,0 mm, C18, 5µm
44	/	ACQUITY UPLC BEH C18 1.7µm 2.1*50mm column
47	ja, 5°C	Shodex Silica 5CN 4D
55	yes/20°C	Waters Acquity UPLC BEH Phenyl
56	A refrigerated autosampler was used and the temperature was adjusted at 15°C	Acclaim RSLC Carbonyl (2.2 µm - d.i: 2.1 mm - L:100 mm)
60	non	
62	no	Ascentis RP Amide HPLC Column
63	nein	Ascentis RP-Amide (Supelco)
67	NO	I used a ALLTECH- ALLTIMA C18 3µ particles, 150mm x 3,2mm
68	Nein	Poroshell 120 EC-C18 4,6x50mm 2,7µm
69	No	Ascentis RP-Amide 25 cm x 4,6 mm
81	no	waters BEH C18
86	no	C18
90	no -ambient temperature	Allure AK 5 µm - 200 x 4.6 mm
94	Nein	Agilent C18, 3.5 µm, 3.0 x 150 mm
96	ja / 10°C	Luna C18(2); 100 x 4,6 mm / 3µm
99	agilent 1200	gemini C18
100	no	allure AK 200*4*5µm
107	nein	Supelcosil LC18, 25 x 4,6 cm x 5µm
111	nein	Phenomenex Synergy Max-RP80A 250 x 4,6 mm 4µm
114	refrigerated autosampler, 10°C	Acclaim 120, C18, 5µm, 250mmx4.6mm
123	yes, 4°C	supelco discovery C 18 (250*4,6 mm, 5µm)
131	NON	UPTISHERE STRATEGY C 18 5µm - 4.6 *250 mm
135	Ja, 10°C	Macherey & Nagel EC 250/4.6 NUCLEODUR 100-5 C18ec
144	20°C	Macherey Nagel NUCEODUR 150/3 C18 HTech 3µm
147	20°C	Kromacil C18 250x4.6 mm (5µm)
151	no	BEH C18 100mm
165	nein	LC18
167	Not refrigerated	Waters Symmetry C18, 3,5 µm,,
168	waters alliance	HYPERSIL ODS 250 mm
174	yes, 10°C	C-18 : 3,5µ 10cm 4,6mm
186	4°C	Waters NOVAPACK C18 / 150nm*3.9nm*4µm
192	Cooling function OFF (Roomtemp)	Formaldehyde, Acetaldehyde: InertSustain C18 Propionaldehyde, Butyraldehyde: Inertsil Acrolein C18

## Round-robin test Aldehydes 2017

Participant	autosampler	Analytical column
195	No	zorbax eclipse plus C18 4.6 x 100 mm x 1.8 um
199	Nein	C18
207	-	Phenomenex Kinetex C18 2,6 µ 100*4,6 mm
208	No	HSS C18, 1,8µm
211	Ja, der Autosampler kühlt auf 10°C	Acclaim Carbonyl C18
214	nein, RT, 23°C	Säule Kinetex 2.6 u, C18,
216	Autosampler Temperature at 25 degree C	RESTEK Ultra C18 5um 150 x 4.6mm
224	Yes, 10°C	Waters Phenyl 1.7 µm
228	Ungekühlt	C18
256	nein	Supelcosil LC-18, 25cm x 4.6 mm, 5um
263	nein	Acclaim RSLC Carbonyl 2.1 x 100 mm, 2,2 µm
265	ja, 15°C	Agilent Zorbax RRHD Eclipse Plus C18, 2,1x150mm, 1,8µm
267	nein, bei 25 °C	Symmetry C18, 250 mm x 4.6 mm x 5 µm (Waters)
280	Autosampler not refrigerated	Column Ultra C18 5 µm, 150x4.6 mm (Restek)

Participant	Mobile phase	Flow rate HPLC
10	Acetonitrile/Water (70/30)	1 ml/min
11	acetonitrile / water	Perkin Elmer : 0,35 mL/min
30	acetonitrile / water	1.2
37	Wasser / Acetonitril, Gradient	1,5 ml/min
44	25%ACN75%H2O	0.5ml/min
47	25% AcN, 0,1% H3PO4	0,8
55	gradient elution of 10%THF in water and acetonitril	0.5
56	Solvent A=Water - Solvent B = Acetonitril; t=0 min - 48% A - 52% B; t=6 min - 48% A - 52% B; t=15 min -0% A - 100% B; t=17 min - 0% A - 100% B	0.4 mL/min
60	Eau / Acétonitrile	1.0
62	Acetonitrile/water	1 mL/min
63	7 min 50% ACN, 17 min 75% ACN, 25 min 80% ACN, 30 min Stopp	1,8
67	Acetonitrile/water	0,6ml/min
68	Gradient: Acetonitril, Methanol, Wasser	1
69	Acetonitrile-water	1,5 ml/min
81	acetonitrile/ water	0.3mL/min
86	ACN 65% / Eau 35% + 0.06%TEA	1.2

## Round-robin test Aldehydes 2017

Participant	Mobile phase	Flow rate HPLC
90	CH3CN/Water - 60/40	1.5 ml/min
94	35 % Acetonitril/ 65 % H2O --> 75 % Acetonitril/ 25 % H2O	1 ml/min
96	Wasser/Acetonitril (40/60)	1
99	65/35	1 ml/min
100	water/acetonitrile	1.8ml/min
107	Acetonitril / Wasser	0,6 ml/min
111	Isokratisch 65 % Acetonitrii, 35 % Wasser	0,8
114	ACN/water	1mL/min
123	Acetonitrile/water	1
131	C18 inverse	1 ml/min
135	Wasser-Acetonitril-THF	2,25 ml/min
144	65/35 (ACN/H2O)	0.7
147	H2O/CH3CN:40/60	1
151	60/40 aq/acetonitrile	0.5
165	Wasser/Acetonitril (40/60)	1,3 ml/min
167	AcN with 0,1 % Phosphoric Acid	1,5 mUmin
168	meoh-tampon-acn 60-28-12	1
174	ACN(70%)/H2O(30%)	1
186	water/ACN/THF	1.5mL/min
192	Water / acetonitrile	1.2 mL
195	ACN:H2O 40:60	1.8
199	Acetonitril/Wasser	0,8mL/min.
207	ACN/THF/H2O	1,5
208	Acetonirile/THF/water	0,42 ml/min
211	Wasser/ Acetonitril	0,6 ml/min
214	ACN / Reinstwasser	0,6 ml/min
216	70% Acetonitrile, 30% Ultra Pure Water	1.0ml/min
224	60% milli-Q, 40% acetonitrile	0.5 mL/min
228	H2O/ACN	2
256	Startbedingungen: 30 % Acetonitril, 60% Wasser, 10% Tetrahydrofuran	2.3 ml/min, ab 9,1 Minuten 2 ml/min
263	Acetonitril/Wasser	0,4 mL/min
265	Acetonitril / Wasser 55:45	0,25
267	Acetonitrile/Wasser	1,5 ml/min

Round-robin test Aldehydes 2017

Participant	Mobile phase	Flow rate HPLC
280	45% Acetonitrile 0.1% H3PO4 + 55% H2O 0.1% H3PO4	1 mL/min

Participant	Wavelength	Column temperature	Recovery rate
10	365 nm	25 °C	No
11	360 nm	Perkin Elmer : 60 °C	
30	360 nm	30	No
37	365 nm / 245 nm / 380 nm	40 °C	nein
44	360nm	40	no
47	359	30°C	wird nicht benutzt.
55	360	40°C	yes
56	360 nm	28°C (+/-1°C)	no
60	360	20°C	non
62	360 nm	30°C	no
63	360	25 °C	nein
67	I used 360 nm wavelength	28°C	No, my result didn't include recovery rates.
68	365nm	25°C	Formaldehyd 94%
69	UV-visible	40°C	No
81	no	no	no
86	355	23	no
90	360 nm	28°C	no
94	360 nm	30 °C	Nein
96	355	25°C	nein
99	354 nm	35°C	NO
100	360 nm	40°C	no
107	365 nm	30 °C	nein
111	365	20°C	nein
114	360nm	40°C	No
123	365.4 nm	25°C	no
131	350 nm et 370 nm		NON
135	365 nm	45 °C	----
144	360nm	25°C	no
147	354 et 362 nm	25°C	non

## Round-robin test Aldehydes 2017

Participant	Wavelength	Column temperature	Recovery rate
151	360	50C	NO
165	360nm	25°C	nein
167	360 nm	24 °C	Yes
168	360	24	no
174	350	20	no
186	360nm	35°C	No
192	360 nm	40 degC	No.
195	365	30 °C	no
199	370nm	30°C	Nein
207	360	40	-
208	360 nm	40 °C	No
211	360	28°C	nein
214	360 nm	RT 23°C	nein
216	365 nm	Column Temperature at 25 degree C	No
224	360 nm	45°C	No
228	360nm	30	Nein
256	360 nm	25 °C	Nein, recoveries variieren zwischen 90 - 110 %
263	360 nm	28°C	nein
265	356	40	nein
267	365 nm	25°C	nein
280	360 nm	40°C	No