DETERMINATION OF SHOCK ABSORPTION

EN 14808:2005

LabCodeNo. 66 remarked: "We find that the samples were too small to carry out the tests".

LabCodeNo. 136 remarked: "Following the difference noted between the results of ST4a and ST4b, we have proceeded crossed tests (shockpad A with turf B and shockpad B with turf A) and the results obtained seem to show difference between the 2 shockpads".

LabCodeNo. 178 remarked: "All samples were tested in the Dry condition".

LabCodeNo. 238 remarked: "According to the standard, relative humidity during the test is not a requirement".

LabCodeNo. 279 remarked: "SS3 variable because of pilr treatment   SS4 difficulty with ss4 being rigid and not flat".

LabCodeNo. 439 remarked: "Sample 4A and 4B were significantly different. On day 2 I retested sample 4a just to make sure it was not my equipment. Retesting sample 4a produced a force reduction of 22%. My samples were far from identical with regard to this system/sample".

LabCodeNo. 464 remarked: "Samples 4a and 4b seem to be not comparable. The underlayment of 4b was measurable and sensible softer the underlayment 4a".

Determination of shock absorption - SS1 - 2nd impact - R

EN 14808

Results submitted by participants   and   Results of robust statistics

i.e., individual results x_{ik}

(bottom part of the table)

+ number of the test repetitions made by each lab (n_i)

+ within laboratory means (x_i) and standard deviations (s_i)

+ results of tests for outliers

Number of reporting laboratories p *: | **20**
Number of reported test results $\sum n_i$: | **40**

Lab Code No.	Test results in % Test replication No. (k) 1	2	3	4	5	6	n_i	x_i	s_i	Cochran	Grubbs	z > 2
66	2,10	2,13					2	2,113	0,0177		**	X
238	32,30	33,25					2	32,775	0,6718			
279	33,13	33,15					2	33,138	0,0177			
872	33,48	34,30					2	33,888	0,5834			
250	34,40	34,55					2	34,475	0,1061			
349	34,30	35,23					2	34,763	0,6541			
206	34,98	34,90					2	34,938	0,0530			
439	36,28	33,78					2	35,025	1,7678	**		
362	35,80	35,83					2	35,813	0,0177			
938	36,10	35,65					2	35,875	0,3182			
464	36,45	36,15					2	36,300	0,2121			
520	36,78	35,95					2	36,363	0,5834			
627	36,48	36,68					2	36,575	0,1414			
99	36,78	36,88					2	36,825	0,0707			
136	37,63	37,05					2	37,338	0,4066			
178	38,45	37,98					2	38,213	0,3359			
565	37,78	38,73					2	38,250	0,6718			
812	38,70	38,75					2	38,725	0,0354			
438	39,50	39,75					2	39,625	0,1768			
747	47,15	47,15					2	47,150	0,0000		**	X

Robust average: x * = 36,25 ← assigned value for the proficiency assessment

Robust standard deviation for the proficiency assessment: s * = **2,307**

Number of repeate measurements necessary due to s_r/s*-ratio: n' = 1 | **OK**

Standard uncertainty of the assigned value: u_x = 0,66164 | **OK**

see page 4 for the meaning of **NOT OK**
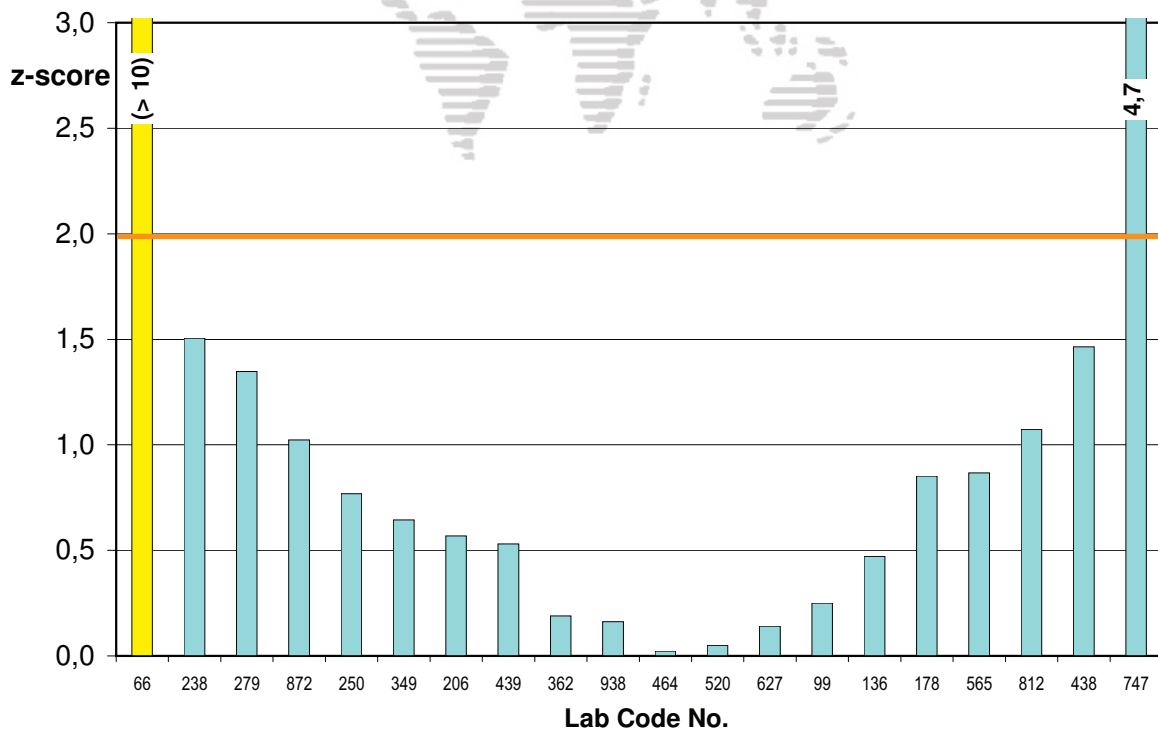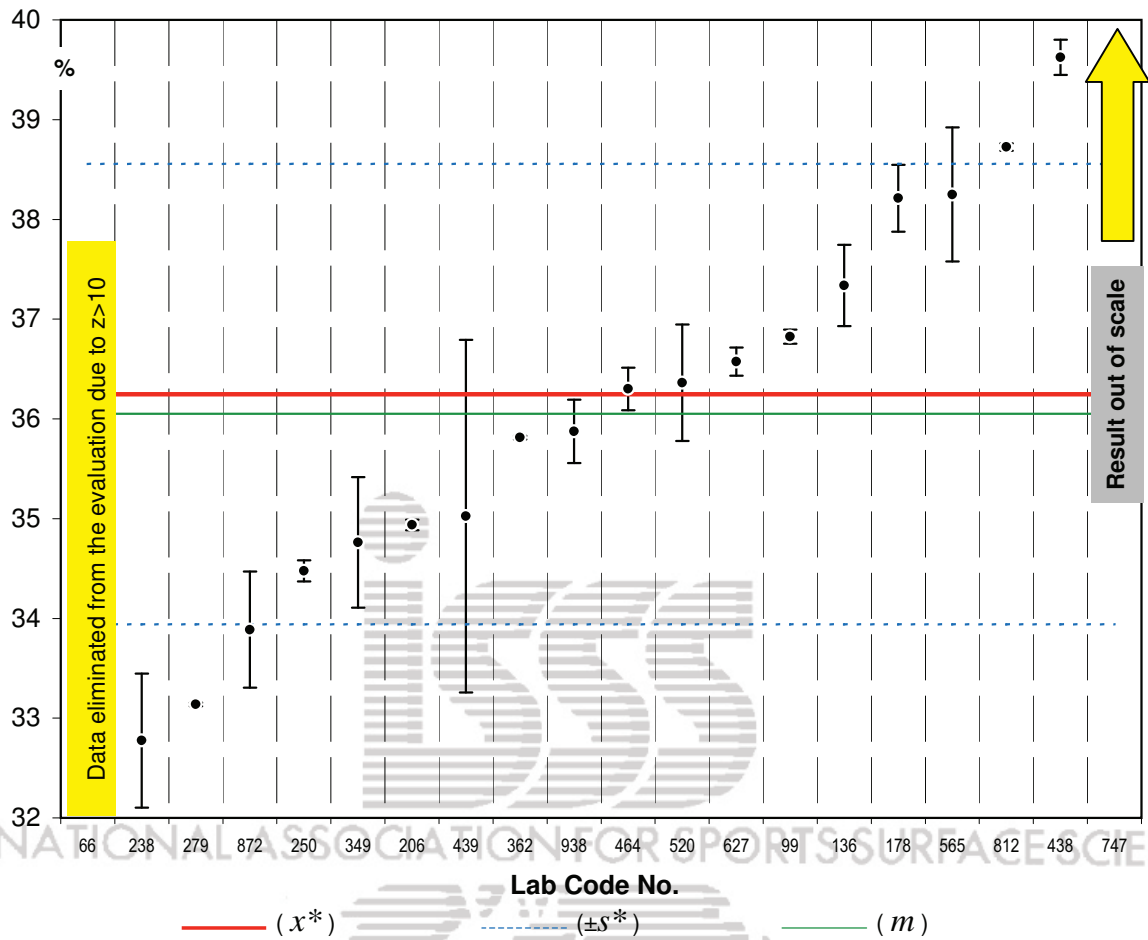
** ... statistical outlier (99%)   * ... straggler (95%)

X ... z > 2; in this case, x_i is considered to be an outlier and is not taken into account in the test method accuracy check

Additional check of the test method accuracy

Do the input data come from a normal distribution (when outliers found were eliminated) **?** (The results listed below shall be considered as really justified only if the input data come from a normal distribution)			**YES**
General mean $\sum n_i x_{ik} / \sum n_i$	m	**36,05**	%
Repeatability variance	s_r^2	0,3129167	
Repeatability standard deviation	s_r	0,55939	%
Repeatability coefficient of variation	$CV\%_r$	1,552	%
Between-laboratory variance	s_L^2	3,5226593	
Between-laboratory standard deviation	s_L	1,87687	%
Between-laboratory coefficient of variation	$CV\%_L$	5,206	%
Reproducibility variance s_R^2	$s_r^2 + s_L^2$	3,8355760	
Reproducibility standard deviation	s_R	1,95846	%
Reproducibility coefficient of variation	$CV\%_R$	5,433	%
Repeatability limit	r	**1,57**	%
Relative repeatability limit	r_{rel}	**4,3**	%
Reproducibility limit	R	**5,48**	%
Relative reproducibility limit	R_{rel}	**15,2**	%
Number of participants included in the accuracy evaluation	p	18	
Number of tests included in the accuracy evaluation	$\sum n$	36	

Determination of shock absorption - SS1 - 2nd impact - R

Chart legend:
— (x^*)   ----- ($\pm s^*$)   — (m)

Upper chart y-axis: % (from 32 to 40), x-axis: Lab Code No.
Lab codes: 66, 238, 279, 872, 250, 349, 206, 439, 362, 938, 464, 520, 627, 99, 136, 178, 565, 812, 438, 747

Left yellow band: Data eliminated from the evaluation due to z>10
Right grey band: Result out of scale

Lower chart y-axis: z-score (0,0 to 3,0), x-axis: Lab Code No.
Left yellow band: (> 10)
Lab code 747: 4,7

Determination of shock absorption - SS2 - 2nd impact - R

EN 14808

Results submitted by participants   **and**   Results of robust statistics

i.e., individual results x_{ik}

(bottom part of the table)

+ number of the test repetitions made by each lab (n_i)

+ within laboratory means (x_i) and standard deviations (s_i)

+ results of tests for outliers

Number of reporting laboratories p *:	**20**
Number of reported test results $\sum n_i$:	**40**

Lab Code No.	Test results in %						Statistical evaluation of the submitted test results x_{ik}			Outliers		
	Test replication No. (k)									Cochran	Grubbs	z > 2
	1	2	3	4	5	6	n_i	x_i	s_i			
66	2,25	2,03					2	2,138	0,1591		**	X
279	36,30	36,13					2	36,213	0,1237			X
238	36,35	38,05					2	37,200	1,2021			
250	39,08	36,53					2	37,800	1,8031			
872	38,13	37,63					2	37,875	0,3536			
206	37,50	40,50					2	39,000	2,1213			
439	39,20	38,85					2	39,025	0,2475			
362	39,93	38,63					2	39,275	0,9192			
99	38,68	40,68					2	39,675	1,4142			
464	40,35	39,30					2	39,825	0,7425			
627	41,60	38,80					2	40,200	1,9799			
812	39,38	41,10					2	40,238	1,2198			
938	41,98	39,38					2	40,675	1,8385			
136	40,38	41,00					2	40,688	0,4419			
520	39,75	42,25					2	41,000	1,7678			
349	41,00	41,35					2	41,175	0,2475			
178	39,25	44,18					2	41,713	3,4825			
565	42,20	41,53					2	41,863	0,4773			
438	44,23	45,00					2	44,613	0,5480			X
747	51,53	50,43					2	50,975	0,7778		**	X

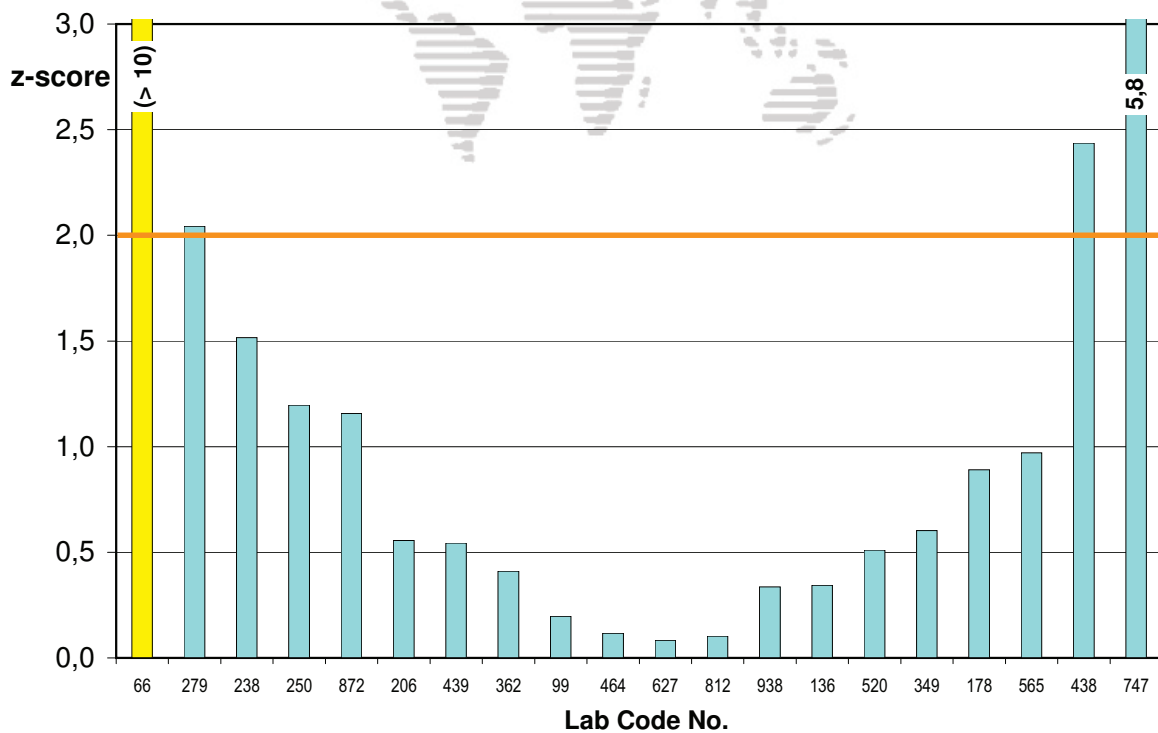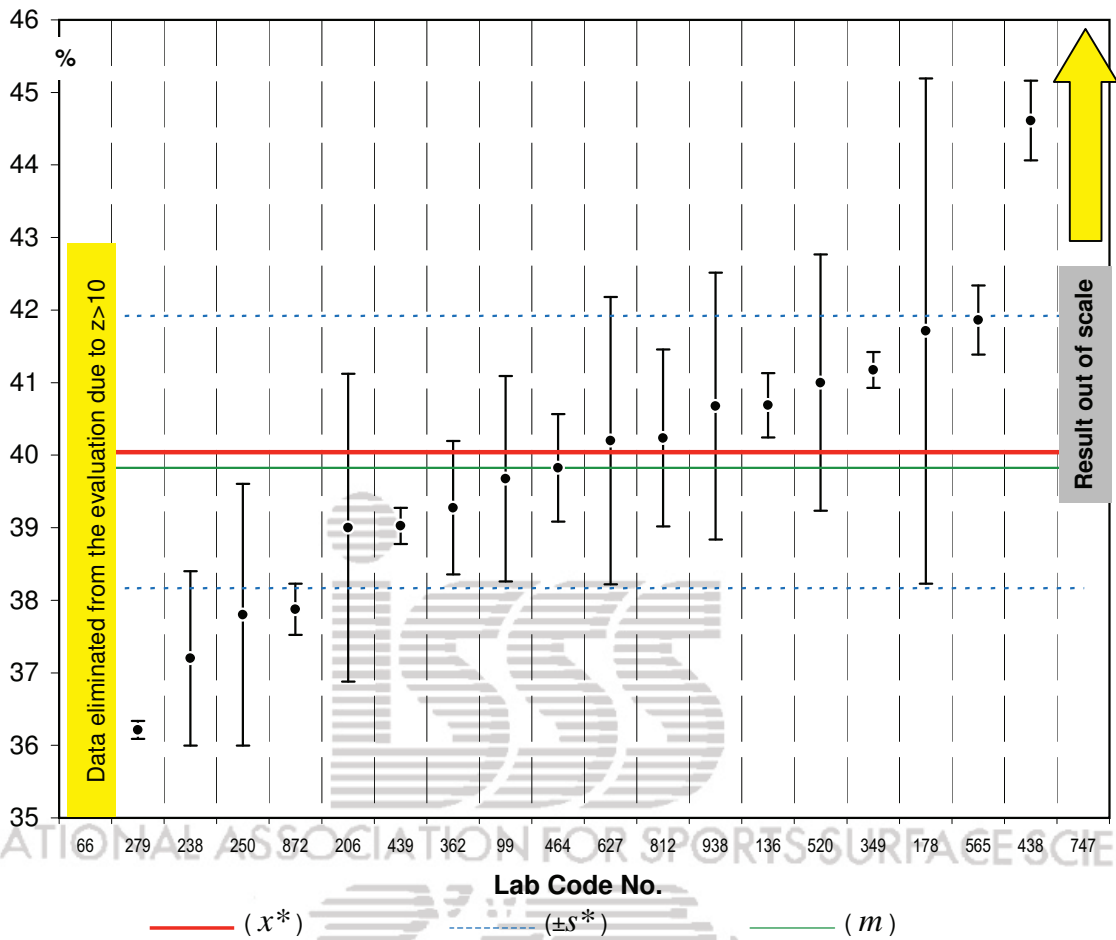|		
Robust average: x * = **40,04**	← **assigned value for the proficiency assessment**	
Robust standard deviation for the proficiency assessment: s * = **1,875**		
Number of repeate measurements necessary due to s_r/s*-ratio: n' = >5	**NOT OK**	see page 4 for the meaning of **NOT OK**
Standard uncertainty of the assigned value: u_x = 0,53779	**OK**	

** ... statistical outlier (99%)   * ... straggler (95%)

X ... z > 2; in this case, x_i is considered to be an outlier and is not taken into account in the test method accuracy check

Additional check of the test method accuracy

Do the input data come from a normal distribution (when outliers found were eliminated) **?** (The results listed below shall be considered as really justified only if the input data come from a normal distribution)			**YES**
General mean $\sum n_i x_{ik} / \sum n_i$	m	**39,83**	%
Repeatability variance	s_r^2	2,3314844	
Repeatability standard deviation	s_r	1,52692	%
Repeatability coefficient of variation	$CV\%_r$	3,834	%
Between-laboratory variance	s_L^2	0,7765052	
Between-laboratory standard deviation	s_L	0,88120	%
Between-laboratory coefficient of variation	$CV\%_L$	2,213	%
Reproducibility variance s_R^2	$s_r^2 + s_L^2$	3,1079896	
Reproducibility standard deviation	s_R	1,76295	%
Reproducibility coefficient of variation	$CV\%_R$	4,427	%
Repeatability limit	r	**4,28**	%
Relative repeatability limit	r_{rel}	**10,7**	%
Reproducibility limit	R	**4,94**	%
Relative reproducibility limit	R_{rel}	**12,4**	%
Number of participants included in the accuracy evaluation	p	16	
Number of tests included in the accuracy evaluation	$\sum n$	32	

Determination of shock absorption - SS2 - 2nd impact - R

Data eliminated from the evaluation due to z>10

Result out of scale

Lab Code No.

——— (x^*)   - - - - - ($\pm s^*$)   ——— (m)

z-score

(> 10)

5,8

Lab Code No.

Determination of shock absorption - SS1 - 3rd impact - R

EN 14808

Results submitted by participants   and   Results of robust statistics

i.e., individual results x_{ik}

(bottom part of the table)

+ number of the test repetitions made by each lab (n_i)

+ within laboratory means (x_i) and standard deviations (s_i)

+ results of tests for outliers

	Number of reporting laboratories p*:	20
	Number of reported test results $\sum n_i$:	40

Lab Code No.	Test results in %						Statistical evaluation of the submitted test results x_{ik}			Outliers		
	Test replication No. (k)									Cochran	Grubbs	$z > 2$
	1	2	3	4	5	6	n_i	x_i	s_i			
66	2,05	2,13					2	2,088	0,0530		**	X
238	32,10	32,78					2	32,438	0,4773			
279	33,45	32,95					2	33,200	0,3536			
872	33,08	34,00					2	33,538	0,6541			
250	34,58	34,23					2	34,400	0,2475			
439	35,60	33,83					2	34,713	1,2551			
349	34,58	35,05					2	34,813	0,3359			
206	35,03	34,93					2	34,975	0,0707			
938	35,78	35,53					2	35,650	0,1768			
362	35,68	35,73					2	35,700	0,0354			
464	36,55	35,95					2	36,250	0,4243			
520	36,70	35,90					2	36,300	0,5657			
627	36,38	36,53					2	36,450	0,1061			
99	36,63	36,70					2	36,663	0,0530			
136	37,68	36,75					2	37,213	0,6541			
438	38,53	37,73					2	38,125	0,5657			
565	37,55	38,75					2	38,150	0,8485			
178	38,43	37,98					2	38,200	0,3182			
812	38,43	38,53					2	38,475	0,0707			
747	46,85	46,98					2	46,913	0,0884		**	X

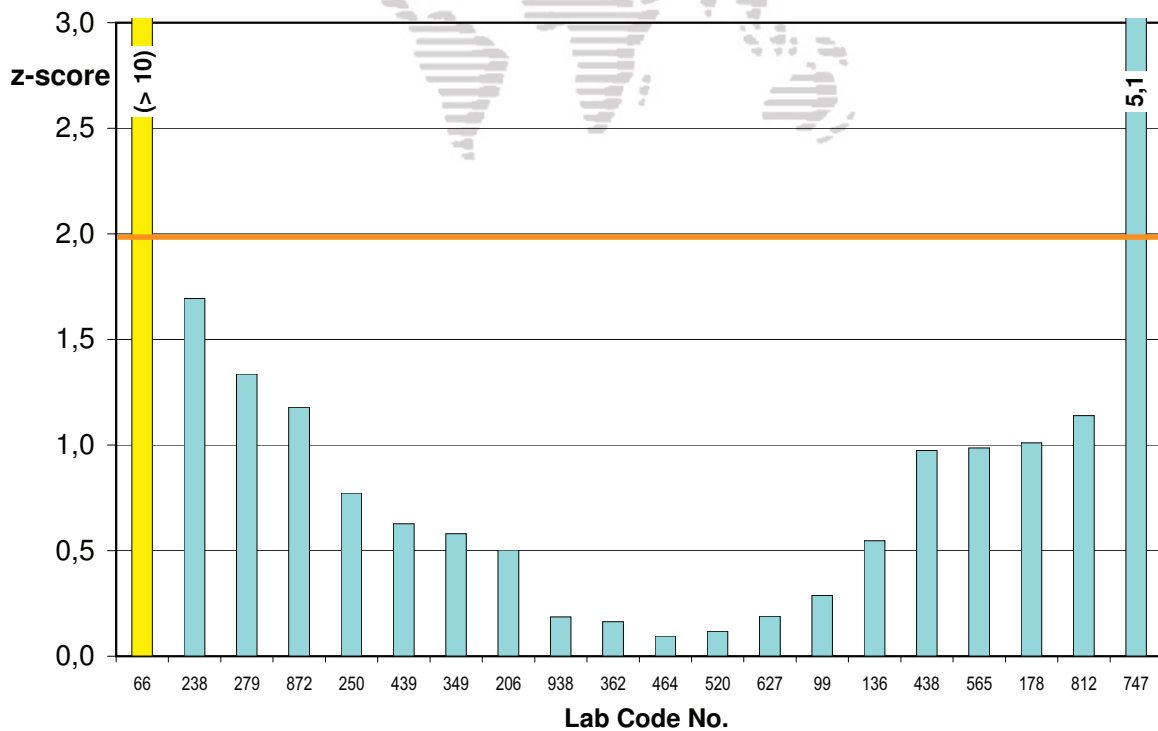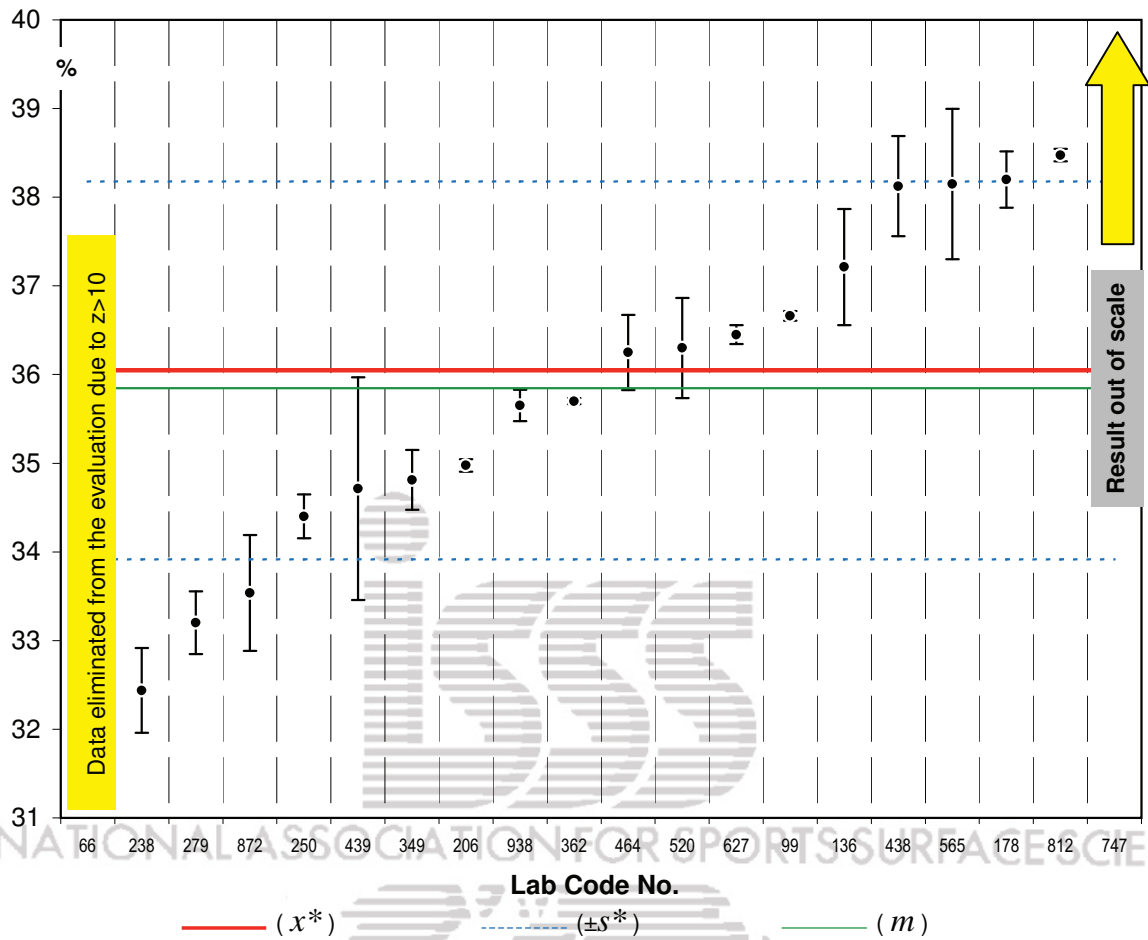|	
Robust average: x* = **36,05**	← **assigned value for the proficiency assessment**
Robust standard deviation for the proficiency assessment: s* = **2,131**	
Number of repeate measurements necessary due to s_r/s*-ratio: n' = 1	**OK** — see page 4 for the meaning of **NOT OK**
Standard uncertainty of the assigned value: u_x = 0,61107	**OK**

** ... statistical outlier (99%)   * ... straggler (95%)

X ... $z > 2$; in this case, x_i is considered to be an outlier and is not taken into account in the test method accuracy check

Additional check of the test method accuracy

Do the input data come from a normal distribution (when outliers found were eliminated) **?** (The results listed below shall be considered as really justified only if the input data come from a normal distribution)			**YES**
General mean $\sum n_i x_{ik} / \sum n_i$	m	**35,85**	%
Repeatability variance	s_r^2	0,2586458	
Repeatability standard deviation	s_r	0,50857	%
Repeatability coefficient of variation	$CV\%_r$	1,419	%
Between-laboratory variance	s_L^2	3,1314961	
Between-laboratory standard deviation	s_L	1,76960	%
Between-laboratory coefficient of variation	$CV\%_L$	4,937	%
Reproducibility variance s_R^2	$s_r^2 + s_L^2$	3,3901420	
Reproducibility standard deviation	s_R	1,84123	%
Reproducibility coefficient of variation	$CV\%_R$	5,136	%
Repeatability limit	r	**1,42**	%
Relative repeatability limit	r_{rel}	**4,0**	%
Reproducibility limit	R	**5,16**	%
Relative reproducibility limit	R_{rel}	**14,4**	%
Number of participants included in the accuracy evaluation	p	18	
Number of tests included in the accuracy evaluation	$\sum n$	36	

Determination of shock absorption - SS1 - 3rd impact - R

Lab Code No.

——— (x^*)   -------- ($\pm s^*$)   ——— (m)

Lab Code No.

Determination of shock absorption - SS2 - 3rd impact - R

EN 14808

Results submitted by participants   and   Results of robust statistics

i.e., individual results x_{ik}

(bottom part of the table)

+ number of the test repetitions made by each lab (n_i)

+ within laboratory means (x_i) and standard deviations (s_i)

+ results of tests for outliers

Number of reporting laboratories p*:	**20**
Number of reported test results $\sum n_i$:	**40**

Lab Code No.	Test results in %						Statistical evaluation of the submitted test results x_{ik}			Outliers		
	Test replication No. (k)						n_i	x_i	s_i	Cochran	Grubbs	$z > 2$
	1	2	3	4	5	6						
66	2,33	2,05					2	2,188	0,1945		**	X
279	36,35	35,78					2	36,063	0,4066			X
238	35,88	37,93					2	36,900	1,4496			
872	37,85	37,48					2	37,663	0,2652			
250	38,93	36,50					2	37,713	1,7147			
439	39,35	36,28					2	37,813	2,1744			
206	37,65	40,45					2	39,050	1,9799			
362	39,95	38,60					2	39,275	0,9546			
99	38,48	40,60					2	39,538	1,5026			
464	40,33	39,38					2	39,850	0,6718			
627	41,50	38,75					2	40,125	1,9445			
812	39,50	40,88					2	40,188	0,9723			
938	41,88	39,30					2	40,588	1,8208			
136	40,20	41,05					2	40,625	0,6010			
520	39,88	42,23					2	41,050	1,6617			
349	41,03	41,23					2	41,125	0,1414			
178	39,33	44,18					2	41,750	3,4295			
565	42,05	41,63					2	41,838	0,3005			
438	44,18	44,68					2	44,425	0,3536			X
747	50,73	50,28					2	50,500	0,3182		**	X

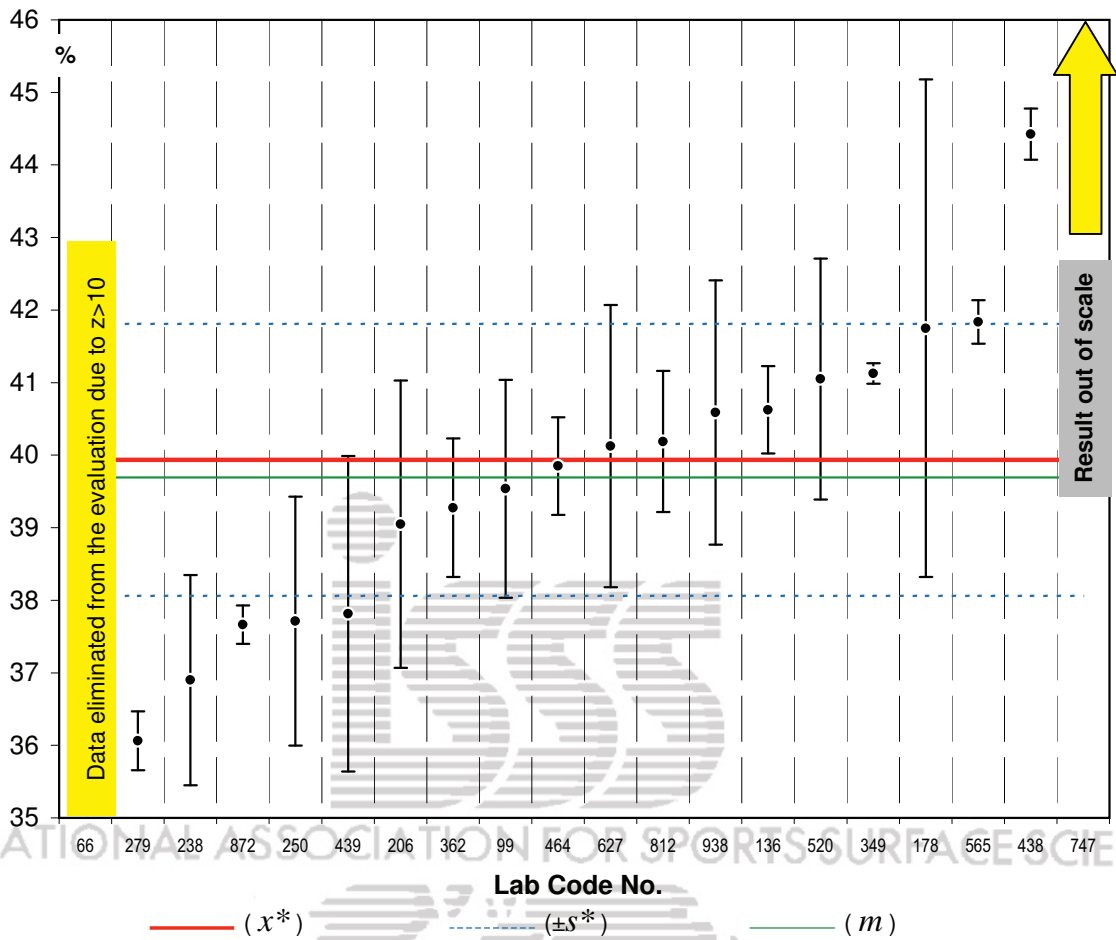|		
Robust average: x* = **39,94**	← **assigned value for the proficiency assessment**	
Robust standard deviation for the proficiency assessment: s* = **1,874**		
Number of repeate measurements necessary due to s_r/s*-ratio: n' = >5	**NOT OK**	see page 4 for the meaning of **NOT OK**
Standard uncertainty of the assigned value: u_x = 0,53750	**OK**	

** ... statistical outlier (99%)   * ... straggler (95%)

X ... $z > 2$; in this case, x_i is considered to be an outlier and is not taken into account in the test method accuracy check

Additional check of the test method accuracy

Do the input data come from a normal distribution (when outliers found were eliminated) **?** (The results listed below shall be considered as really justified only if the input data come from a normal distribution)			**YES**
General mean $\sum n_i x_{ik} / \sum n_i$	m	**39,69**	%
Repeatability variance	s_r^2	2,5259961	
Repeatability standard deviation	s_r	1,58934	%
Repeatability coefficient of variation	$CV\%_r$	4,004	%
Between-laboratory variance	s_L^2	1,0597721	
Between-laboratory standard deviation	s_L	1,02945	%
Between-laboratory coefficient of variation	$CV\%_L$	2,594	%
Reproducibility variance s_R^2	$s_r^2 + s_L^2$	3,5857682	
Reproducibility standard deviation	s_R	1,89361	%
Reproducibility coefficient of variation	$CV\%_R$	4,771	%
Repeatability limit	r	**4,45**	%
Relative repeatability limit	r_{rel}	**11,2**	%
Reproducibility limit	R	**5,30**	%
Relative reproducibility limit	R_{rel}	**13,4**	%
Number of participants included in the accuracy evaluation	p	16	
Number of tests included in the accuracy evaluation	$\sum n$	32	

Determination of shock absorption - SS2 - 3rd impact - R

Data eliminated from the evaluation due to z>10

Result out of scale

Lab Code No.

——— (x^*)   --------- ($\pm s^*$)   ——— (m)

z-score

(> 10)

5,6

Lab Code No.

Determination of shock absorption - ST3 - 2nd impact - R

Results submitted by participants   and   Results of robust statistics
(bottom part of the table)

i.e., individual results x_{ik}

+ number of the test repetitions made by each lab (n_i)

+ within laboratory means (x_i) and standard deviations (s_i)

+ results of tests for outliers

Number of reporting laboratories p *: 20
Number of reported test results $\sum n_i$: 39

Lab Code No.	Test results in % Test replication No. (k)						Statistical evaluation of the submitted test results x_{ik}			Outliers		
	1	2	3	4	5	6	n_i	x_i	s_i	Cochran	Grubbs	$z > 2$
66	8,18	8,15					2	8,163	0,0177		**	X
872	57,33	58,35					2	57,838	0,7248			X
279	59,03	56,85					2	57,938	1,5380			X
250	58,15	59,25					2	58,700	0,7778			X
439	60,05	60,75					2	60,400	0,4950			
178	60,75	60,73					2	60,738	0,0177			
136	60,98						1	60,975				
362	61,50	61,18					2	61,338	0,2298			
565	61,80	60,88					2	61,338	0,6541			
206	61,43	61,53					2	61,475	0,0707			
938	61,93	61,93					2	61,925	0,0000			
349	61,38	62,85					2	62,113	1,0430			
464	63,25	62,13					2	62,688	0,7955			
238	62,98	62,43					2	62,700	0,3889			
812	63,33	62,25					2	62,788	0,7601			
99	63,10	62,50					2	62,800	0,4243			
747	63,33	63,38					2	63,350	0,0354			
520	63,03	63,78					2	63,400	0,5303			
438	63,78	64,18					2	63,975	0,2828			
627	63,80	64,33					2	64,063	0,3712			

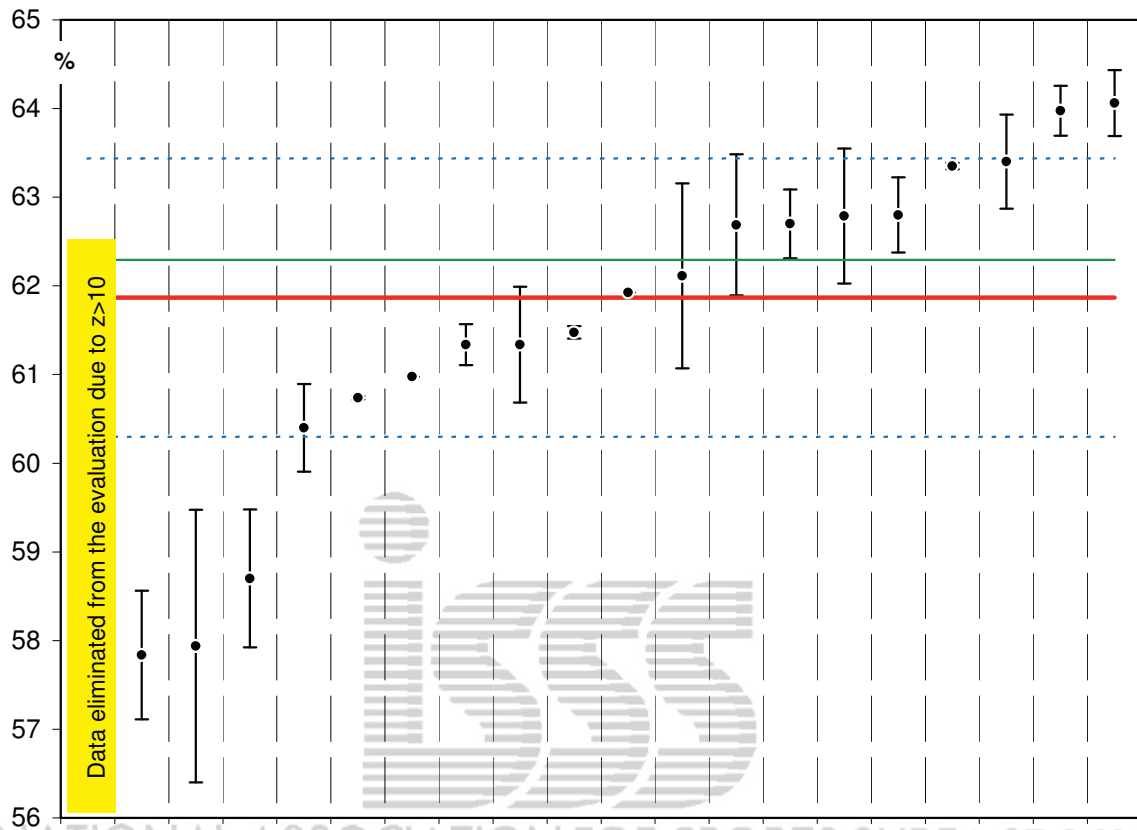|		
Robust average: x * = **61,87**	← **assigned value for the proficiency assessment**	
Robust standard deviation for the proficiency assessment: s * = **1,569**		
Number of repeate measurements necessary due to s_r/s*-ratio: n' = 2	**OK**	see page 4 for the meaning of **NOT OK**
Standard uncertainty of the assigned value: u_x = 0,45000	**OK**	

** ... statistical outlier (99%)   * ... straggler (95%)
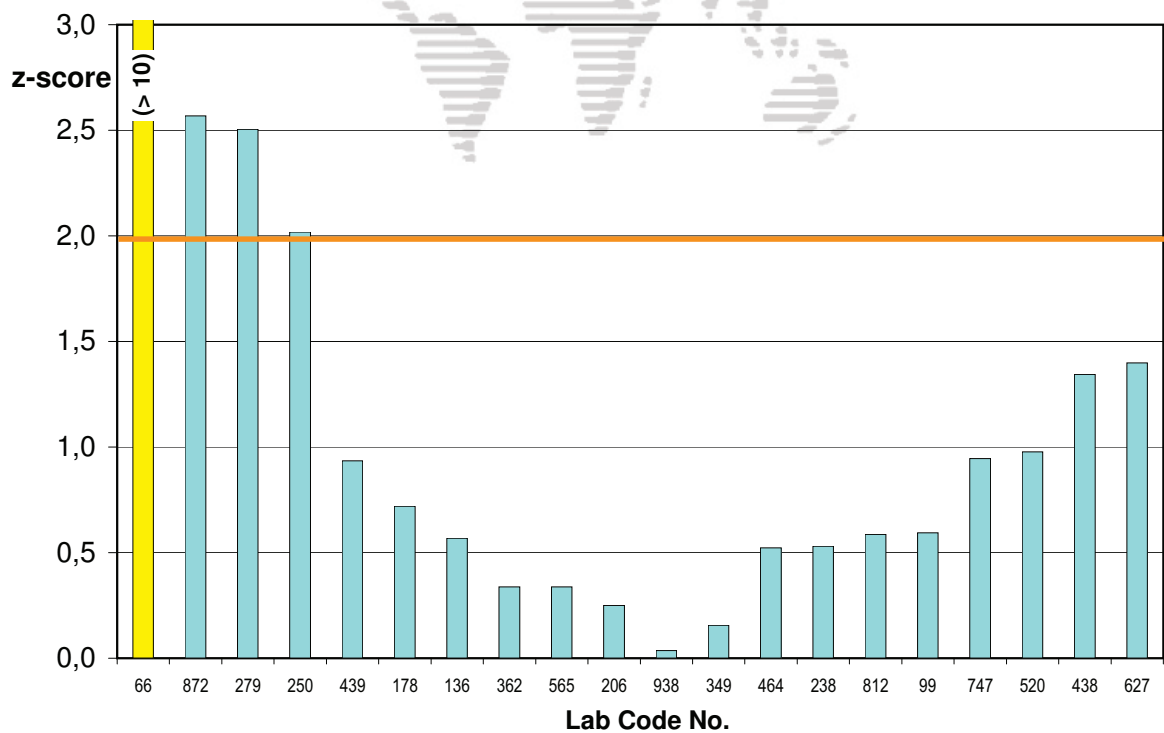
X ... $z > 2$; in this case, x_i is considered to be an outlier and is not taken into account in the test method accuracy check

Additional check of the test method accuracy

Do the input data come from a normal distribution (when outliers found were eliminated) ? (The results listed below shall be considered as really justified only if the input data come from a normal distribution)			YES
General mean $\sum n_i x_{ik} / \sum n_i$	m	**62,30**	%
Repeatability variance	s_r^2	0,2413086	
Repeatability standard deviation	s_r	0,49123	%
Repeatability coefficient of variation	$CV\%_r$	0,789	%
Between-laboratory variance	s_L^2	1,1691311	
Between-laboratory standard deviation	s_L	1,08126	%
Between-laboratory coefficient of variation	$CV\%_L$	1,736	%
Reproducibility variance s_R^2	$s_r^2 + s_L^2$	1,4104397	
Reproducibility standard deviation	s_R	1,18762	%
Reproducibility coefficient of variation	$CV\%_R$	1,906	%
Repeatability limit	r	**1,38**	%
Relative repeatability limit	r_{rel}	**2,2**	%
Reproducibility limit	R	**3,33**	%
Relative reproducibility limit	R_{rel}	**5,3**	%
Number of participants included in the accuracy evaluation	p	16	
Number of tests included in the accuracy evaluation	$\sum n$	31	

Determination of shock absorption - ST3 - 2nd impact - R

Data eliminated from the evaluation due to z>10

Lab Code No.

——— (x^*)　　　------- ($\pm s^*$)　　　——— (m)

z-score

(> 10)

Lab Code No.

Determination of shock absorption - ST4 - 2nd impact - R

EN 14808

Results submitted by participants   and   Results of robust statistics

i.e., individual results x_{ik}

(bottom part of the table)

+ number of the test repetitions made by each lab (n_i)

+ within laboratory means (x_i) and standard deviations (s_i)

+ results of tests for outliers

	Number of reporting laboratories p *:	**19**
	Number of reported test results $\sum n_i$:	**38**

Lab Code No.	Test results in % Test replication No. (k)						Statistical evaluation of the submitted test results x_{ik}			Outliers		
	1	2	3	4	5	6	n_i	x_i	s_i	Cochran	Grubbs	$z > 2$
66	7,25	6,83					2	7,038	0,3005		**	X
439	25,05	50,20					2	37,625	17,7837	**	**	X
872	44,90	45,38					2	45,138	0,3359			
565	47,48	47,08					2	47,275	0,2828			
279	48,53	48,10					2	48,313	0,3005			
178	49,15	48,60					2	48,875	0,3889			
206	49,30	48,78					2	49,038	0,3712			
362	48,73	49,95					2	49,338	0,8662			
349	49,88	49,50					2	49,688	0,2652			
238	50,40	50,08					2	50,238	0,2298			
99	51,45	50,63					2	51,038	0,5834			
464	56,13	46,73					2	51,425	6,6468	**		
938	51,55	52,33					2	51,938	0,5480			
250	52,70	51,43					2	52,063	0,9016			
520	52,45	53,23					2	52,838	0,5480			
438	52,83	53,33					2	53,075	0,3536			
627	53,08	53,10					2	53,088	0,0177			
812	53,73	54,00					2	53,863	0,1945			
747	57,65	56,60					2	57,125	0,7425			X
136			no results reported									X

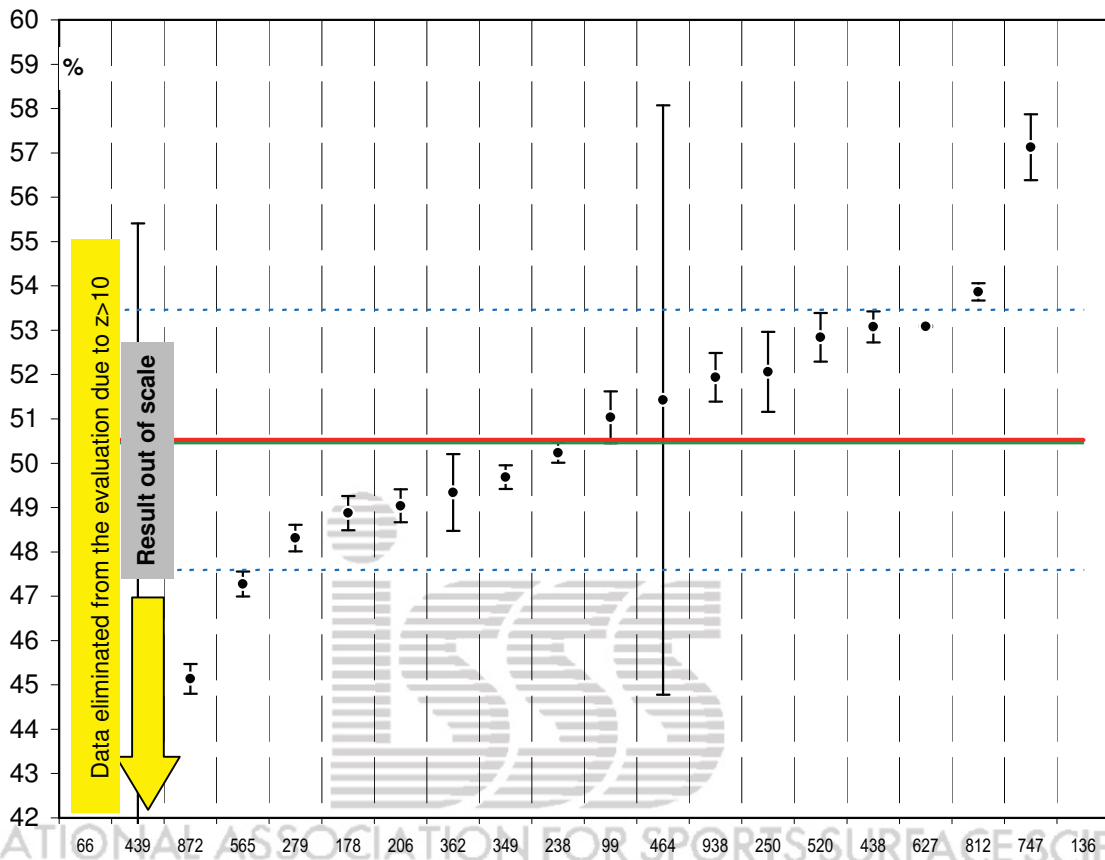|		
Robust average: x * = **50,53**	← assigned value for the proficiency assessment	
Robust standard deviation for the proficiency assessment: s * = **2,935**		
Number of repeat measurements necessary due to s_r/s*-ratio: n' = 4	**NOT OK**	see page 4 for the meaning of **NOT OK**
Standard uncertainty of the assigned value: u_x = 0,86465	**OK**	

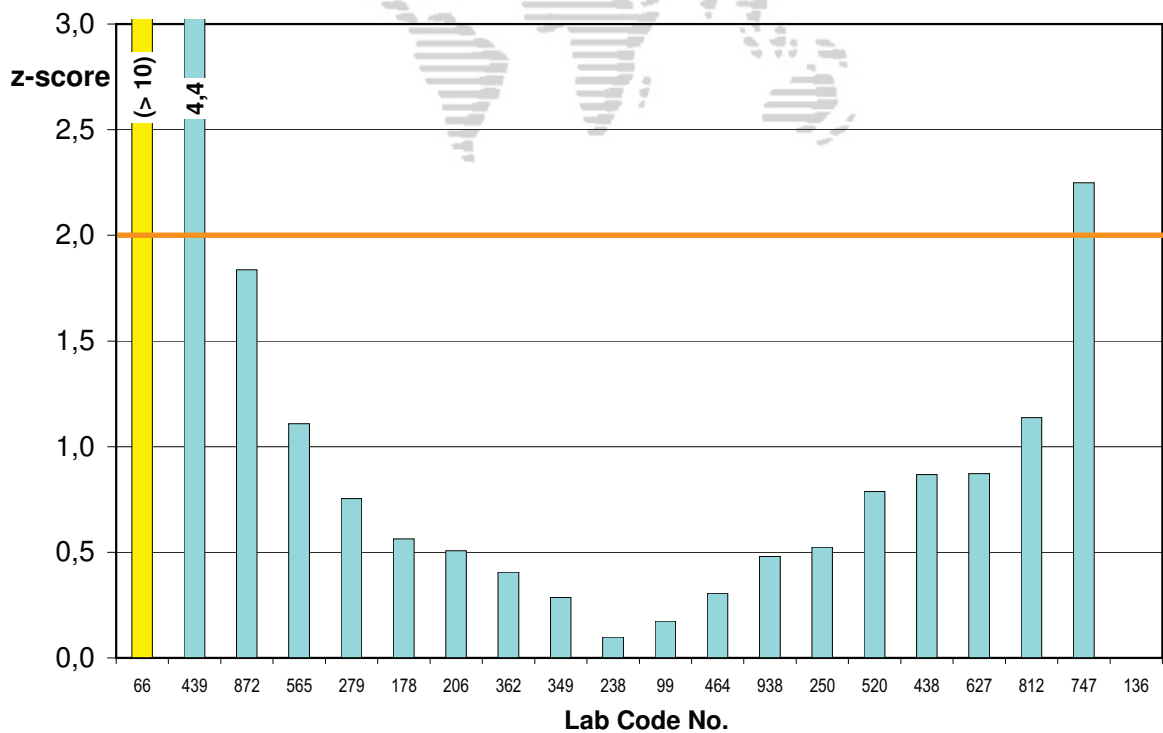** ... statistical outlier (99%)   * ... straggler (95%)

X ... $z > 2$; in this case, x_i is considered to be an outlier and is not taken into account in the test method accuracy check

Additional check of the test method accuracy

Do the input data come from a normal distribution (when outliers found were eliminated) **?** (The results listed below shall be considered as really justified only if the input data come from a normal distribution)			**YES**
General mean $\sum n_i x_{ik} / \sum n_i$	m	**50,45**	%
Repeatability variance	$s_r{}^2$	2,9714063	
Repeatability standard deviation	s_r	1,72378	%
Repeatability coefficient of variation	$CV\%_r$	3,417	%
Between-laboratory variance	$s_L{}^2$	4,2818359	
Between-laboratory standard deviation	s_L	2,06926	%
Between-laboratory coefficient of variation	$CV\%_L$	4,101	%
Reproducibility variance $s_R{}^2$	$s_r{}^2 + s_L{}^2$	7,2532422	
Reproducibility standard deviation	s_R	2,69318	%
Reproducibility coefficient of variation	$CV\%_R$	5,338	%
Repeatability limit	r	**4,83**	%
Relative repeatability limit	r_{rel}	**9,6**	%
Reproducibility limit	R	**7,54**	%
Relative reproducibility limit	R_{rel}	**14,9**	%
Number of participants included in the accuracy evaluation	p	16	
Number of tests included in the accuracy evaluation	$\sum n$	32	

Determination of shock absorption - ST4 - 2nd impact - R

Data eliminated from the evaluation due to z>10

Result out of scale

%

—— (x^*)   ---- ($\pm s^*$)   —— (m)

Lab Code No.

z-score

(> 10)

4,4

Lab Code No.

Determination of shock absorption - ST3 - 3rd impact - R

EN 14808

Results submitted by participants   **and**   **Results of robust statistics**

i.e., individual results x_{ik}

(bottom part of the table)

+ number of the test repetitions made by each lab (n_i)

+ within laboratory means (x_i) and standard deviations (s_i)

+ results of tests for outliers

	Number of reporting laboratories p *:	**20**
	Number of reported test results $\sum n_i$:	**39**

Lab Code No.	Test results in % — Test replication No. (k)						Statistical evaluation of the submitted test results x_{ik}			Outliers		
	1	2	3	4	5	6	n_i	x_i	s_i	Cochran	Grubbs	$z > 2$
66	7,90	7,98					2	7,938	0,0530		**	X
279	58,58	55,85					2	57,213	1,9269			X
872	56,90	57,65					2	57,275	0,5303			X
250	57,78	58,45					2	58,113	0,4773			
438	62,15	55,38					2	58,763	4,7906	**		
439	59,25	60,53					2	59,888	0,9016			
136	60,10						1	60,100				
178	60,45	59,98					2	60,213	0,3359			
565	61,15	60,03					2	60,588	0,7955			
362	60,85	60,45					2	60,650	0,2828			
206	60,80	61,15					2	60,975	0,2475			
938	61,15	61,18					2	61,163	0,0177			
349	60,55	62,33					2	61,438	1,2551			
464	62,58	61,30					2	61,938	0,9016			
812	62,18	61,88					2	62,025	0,2121			
99	62,33	61,88					2	62,100	0,3182			
238	62,83	61,68					2	62,250	0,8132			
520	62,10	62,93					2	62,513	0,5834			
747	63,08	63,03					2	63,050	0,0354			
627	63,13	63,63					2	63,375	0,3536			

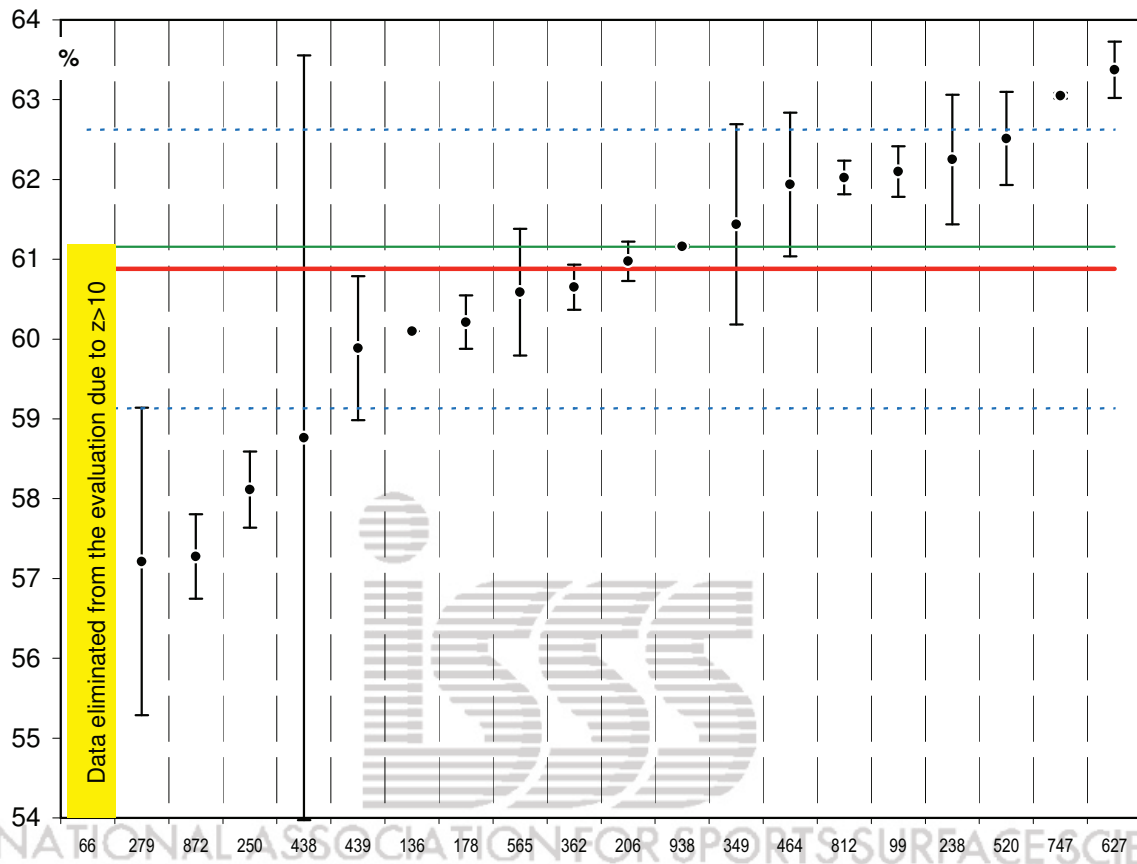|	
Robust average: x * = **60,88**	← **assigned value for the proficiency assessment**
Robust standard deviation for the proficiency assessment: s * = **1,746**	
Number of repeate measurements necessary due to s_r/s*-ratio: n' = >5	**NOT OK** — see page 4 for the meaning of **NOT OK**
Standard uncertainty of the assigned value: u_x = 0,50063	**OK**

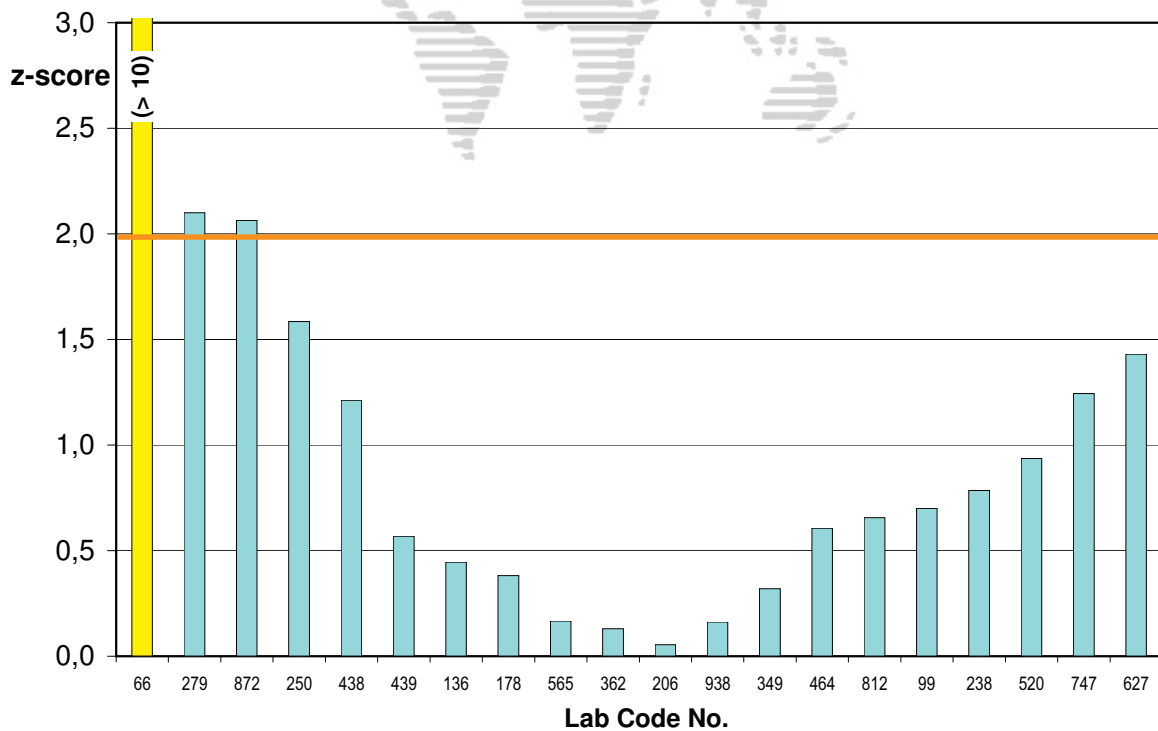** ... statistical outlier (99%)   * ... straggler (95%)

X ... $z > 2$; in this case, x_i is considered to be an outlier and is not taken into account in the test method accuracy check

Additional check of the test method accuracy

Do the input data come from a normal distribution (when outliers found were eliminated) **?** (The results listed below shall be considered as really justified only if the input data come from a normal distribution)			**NO**
General mean $\sum n_i x_{ik} / \sum n_i$	m	**61,16**	%
Repeatability variance	s_r^2	1,6788419	
Repeatability standard deviation	s_r	1,29570	%
Repeatability coefficient of variation	$CV\%_r$	2,119	%
Between-laboratory variance	s_L^2	1,2860783	
Between-laboratory standard deviation	s_L	1,13405	%
Between-laboratory coefficient of variation	$CV\%_L$	1,854	%
Reproducibility variance s_R^2	$s_r^2 + s_L^2$	2,9649202	
Reproducibility standard deviation	s_R	1,72189	%
Reproducibility coefficient of variation	$CV\%_R$	2,816	%
Repeatability limit	r	**3,63**	%
Relative repeatability limit	r_{rel}	**5,9**	%
Reproducibility limit	R	**4,82**	%
Relative reproducibility limit	R_{rel}	**7,9**	%
Number of participants included in the accuracy evaluation	p	17	
Number of tests included in the accuracy evaluation	$\sum n$	33	

Determination of shock absorption - ST3 - 3rd impact - R

Data eliminated from the evaluation due to z>10

—— (x^*)	------ ($\pm s^*$)	—— (m)	

Lab Code No.

z-score

(> 10)

Lab Code No.

Determination of shock absorption - ST4 - 3rd impact - R

EN 14808

Results submitted by participants   and   Results of robust statistics

i.e., individual results x_{ik}

(bottom part of the table)

+ number of the test repetitions made by each lab (n_i)

+ within laboratory means (x_i) and standard deviations (s_i)

+ results of tests for outliers

Number of reporting laboratories p *: **19**

Number of reported test results $\sum n_i$: **38**

Lab Code No.	Test results in %						n_i	x_i	s_i	Cochran	Grubbs	z > 2
	Test replication No. (k)						Statistical evaluation of the submitted test results x_{ik}			Outliers		
	1	2	3	4	5	6						
66	6,05	5,55					2	5,800	0,3536		**	X
439	25,48	51,30					2	38,388	18,2610	**	*	X
872	42,28	42,80					2	42,538	0,3712			X
565	44,83	45,00					2	44,913	0,1237			
279	46,38	45,88					2	46,125	0,3536			
206	46,65	45,88					2	46,263	0,5480			
238	47,05	47,05					2	47,050	0,0000			
349	47,58	46,68					2	47,125	0,6364			
362	46,38	47,90					2	47,138	1,0783			
178	47,30	47,00					2	47,150	0,2121			
99	48,40	47,80					2	48,100	0,4243			
250	49,35	48,65					2	49,000	0,4950			
938	48,63	49,45					2	49,038	0,5834			
627	49,70	49,75					2	49,725	0,0354			
464	54,80	44,80					2	49,800	7,0711	**		
520	50,03	49,68					2	49,850	0,2475			
438	49,88	50,18					2	50,025	0,2121			
812	51,78	51,70					2	51,738	0,0530			
747	55,60	55,08					2	55,338	0,3712			X
136	no results reported											X

Robust average: x * = **47,91**   ← **assigned value for the proficiency assessment**

Robust standard deviation for the proficiency assessment: s * = **2,682**

Number of repeate measurements necessary due to s_r/s*-ratio: n' = **>5**   **NOT OK**   see page 4 for the meaning of **NOT OK**

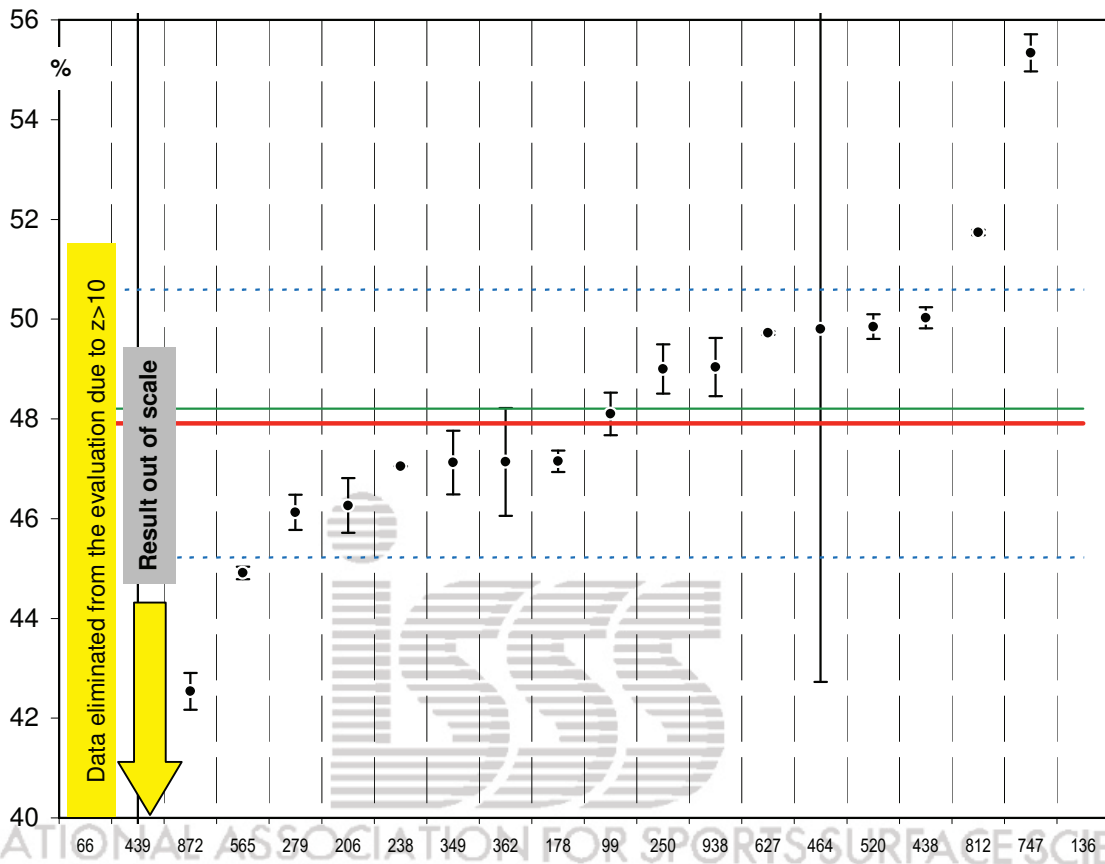**Standard uncertainty** of the assigned value: u_x = 0,79022   **OK**

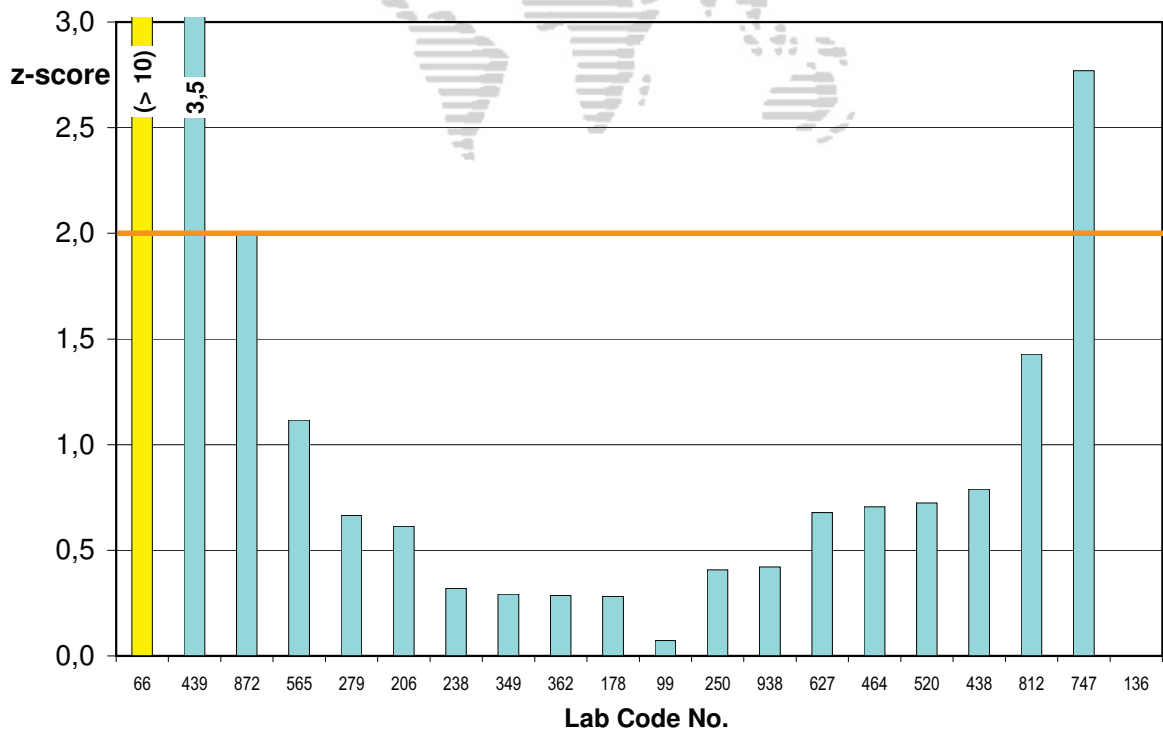** ... statistical outlier (99%)   * ... straggler (95%)

X ... z > 2; in this case, x_i is considered to be an outlier and is not taken into account in the test method accuracy check

Additional check of the test method accuracy

|			
Do the input data come from a normal distribution (when outliers found were eliminated) **?** (The results listed below shall be considered as really justified only if the input data come from a normal distribution)			**YES**
General mean $\sum n_i x_{ik} / \sum n_i$	m	**48,20**	%
Repeatability variance	s_r^2	3,5286042	
Repeatability standard deviation	s_r	1,87846	%
Repeatability coefficient of variation	$CV\%_r$	3,897	%
Between-laboratory variance	s_L^2	1,6914613	
Between-laboratory standard deviation	s_L	1,30056	%
Between-laboratory coefficient of variation	$CV\%_L$	2,698	%
Reproducibility variance s_R^2	$s_r^2 + s_L^2$	5,2200655	
Reproducibility standard deviation	s_R	2,28475	%
Reproducibility coefficient of variation	$CV\%_R$	4,740	%
Repeatability limit	r	**5,26**	%
Relative repeatability limit	r_{rel}	**10,9**	%
Reproducibility limit	R	**6,40**	%
Relative reproducibility limit	R_{rel}	**13,3**	%
Number of participants included in the accuracy evaluation	p	15	
Number of tests included in the accuracy evaluation	$\sum n$	30	

Determination of shock absorption - ST4 - 3rd impact - R

%

Data eliminated from the evaluation due to z>10

Result out of scale

Lab Code No.

——— (x^*)   (±s^*)   ——— (m)

z-score

(> 10)

3,5

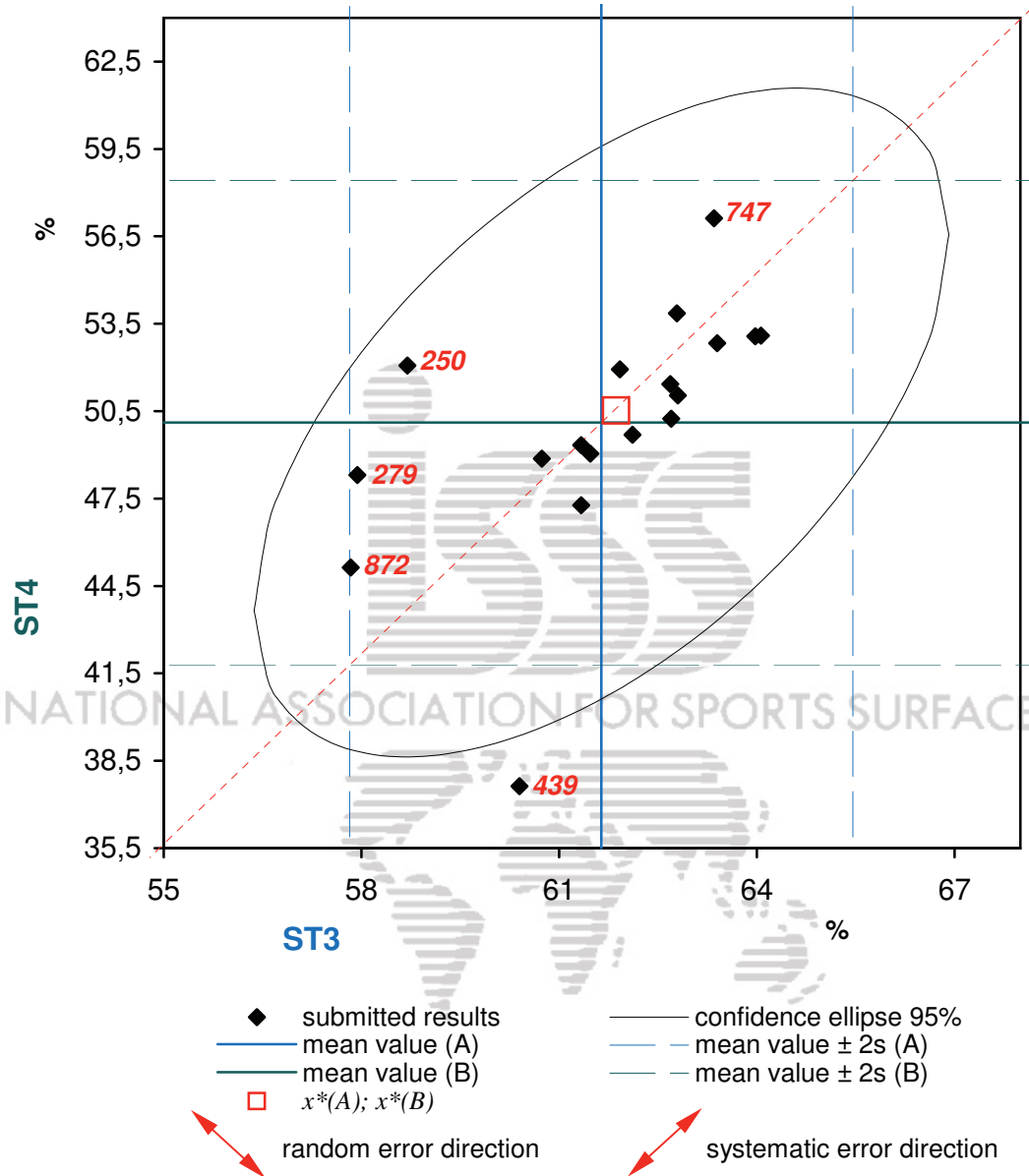Lab Code No.

Youden Plot & Confidence Ellipse

Determination of shock absorption - SS - 2nd impact - R

Youden Plot & Confidence Ellipse
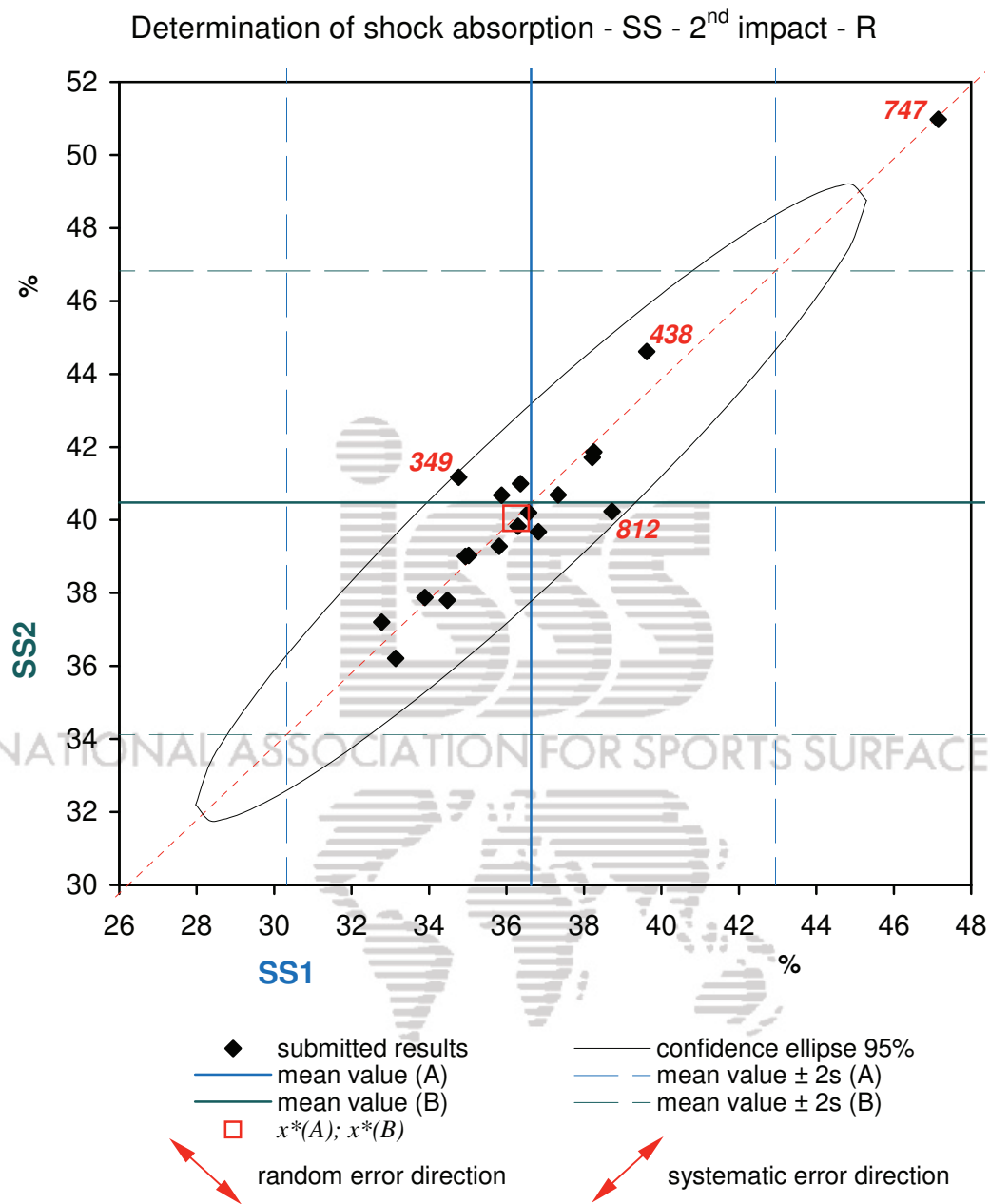
Determination of shock absorption - SS - 3rd impact - R
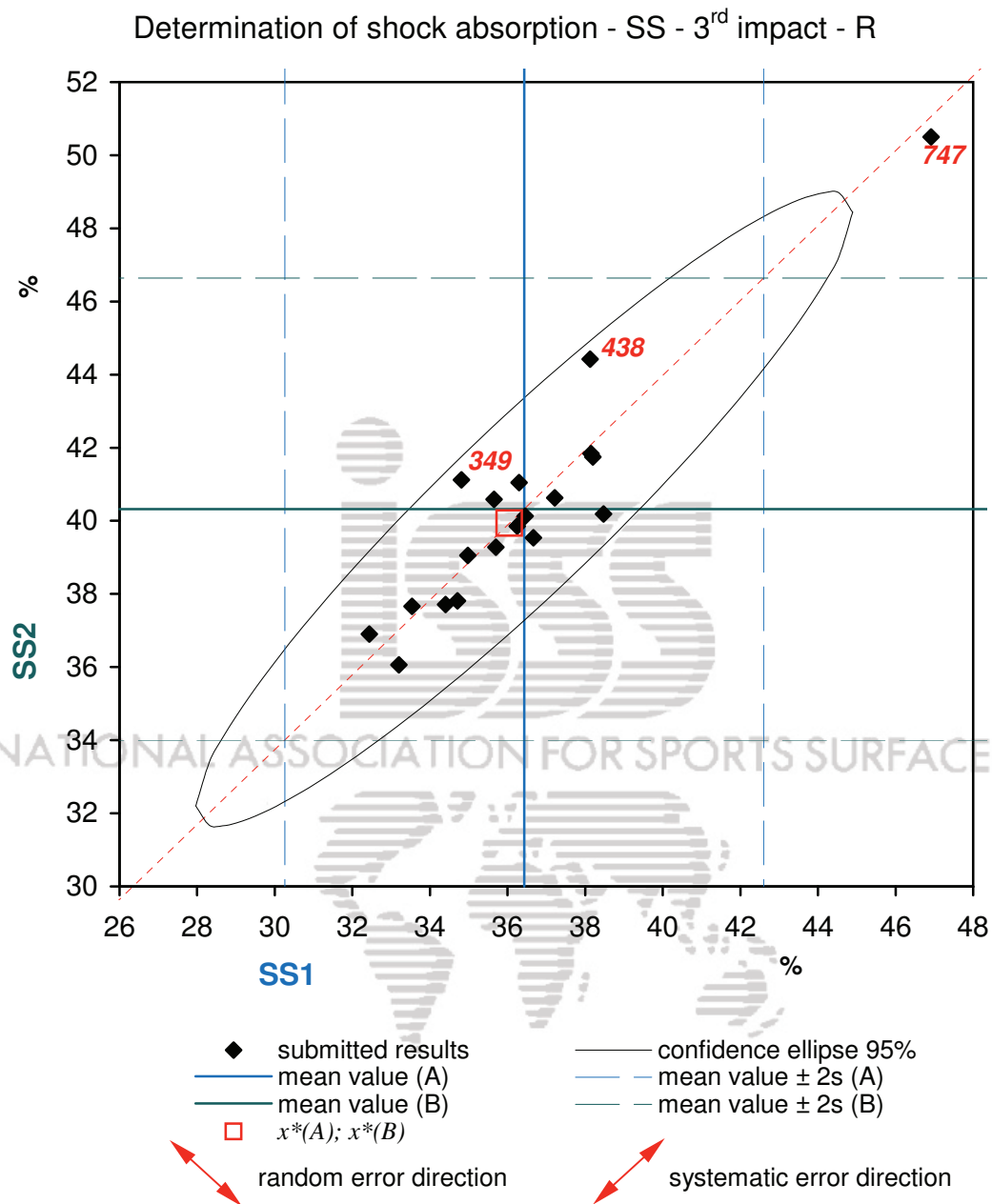
Youden Plot & Confidence Ellipse

Determination of shock absorption - ST - 2nd impact - R

Legend:
- ◆ submitted results
- ── mean value (A)
- ── mean value (B)
- □ x*(A); x*(B)
- ── confidence ellipse 95%
- – – mean value ± 2s (A)
- – – mean value ± 2s (B)

↔ random error direction   ↔ systematic error direction

Youden Plot & Confidence Ellipse

Determination of shock absorption - ST - 3rd impact - R