TECHNICKÝ A SKÚŠOBNÝ ÚSTAV STAVEBNÝ, n. o.
BUILDING TESTING AND RESEARCH INSTITUTE, Slovak Republic
Studená 967/3, 821 04 Bratislava

Application / archive No. 20260017

„Cement Ring Tests 2026“ final report

No.: 20-26-0010

Organizer: Building testing and research institute, Bratislava branch
Sampling material: Portland-composite cement EN 197-1 – CEM II/B-M (S-L) 32,5 R (sample No.: 20-26/0068)
Test methods: STN EN 196 – parts 1, 2, 3, 6, 8, 9, 10 and TNI CEN/TR 196-4: 2025

Participant’ code:

Chemical analyses	Physical tests	Mechanical tests
x1, x2, x3, x4, x5, x6, x7, x8	y1, y2, y3, y4, y5, y6, y7	z1, z2, z3, z4

Date of issue: 30. 07. 2026

Coordinator: Dipl. Eng. Marián K u b i š

Analyst of testing: Dipl. Eng. Michal C á p a y

Head of testing laboratories: Dipl. Eng. Daniel P e t h ő

Director of Bratislava branch: Dipl. Eng. Patrik Š e v č í k

CONTENT

1 SCOPE

Main objective of the final report is evaluation of the comparative tests of participating laboratories. These tests entitled as "Cement Ring Tests" are alternately organized by laboratories TZÚS Prague and TSÚS Bratislava. The Cement Ring Test 2026 was attended by 18 laboratories include laboratories working in building material industry and laboratories operating as independent testing institutes. Invitation to these comparative tests was accepted by following laboratories (*written in alphabetical order*):

Czech Republic (CZ) (08)
Cement Hranice, akciová společnost ; Bělotínská 288; 753 01 Hranice I - Město - ČR
Cemex Czech Republic, s. r. o. (cementová mlýnice Dětmarovice); Areál Edě č. p. 1216; 735 71 Dětmarovice, CZ
Cemex Czech Republic, s. r. o. (cementárna Prachovice); Tovární 296; 538 04 Prachovice, CZ
Heidelberg Materials CZ, a. s., [Českomoravský cement, a. s.]; závod Mokrá; Mokrá 359; 664 09 Mokrá-Horákov, CZ
HM CZ a.s. (laboratoř Radotín) ČESKOMORAVSKÝ CEMENT A.S.; K Cementárně 1261/25; 15302 Praha Radotín - ČR
HOLCIM (Česko), a.s., [Lafarge Cement], a. s.; Čížkovice 27; 411 12 Čížkovice, CZ
Technický a zkušební ústav stavební Praha, s. p., pobočka Teplice; Tolstého 447; Teplice 415 03, CZ [abbreviated TZÚS]
Výzkumný ústav maltovin Praha, s. r. o.; Na Cikánce 614/2; Praha 5 – Radotín, CZ
Výzkumný ústav stavebních hmot, a. s.; Hněvkovského 30/65; 617 00 Brno, CZ

Hungary (HU) (01)
SZIKKTI LABOR, Kft.; Bécsi út 122-124. D épulet, 1301 Pf.: 81.; 1034 Budapest, HU

Slovak Republic (SK) (08)
CEMMAC, a. s.; Cementárska 14; 914 42 Horné Srnie, SK
Danucem Slovensko, a. s., závod Rohožník; Senická cesta; 906 38 Rohožník, SK
Danucem Slovensko, a. s., závod Turňa nad Bodvou; 044 02 Turňa nad Bodvou, SK
Považská cementáreň, a. s.; ul. J. Kráľa; 018 63 Ladce, SK
STACHEMA Bratislava, s. r. o., 900 41 Rovinka 411, SK
Technický a skúšobný ústav stavebný, n. o., pobočka Bratislava; Studená 967/3; 821 04 Bratislava, SK [abbreviated TSÚS]
ZEOCEM, s. r. o., Prešovská 282/1, 094 34 Bystré, SK
S-320 BetónRacio, s.r.o., Skladová 2, 917 01 Trnava, SK

To compare the test results homogenized Portland-composite cement EN 197-1 – CEM II/B-M (S-L) 32,5 R (sample No.: 20-26/0068) (according to STN EN 197-1) was used. The test results were evaluated according to STN ISO 13528 and TNI CEN/TR 10345, while comparisons of the deviations were performed within the participated laboratories.

For this testing, cement, which contains not reduced content of water-soluble chromium (VI) was chosen.

1.1 Test data

Ordering party / organizer: (proficiency testing provider)	Building Testing and Research Institute, (abbrev: TSÚS), Studená 3, 821 04 Bratislava
Cement Manufacturer:	unreported (information archiving by organizer)
Evaluator:	Building Testing and Research Institute, Inovation department Studená 967/3, 821 04 B r a t i s l a v a

Competence and authorization of the test provider / organizer:
TSÚS is Notified body No.:1301 according to Regulation (EU) No 305/2011 – Construction products, regards to building materials and Construction.

TSÚS, testing laboratory Bratislava has developed system of quality according to requirements of STN EN ISO/IEC 17025: 2018, article 1.2 as holder of Certificate of accreditation No.: S-045 valid until 21. 12. 2029, is acting as independent testing and research institute.

Head of tests (coordinator): Dipl. Eng. Marián K u b i š

Character of the tests: study according to STN 73 2031;
Type of tests: STN EN 196 - parts 1, 2, 3, 6, 8, 9, 10; TNI CEN/TR 196-4

The tests were performed according to standard test methods in a range of organizer's requirements whilst following a test schedule.

1.2 Statistic execution

Organizer: Building testing and research institute (TSÚS),
Bratislava branch, Studená 967/3, 821 04 Bratislava

Analyst of the tests: Dipl. Eng. Michal C á p a y

1.3 Background to execution of the tests and results of the evaluation

Quoted standards and technical regulations

STN ISO 2602: 1993 Statistical interpretation of test results. Estimation of the mean. Confidence interval [*Štatistická interpretácia výsledkov skúšok. Odhad priemeru. Interval spoľahlivosti*] (01 0231)

TNI CEN/TR 10345: 2014 Guideline for statistical data treatment of inter laboratory tests for validation of analytical methods [*Návod na štatistické spracovanie údajov medzilaboratórnych skúšok na validáciu analytických metód*] (01 0240)

STN ISO 13528: 2023 Statistical methods for use in proficiency testing by interlaboratory comparison [*Štatistické metódy používané pri skúšaní spôsobilosti založenom na medzilaboratórnom porovnaní*] (01 0241)

ISO 5725-2: 2019 Accuracy (trueness and precision) of measurement methods and results. Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method [*Presnosť (správnosť a precíznosť) metód a výsledkov merania. Časť 2 – nahrádza zrušenú STN ISO 5725-2: 2000*] (01 0251)

STN EN ISO/IEC 17025: 2018 General requirements for the competence of testing and calibration laboratories [*Všeobecné požiadavky na kompetentnosť skúšobných a kalibračných laboratórií (ISO/IEC 17025: 2017)*] (01 5253)

STN EN ISO/IEC 17043: 2023 Conformity assessment - General requirements for the competence of proficiency testing providers [*Posudzovanie zhody. Všeobecné požiadavky na kompetentnosť poskytovateľov skúšok spôsobilosti*] (01 5257)

STN EN 196-1: 2019 Methods of testing cement. Part 1: Determination of strength [*Metódy skúšania cementu. Časť 1: Stanovenie pevnosti*] (72 2100)

STN EN 196-2: 2026 Methods of testing cement. Part 2: Chemical analysis of cement [*Metódy skúšania cementu. Časť 2: Chemický rozbor cementu*] (72 2100)

STN EN 196-3: 2020 Methods of testing cement. Part 3: Determination of setting time and soundness [*Metódy skúšania cementu. Časť 3: Stanovenie času tuhnutia a objemovej stálosti (Konsolidovaný text)*] (72 2100)

TNI CEN/TR 196-4: 2025 Methods of testing cement. Part 4: Quantitative determination of constituents [*Metódy skúšania cementu. 4. časť: Kvantitatívne stanovenie hlavných zložiek*] (72 2100)

STN EN 196-6: 2020 Methods of testing cement. Part 6: Determination of fineness [*Metódy skúšania cementu. Stanovenie jemnosti mletia*] (72 2100)

STN EN 196-7: 2008 Methods of testing cement. Part 7: Methods of taking and preparing samples of cement [*Metódy skúšania cementu. Časť 7: Postupy na odber a úpravu vzoriek cementu*] (72 2100)

STN EN 196-8: 2010 Methods of testing cement. Part 8: Heat of hydration. Solution method [*Metódy skúšania cementu. Časť 8: Stanovenie hydratačného tepla. Rozpúšťacia metóda*] (72 2100)

STN EN 196-9: 2010	Methods of testing cement. Part 9: Heat of hydration. Semi-adiabatic method [*Metódy skúšania cementu. Časť 9: Stanovenie hydratačného tepla. Semiadiabatická metóda*] (72 2100)
STN EN 196-10: 2019	Methods of testing cement. Part 10: Determination of the water-soluble chromium (VI) content of cement [*Metódy skúšania cementu. Časť 10: Stanovenie obsahu vo vode rozpustného šesťmocného chrómu (VI) v cemente*] (72 2100)
STN EN 197-1: 2012	Cement Part 1: Composition, specifications and conformity criteria for common cements [*Cement. Časť 1: Zloženie, špecifikácie a kritériá na preukazovanie zhody cementov na všeobecné použitie*] (72 2101)
STN EN 197-2: 2021	Cement. Part 2: Conformity evaluation [*Cement. Časť 2: Hodnotenie zhody*] (72 2101)

1.4 List of references

[1] Likeš J., Laga J.: Základní statistické tabulky, [*Basic statistical tables*]; SNTL – Nakladatelství technické literatury, Praha 1978

[2] Jílek M.: Statistické toleranční meze, [*Statistical tolerance limits*]; SNTL – Nakladatelství technické literatury, Praha 1988

[3] MSA – L/14: Stanovenie rozsahu a frekvencie účasti v skúškach spôsobilosti, Metodická smernica na akreditáciu, [*Determination of the scope and frequency of participation in competency tests*], [*Methodological guideline for accreditation*], SNAS, Bratislava, júl 2021

[4] K. Kersting, J. Wehde, W. Leimbrock, D. Breuer: Bestimmung des Chrom(VI)-Gehaltes in Zementen, in: Gefahrstoffe -Reinhaltung der Luft 62 (2002) Nr. 7/8

2 ELIGIBILITY OF THE TEST

2.1 Requirements of compliances of the tests

Organization of the Cement Ring Test 2026

These tests are organized alternately by the laboratories of TSÚS, Bratislava branch and TZÚS, Teplice branch since 1996.

Laboratories recruitments

To attend the comparative tests, the laboratories of cement manufacturers from Slovak republic were invited as well as laboratories of cement manufacturers and independent testing institutes from Czech Republic, Slovak Republic and Hungary. Laboratories involvement was based on experience from previous years.

Preparation of testing materials

For execution of comparative tests approximately 110 kg of homogenized cement was used.

Verification of stability and homogeneity of testing material: Previous to transport organizer of the tests confirmed homogeneity of testing material according to STN EN 196-7.

Selection of the test methods

Subject of comparison was based on standard testing method such as chemical analyses, physical methods and stability of cement according to EN 196. In addition alternative test methods were offered.

Instructions for participants of international laboratories comparative tests

Test attendants received a spreadsheet indicating the name of the property being tested, the required values with units and an opportunity to comment on deviations from the procedure.

Based on previous experience, the test results are presented in such form that each participating laboratory is able to find only its own results. The overall review of the test results can be seen in section 4 and 5 in a following form:

Chemical analyses	Physical tests	Mechanical tests
x1, x2, x3, x4, x5, x6, x7, x8	y1, y2, y3, y4, y5, y6, y7	z1, z2, z3, z4

Where:

x1, x2, x3, x4, x5, x6, x7, x8	are row numbers in table 4.1 and 5.1.1, 5.1.2
y1, y2, y3, y4, y5, y6, y7	are row numbers in table 4.2 and 5.2.1, 5.2.2
z1, z2, z3, z4	are row numbers in table 4.3 and 5.3.1, 5.3.2

The code numbers will be announced to each laboratory separately.

2.2 Statistics analyse of the test compliance

Basic statistics for evaluation of the tests

p Sample size / Count

Central trend parameters

$\overline{x}$ Average, arithmetic mean

$$\overline{x} = \frac{1}{p}\sum_{i=1}^{p} x_i \quad (2.1)$$

Dispersion parameters

v Coefficient of variation / Variance

$$v(\%) = \frac{s \cdot 100}{|\overline{x}|} \quad (2.2)$$

s Standard deviation of a sample

$$s = \sqrt{\frac{1}{p-1}\sum_{i=1}^{p}(x_i - \overline{x})^2} \quad (2.3)$$

s_o Standard deviation

$$s_0 = \sqrt{\frac{1}{p}\sum_{i=1}^{p}(x_i - \overline{x})^2} \quad (2.4)$$

Robust parameters (STN ISO 13528, Annex C – Algorithm A)

*x** Robust average – robust estimate of the location of participant results, used as the assigned value xpt. It is obtained iteratively: the starting value is the median of the results; in each iteration the results are winsorised (trimmed) to the limits x*±1,5·s* and the mean of the winsorised values is recalculated, until x* and s* no longer change in the third significant figure.

*s** Robust standard deviation – robust estimate of the dispersion of participant results, used as the standard deviation for proficiency assessment σpt. The starting value is 1,483·MAD (the scaled median absolute deviation from the median); in each iteration it is recalculated from the winsorised values as s* = 1,134·√(Σ(xi* − x*)²/(p − 1)). Unlike the classical standard deviation s, it is not inflated by extreme values, because no result is rejected – its influence is only limited by winsorisation.

$u_{(xpt)}$ Standard uncertainty of the assigned value, u(xpt) = 1,25·s*/√p (STN ISO 13528, Clause 7.7.2.2).

x_{min} Minimum value

x_{max} Maximum value

R Sample range

$$R = x_{max} - x_{min} \quad (2.5)$$

Standard Skewness

Skewness is symmetry ratio of distribution of dividing function
Skewness is defined with regards to central moment of third degree:

$$SK_{est} = \frac{1}{n \cdot s^3} \sum_{i=1}^{p} (x_i - \overline{x})^3 \quad (2.6)$$

which is mean value of divided cubature Z-score.

Standard Kurtosis

Kurtosis is commonly defined as the fourth cumulant divided by the square of the variance of the probability distribution.

Excess is defined as:

$$\gamma_2 = \beta_2 - 3 \quad (2.7)$$

$$\beta_2 = \frac{1}{n \cdot s^4} \sum_{i=1}^{p} (x_i - \overline{x})^4 \quad (2.8)$$

where:

s is decisive deviation of a sample.

Note: Values of skewness and kurtosis were formally evaluated without any precise analyse of dividing. In case that statistic values are out of interval ≤ -2; +2 ≥, a higher consideration should be taken since these values represent significant deviations from standard dividing.

Robust treatment of results (Algorithm A, STN ISO 13528)

outlier (accordance with ISO 13528): member of a set of values which is inconsistent with other members of that set

Note 1 to entry: An outlier can arise by chance from the expected population, originate from a different population, or be the result of an incorrect recording or other blunder.

Note 2 to entry: Many schemes use the term outlier to designate a result that generates an action signal. This is not the intended use of the term. While outliers will usually generate action signals, it is possible to have action signals from results that are not outliers.

In accordance with STN ISO 13528 (Clause 6.5), outliers are not excluded from the evaluation. Instead, a robust statistical method – Algorithm A (STN ISO 13528, Annex C) – was applied. Algorithm A does not remove any result; the influence of extreme values is limited by winsorisation (trimming to the limits x* ± 1,5·s*). By iterative calculation it provides a robust average x* and a robust standard deviation s* of the participant results. The outlier tests according to STN ISO 5725-2 (Grubbs, Irwin, Dean-Dixon) described below are given for information and diagnostic purposes only; no results were eliminated on their basis.

For information only, the occurrence of one extreme observation can be indicated by the Grubbs' statistic G_p, and G_1 respectively:

Definitions of Grubbs' tests are based on hypothesis H_0 against H_a where:

H_0: no outlier in a sample

H_a: at least one outlier in a sample

Grubbs' test statistic is defined as:

$$G_p = \frac{(x_p - \bar{x})}{s} \quad (2.9)$$

$$G_1 = \frac{(\bar{x} - x_1)}{s} \quad (2.10)$$

Or in accordance with [1] :

$$k_{calc} = \frac{x_{max} - \bar{x}_n}{s_n} \geq k_{crit} = k_\alpha(n) \quad (2.11)$$

$$k_{calc} = \frac{\bar{x}_n - x_{min}}{s_n} \geq k_{crit} = k_\alpha(n) \quad (2.12)$$

where x̄n and sn are mean values and decisive deviation.

The Grubb´s test statistic is the largest absolute deviation from a sample mean value in units of a sample standard deviation.

Significance Level:
critical region: The hypothesis of no outliers is rejected if:

$$G > \frac{n-1}{\sqrt{n}} \sqrt{\frac{t_{\alpha/(2n),n-2}{}^2}{n-2+t_{\alpha/(2n),n-2}{}^2}} \quad (2.13)$$

where
is the critical value of the t-distribution with (N-2) degrees of freedom and a significance level of α /(2N).

In the above formulas for the critical regions, the Handbook follows the convention that is the upper critical value from the t-distribution and is the lower critical value from the t-distribution. Note that this is the opposite of what is used in some texts and software programs. In particular, Data plot uses the opposite convention.

Irwin test, in which the biased of two the closest elements on the edge of ordered selection is verified according to:

$$\lambda_{vyp} = \frac{x_n - x_{n-1}}{s_n} \geq \lambda_\alpha(n) \quad (2.14)$$

$$\lambda_{vyp} = \frac{x_2 - x_1}{s_n} \geq \lambda_\alpha(n) \quad (2.15)$$

($x_1 \leq x_2 \leq x_3 \leq x_4 \leq \ldots \leq x_i \leq \ldots \leq x_{n-1} \leq x_n$)

Critical value was approximately calculated for number of elements *n* as:

$$\lambda_\alpha(n) = 11{,}58849 - 10{,}752151 \cdot \exp(-0{,}30788516 \cdot n^{(-0.67230923)}) \quad (2.16)$$

For regression curve the Weibull model was used, where:

$$y = a - b \cdot \exp(-c \cdot x \,\hat{}\, d)$$

with parameters:

a = 11,58849
b = 10,752151
c = 0,30788516
d = -0,67230923

Significance of outlier value and biased value correspond to definitions within STN ISO 5725-2: 2000.

Because of the relatively small number of participating laboratories and because the assumption of a normal distribution is not met in some cases (Cl-content, sodium oxide content, potassium content, chromium content, volume of soundness, initial setting time; slag content—chemical, wet method (% by weight); slag content—microscopic (% by weight); heat of hydration—dissolution method (J/g); heat of hydration—semi-adiabatic method (J/g)), the robust Algorithm A (STN ISO 13528, Annex C) was applied for the evaluation. Outliers were therefore not excluded (e.g. by the Grubbs test); their influence was limited by winsorisation within Algorithm A.

Intervals of confidence for outlier values were evaluated as minimum L_m and maximum L_M at level of α=0,05 as a result Student's distribution was applied' dividing for N=(n-1) degree of freedom:

$$L_m = \overline{x} - s \cdot t_{(n-1)} \quad (2.17)$$

$$L_M = \overline{x} + s \cdot t_{(n-1)} \quad (2.18)$$

where

$L_{m\ 95\%}$ Lower confidence limit (reported for information only).

$L_{M\ 95\%}$ Upper confidence limit (reported for information only).

For evaluation of deviation ε following equation was applied:

$$\varepsilon = \frac{s}{\sqrt{n}} \cdot t_{(n-1)} \quad (2.19)$$

where

$t_{(n-1)}$ is value of Student's dividing for N=n-1 degree of freedom when level of significance is selected.

Z-SCORE

z-score Standardized measure of performance, calculated using the participant result, assigned value and the standard deviation for proficiency assessment.

The Z-SCORE (standard score) indicates how many standard deviations an element is from the mean. The robust Z-SCORE2 (calculated from the robust average x* and the robust standard deviation s* by Algorithm A) is the score used for the assessment of proficiency; the classical Z-SCORE1 is reported for information only.

Z-SCORE1 is defined as:

$$Z - SCORE1 = \frac{x_i - \bar{x}}{s} \qquad (2.20)$$

where the arithmetic mean $\bar{x}$ and s are the classical arithmetic mean and standard deviation of all reported values (complete sample, including extreme values).

Z-SCORE2 is defined as:

$$Z - SCORE2 = \frac{x_i - \bar{x}_2}{s_2} \qquad (2.21)$$

where $\bar{x}_2$ and s_2 are the robust average x^* and the robust standard deviation s^* calculated by Algorithm A (STN ISO 13528, Annex C); no results are excluded. Note (small numbers of participants – STN ISO 13528, Clause 5.4 and Annex D.1): the robust consensus (Algorithm A) requires approximately p ≥ 15 participants. For parameters with fewer participants the assigned value and σpt are not derived from the single-round participant consensus; where possible the assigned value is based on an independent source (certified reference material, reference/metrology laboratory, or gravimetric preparation) and σpt is set from a fitness-for-purpose goal (STN ISO 13528, Clause 8.1.2). Performance is then evaluated by the z-score, or – when the uncertainty of the assigned value or of the participant result is significant – by the z′-score [$z' = (x - xpt)/\sqrt{(\sigma pt^2 + u(xpt)^2)}$], the zeta score or the En number (STN ISO 13528, Clauses 9.5–9.7). A minimum number of participants is set for scoring; below this number z-scores are not assigned and the results are reported for information only. Accordingly, for slag content (p = 5) and water-soluble Cr(VI) (p = 12) z-scores from the participant consensus are not assigned.

if	$\lvert Z_i \rvert \le 2{,}0$	then the result is satisfactory/is considered to be acceptable,
if	$2{,}0 < \lvert Z_i \rvert < 3{,}0$	then the result is questionable and biased/is considered to give a warning signal,
if	$\lvert Z_i \rvert \ge 3{,}0$	then the result is unsatisfactory and outlier/is considered to be unacceptable (or action signal).

3 PARTIAL RESULTS

Summary of statistic comparative results testing methods is illustrated in the Annex.
The results are presented in tables in Section 4.
The Z-SCORE1, Z-SCORE2 of the results is presented in tables in Section 5.

The result selection:
each laboratory has received code which consists of 3 number series: - x_i / y_j / z_k.

The **first number cluster** represents the code of lines for the results and Z-SCORE presented in Table 4.1 and 5.1.1, 5.1.2 resp. and

the **second number cluster** represents the code for the results and Z-SCORE presented in Table 4.2 and 5.2.1, 5.2.2 resp. and

the **third number cluster** represents the code for the results and Z-SCORE presented in Table 4.3 and 5.3.1, 5.3.2 resp. .

NOTE
Blunder removal by ISO 13528, Clause 6.3
6.3.1 ISO/IEC 17043 section B.2.5 and the IUPAC Harmonized Protocol recommend removing obvious blunders from a data set at an early stage in an analysis, prior to use of any robust procedure or any test to identify statistical outliers. Generally, these results would be treated separately (such as contacting the participant). It can be possible to correct some blunders, but this should only be done according to an approved policy and procedure.
Occasionally (especially in proficiency testing that is offered for the first time) a single participant (or multiple participants) will make several such blunders in reporting, perhaps due to misunderstanding of instructions or report forms. In such cases all results from that participant should be removed from the analysis, including any results that may not be obvious blunders.
NOTE Obvious blunders, such as reporting results in incorrect units or switching results from different proficiency test items, occurs in most rounds of proficiency testing, and these results only impair the performance of subsequent statistical methods.

4 SUMMARY OF THE RESULTS

4.1 Results of chemical analysis

The results of chemical analyses are presented in Table 4.1

Table 4.1 - The results of chemical analysis

Laboratory key numbers	Sulfate content (as SO_3)	Chloride content	Loss on Ignition	Insoluble residue	Na_2O content	K_2O content	Slag content wet way [1)]	Chromium (VI) content [2)]
	(% by mass)	(% by mass)	(% by mass)	(% by mass)	(% by mass)	(% by mass)	(% by mass)	(ppm)
x_j	x1	x2	x3	x4	x5	x6	x7	x8
1	2,930	***0,044 *****	***6,365 *****	***1,385 *****	***0,100 *****	***0,640 *****	14,70	0,00
2	3,015	0,068	6,695	1,615	0,220	0,680	14,95	0,00
3	3,015	0,070	6,715	1,670	0,260	0,696	14,95	0,00
4	3,035	0,071	6,715	1,715	0,275	0,700	15,20	0,00
5	3,050	0,075	6,735	1,715	0,275	0,700	***18,36 *****	0,00
6	3,055	0,075	6,735	1,730	0,275	0,705	-	0,03
7	3,075	0,076	6,795	1,740	0,300	0,705	-	0,05
8	3,125	0,077	6,820	1,800	0,300	0,715	-	0,07
9	3,160	0,078	6,835	1,840	0,300	0,720	-	0,08
10	3,170	0,078	6,850	1,865	0,300	0,727	-	0,14
11	3,170	0,078	6,850	1,880	0,305	0,732	-	***1,00 *****
12	3,175	0,078	6,855	1,920	0,305	0,740	-	***3,65 *****
13	3,190	0,079	6,870	1,965	0,310	0,745	-	-
14	3,225	0,079	6,895	2,035	0,375	0,765	-	-
15	***3,450 ****	0,083	***7,460 *****	2,060	-	-	-	-
16	***3,460 ****	0,090	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-

Note:
Values marked with single star (*) are considered as biased values.
Values marked with two stars (**) are considered as outliers.
1) The results of the chemical analysis for property X7 – Slag content (microscopic method) were reported by two laboratories, with values of 17,05% and 17,85% (by mass). Due to the insufficient number of results, no further statistical evaluation of this method was performed.
2) The results of the chemical analysis for property X8 – Chromium (VI) content indicate a very low chromium concentration in the sample, approaching zero. Therefore, it is not possible to reliably evaluate the Z-scores of the negative deviations reported by individual laboratories.

4.2 Results of physical tests

The results of physical tests are presented in Table 4.2.

Table 4.2 - The results of physical tests

Laboratory key numbers	Hydrating heat dissolution metod	Grinding fineness		Setting time		Water for standard consistency	Volume soundness
		Specific surface	Specific gravity	Initial setting time	Final setting time		
	(J/g)	(m^2/kg)	(g/cm^3)	(min)	(min)	(% by mass)	(mm)
y_j	y1	y2	y3	y4	y5	y6	y7
1	***287***	508,1	2,94	198	***250*** **	27,65	0,2
2	***323***	509,0	2,95	228	300	28,00	0,3
3	-	512,1	2,97	235	357	28,10	0,4
4	-	518,7	2,97	236	381	28,45	0,5
5	-	521,0	2,99	240	387	28,70	0,5
6	-	524,2	2,99	263	388	29,00	0,5
7	-	525,5	3,00	272	395	29,00	0,5
8	-	525,5	3,01	288	401	29,10	0,7
9	-	527,5	3,01	302	402	29,20	1,0
10	-	529,4	3,02	303	405	29,25	1,0
11	-	533,5	3,02	327	413	29,25	1,0
12	-	535,0	3,02	330	425	29,50	1,0
13	-	537,5	3,02	343	435	29,60	***1,5*** **
14	-	538,0	3,04	351	440	29,80	-
15	-	542,2	***3,19*** **	365	442	30,00	-
16	-	***559,3*** **	-	375	493	30,50	-
17	-	-	-	***450*** **	503	***32,00*** **	-
18	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-

Note:
Values marked with single star (*) are considered as biased values.
Values marked with two stars (**) are considered as outliers.

4.3 Results of mechanical tests

The results of mechanical tests are presented in Table 4.3.

Table 4.3 - The results of mechanical tests

Laboratory key numbers	Strength			
	Flexural strength		Compressive strength	
	2 days	28 days	2 days	28 days
	(MPa)	(MPa)	(MPa)	(MPa)
z_k	z1	z2	z3	z4
1	3,40	***5,53*** **	***16,29*** *	49,36
2	3,62	7,75	17,38	49,53
3	3,78	8,13	17,38	50,43
4	3,90	8,16	18,12	50,46
5	3,93	8,22	18,35	50,59
6	3,94	8,37	18,49	51,47
7	3,95	8,40	18,71	51,58
8	3,95	8,50	18,75	52,41
9	3,96	8,54	18,75	52,42
10	3,98	8,58	18,77	52,83
11	3,98	8,75	19,22	52,92
12	4,03	8,83	19,29	52,95
13	4,07	9,07	19,67	53,39
14	4,10	9,13	20,23	53,69
15	4,28	9,28	20,35	53,97
16	4,57	9,59	20,37	54,13
17	4,58	9,65	20,55	54,95
18	4,67	9,93	20,78	55,30
19	-	-	-	-
20	-	-	-	-
21	-	-	-	-
22	-	-	-	-

Note:
Values marked with single star (*) are considered as biased values.
Values marked with two stars (**) are considered as outliers.

5 Z-SCORE EVALUATION

5.1 Z-SCORE for chemical analysis

The Z-SCORE1 for chemical analyses is presented in Table 5.1.1

Table 5.1.1 – Z-SCORE1 for chemical analysis

Laboratory key numbers	Sulfate content (as SO_3)	Chloride content	Loss on Ignition	Insoluble residue	Na_2O content	K_2O content	Slag content wet way (information only)	Chromium (VI) content (information only)
x_j	x1	x2	x3	x4	x5	x6	x7	x8
1	-1,469	***-3,188 *****	***-2,031 ****	***-2,363 ****	***-2,902 ****	***-2,352 ****	*-0,607*	*-0,396*
2	-0,885	-0,715	-0,534	-1,040	-0,952	-1,048	*-0,444*	*-0,396*
3	-0,885	-0,509	-0,443	-0,723	-0,302	-0,526	*-0,444*	*-0,396*
4	-0,747	-0,406	-0,443	-0,464	-0,058	-0,396	*-0,281*	*-0,396*
5	-0,644	0,006	-0,352	-0,464	-0,058	-0,396	*1,777*	*-0,396*
6	-0,610	0,006	-0,352	-0,378	-0,058	-0,233	-	*-0,368*
7	-0,472	0,109	-0,080	-0,320	0,348	-0,233	-	*-0,349*
8	-0,129	0,213	0,033	0,025	0,348	0,093	-	*-0,330*
9	0,112	0,316	0,101	0,255	0,348	0,256	-	*-0,321*
10	0,180	0,316	0,169	0,399	0,348	0,484	-	*-0,264*
11	0,180	0,316	0,169	0,485	0,430	0,647	-	*0,551*
12	0,215	0,316	0,192	0,716	0,430	0,908	-	*3,062*
13	0,318	0,419	0,260	0,975	0,511	1,071	-	-
14	0,558	0,419	0,374	1,377	1,567	1,723	-	-
15	***2,105 ****	0,831	***2,937 ****	1,521	-	-	-	-
16	***2,173 ****	1,552	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-

Note:
Values marked with single star (*) are considered as questionable values.
Values marked with two stars (**) are considered as unsatisfactory values.
1) The results of the chemical analysis for property X8 – Chromium (VI) content indicate a very low chromium concentration in the sample, approaching zero. Therefore, it is not possible to reliably evaluate the Z-scores of the negative deviations reported by individual laboratories.
2) Slag content – wet way (p = 5) and Chromium (VI) content (p = 12): z-scores from the participant consensus are not assigned (STN ISO 13528, Clause 5.4 and Annex D.1 – insufficient number of participants for a robust consensus). The z-scores shown for these two properties are given for information only, are not used for the assessment of proficiency and are therefore not flagged as questionable or unsatisfactory.

The Z-SCORE2 for chemical analyses is presented in Table 5.1.2

Table 5.1.2 – Z-SCORE2 for chemical analysis

Laboratory key numbers	Sulfate content (as SO_3)	Chloride content	Loss on Ignition	Insoluble residue	Na_2O content	K_2O content	Slag content wet way (information only)	Chromium (VI) content (information only)
x_j	x1	x2	x3	x4	x5	x6	x7	x8
1	-1,670	***-5,911 *****	***-4,559 *****	***-2,497 ****	***-6,282 *****	***-2,695 ****	*-0,761*	*-0,758*
2	-0,945	-1,488	-1,079	-1,136	***-2,257 ****	-1,233	*-0,375*	*-0,758*
3	-0,945	-1,119	-0,868	-0,810	-0,916	-0,649	*-0,375*	*-0,758*
4	-0,774	-0,935	-0,868	-0,544	-0,412	-0,502	*0,011*	*-0,758*
5	-0,647	-0,197	-0,657	-0,544	-0,412	-0,502	*4,891*	*-0,758*
6	-0,604	-0,197	-0,657	-0,455	-0,412	-0,320	-	*-0,387*
7	-0,433	-0,013	-0,024	-0,396	0,426	-0,320	-	*-0,139*
8	-0,007	0,171	0,239	-0,041	0,426	0,046	-	*0,108*
9	0,291	0,355	0,397	0,196	0,426	0,228	-	*0,232*
10	0,376	0,355	0,556	0,344	0,426	0,484	-	*0,974*
11	0,376	0,355	0,556	0,433	0,594	0,667	-	*11,613*
12	0,419	0,355	0,608	0,669	0,594	0,959	-	*44,395*
13	0,547	0,540	0,767	0,936	0,761	1,142	-	-
14	0,845	0,540	1,030	1,350	***2,941 ****	1,873	-	-
15	***2,764 ****	1,277	***6,988 *****	1,498	-	-	-	-
16	***2,849 ****	***2,567 ****	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-
18	-	-		-	-	-	-	-
19	-	-		-	-	-	-	-
20	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-

Note:
Values marked with single star (*) are considered as questionable values.
Values marked with two stars (**) are considered as unsatisfactory values.
2) Slag content – wet way (p = 5) and Chromium (VI) content (p = 12): z-scores from the participant consensus are not assigned (STN ISO 13528, Clause 5.4 and Annex D.1 – insufficient number of participants for a robust consensus). The z-scores shown for these two properties are given for information only, are not used for the assessment of proficiency and are therefore not flagged as questionable or unsatisfactory.
1) The results of the chemical analysis for property X8 – Chromium (VI) content indicate a very low chromium concentration in the sample, approaching zero. Therefore, it is not possible to reliably evaluate the Z-scores of the negative deviations reported by individual laboratories.

5.2 Z-SCORE for physical tests

The Z-SCORE1 for physical tests is presented in Table 5.2.1.

Table 5.2.1 – Z-SCORE1 for physical tests

Laboratory. key numbers	Hydrating heat dissolution metod [1)]	Grinding fineness		Setting time		Water for standard consistency	Volume soundness
		Specific surface	Specific gravity	Initial setting time	Final setting time		
y_j	y1	y2	y3	y4	y5	y6	y7
1	- [1)]	-1,497	-1,206	-1,567	***-2,472 ****	-1,557	-1,344
2	- [1)]	-1,429	-1,032	-1,108	-1,653	-1,214	-1,075
3	-	-1,195	-0,684	-1,001	-0,720	-1,117	-0,807
4	-	-0,696	-0,684	-0,985	-0,327	-0,774	-0,538
5	-	-0,522	-0,336	-0,924	-0,229	-0,530	-0,538
6	-	-0,280	-0,336	-0,572	-0,213	-0,236	-0,538
7	-	-0,182	-0,162	-0,434	-0,098	-0,236	-0,538
8	-	-0,182	0,012	-0,189	0,000	-0,138	0,000
9	-	-0,031	0,012	0,025	0,016	-0,040	0,807
10	-	0,113	0,185	0,041	0,065	0,009	0,807
11	-	0,423	0,185	0,408	0,196	0,009	0,807
12	-	0,536	0,185	0,454	0,393	0,253	0,807
13	-	0,725	0,185	0,653	0,557	0,351	***2,151 ****
14	-	0,763	0,533	0,775	0,638	0,547	-
15	-	1,080	***3,142 *****	0,990	0,671	0,743	-
16	-	***2,373 ****	-	1,143	1,506	1,232	-
17	-	-	-	***2,291 ****	1,670	***2,699 ****	-
18	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-

Note:
1) - We do not present the results for a small number of participants.
Values marked with single star (*) are considered as questionable values.
Values marked with two stars (**) are considered as unsatisfactory values.

The Z-SCORE2 for physical tests is presented in Table 5.2.2.

Table 5.2.2 – Z-SCORE2 for physical tests

Laboratory. key numbers	Hydrating heat dissolution metod [1)]	Grinding fineness		Setting time		Water for standard consistency	Volume soundness
		Specific surface	Specific gravity	Initial setting time	Final setting time		
y_j	y1	y2	y3	y4	y5	y6	y7
1	- [1)]	-1,459	-1,729	-1,492	***-3,314 *****	-1,676	-1,282
2	- [1)]	-1,390	-1,444	-1,041	***-2,248 ****	-1,288	-1,015
3	-	-1,152	-0,875	-0,936	-1,033	-1,177	-0,748
4	-	-0,646	-0,875	-0,921	-0,522	-0,790	-0,481
5	-	-0,469	-0,306	-0,861	-0,394	-0,513	-0,481
6	-	-0,224	-0,306	-0,515	-0,372	-0,181	-0,481
7	-	-0,124	-0,022	-0,379	-0,223	-0,181	-0,481
8	-	-0,124	0,263	-0,139	-0,095	-0,070	0,053
9	-	0,029	0,263	0,072	-0,074	0,041	0,854
10	-	0,175	0,547	0,087	-0,010	0,096	0,854
11	-	0,490	0,547	0,448	0,161	0,096	0,854
12	-	0,605	0,547	0,493	0,417	0,373	0,854
13	-	0,797	0,547	0,688	0,630	0,484	***2,189 ****
14	-	0,835	1,116	0,808	0,736	0,705	
15	-	1,157	***5,383 *****	1,019	0,779	0,926	
16	-	***2,469 ****		1,169	1,866	1,480	
17	-			***2,297 ****	***2,079 ****	***3,141 *****	
18	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-

Note:
1) - We do not present the results for a small number of participants.
Values marked with single star (*) are considered as questionable values.
Values marked with two stars (**) are considered as unsatisfactory values.

5.3 Z-SCORE for mechanical tests

The Z-SCORE1 for mechanical tests is presented in Table 5.3.1.

Table 5.3.1 – Z-SCORE1 for mechanical tests

Labor key numbers	Strength			
	Flexural strength		Compressive strength	
	2 days	28 days	2 days	28 days
z_k	z1	z2	z3	z4
1	-1,986	***-3,172*** **	***-2,181*** *	-1,685
2	-1,301	-0,862	-1,294	-1,590
3	-0,804	-0,467	-1,294	-1,083
4	-0,430	-0,435	-0,691	-1,066
5	-0,337	-0,373	-0,504	-0,993
6	-0,306	-0,217	-0,390	-0,498
7	-0,275	-0,186	-0,211	-0,436
8	-0,275	-0,082	-0,179	0,031
9	-0,244	-0,040	-0,179	0,037
10	-0,181	0,002	-0,162	0,268
11	-0,181	0,179	0,204	0,318
12	-0,026	0,262	0,261	0,335
13	0,099	0,512	0,570	0,583
14	0,192	0,574	1,026	0,752
15	0,752	0,730	1,124	0,909
16	1,654	1,053	1,140	0,999
17	1,685	1,115	1,286	1,461
18	1,965	1,407	1,474	1,658
19	-	-	-	-
20	-	-	-	-
21	-	-	-	-
22	-	-	-	-

Note:
Values marked with single star (*) are considered as questionable values.
Values marked with two stars (**) are considered as unsatisfactory values.

The Z-SCORE2 for mechanical tests is presented in Table 5.3.2.

Table 5.3.2 – Z-SCORE2 for mechanical tests

Labor key numbers	Strength			
	Flexural strength		Compressive strength	
	2 days	28 days	2 days	28 days
z_k	z1	z2	z3	z4
1	***-2,179 ****	***-4,442 *****	***-2,110 ****	-1,486
2	-1,410	-1,316	-1,265	-1,402
3	-0,851	-0,781	-1,265	-0,955
4	-0,431	-0,738	-0,692	-0,940
5	-0,327	-0,654	-0,514	-0,876
6	-0,292	-0,443	-0,405	-0,439
7	-0,257	-0,400	-0,235	-0,384
8	-0,257	-0,260	-0,204	0,028
9	-0,222	-0,203	-0,204	0,033
10	-0,152	-0,147	-0,188	0,236
11	-0,152	0,092	0,160	0,281
12	0,023	0,205	0,214	0,296
13	0,163	0,543	0,509	0,514
14	0,268	0,628	0,943	0,663
15	0,897	0,839	1,036	0,802
16	1,910	1,275	1,051	0,881
17	1,945	1,360	1,191	1,288
18	***2,260 ****	1,754	1,369	1,462
19	-	-	-	-
20	-	-	-	-
21	-	-	-	-
22	-	-	-	-

Note:
Values marked with single star (*) are considered as questionable values.
Values marked with two stars (**) are considered as unsatisfactory values.

6 SUMMARY OF THE RESULTS

The results of the Cement Ring Tests 2026 are summarised in Table 6.1.

Table 6.1 - Results summary

Sample	Arithmetic mean of all values	Standard deviation of all values	Robust average	Robust standard deviation	Standard uncertainty of the assigned value	Lower winsorisation limit	Upper winsorisation limit	Count (Sample size)
	$\bar{x}$	s	x^*	s^*	$u(x_{pt})$	$x^*-1.5s^*$	$x^*+1.5s^*$	p
Sulfate content (as SO_3) (% by mass)	3,1438	0,1455	3,1258	0,1173	0,0367	2,9499	3,3018	16
Chloride content (% by mass)	0,0749	0,0097	0,0761	0,0054	0,0017	0,0679	0,0842	16
Loss on Ignition (% by mass)	6,8127	0,2204	6,7973	0,0948	0,0306	6,6551	6,9395	15
Insoluble residue (% by mass)	1,7957	0,1738	1,8069	0,1690	0,0545	1,5534	2,0604	15
Na_2O content (% by mass)	0,2786	0,0615	0,2873	0,0298	0,0100	0,2426	0,3320	14
K_2O content (% by mass)	0,7121	0,0307	0,7138	0,0274	0,0091	0,6727	0,7548	14
Slag content – wet way (% by mass)	15,6320	1,5352	15,1928	0,6475	0,3620	14,2215	16,1641	5
Chromium (VI) content (ppm)	0,4183	1,0556	0,0613	0,0808	0,0292	-0,0600	0,1825	12[+]
Hydrating heath (J/g)	-	-	-	-	-	-	-	2[++]
Specific surface (m^2/kg)	527,91	13,229	527,12	13,034	4,0731	507,566	546,668	16
Specific gravity (g/cm^3)	3,0093	0,0575	3,0008	0,035	0,0113	2,9480	3,0535	15
Initial setting time (min)	300,35	65,310	297,23	66,501	20,1612	197,482	396,987	17
Final setting time (min)	401,00	61,085	405,46	46,906	14,2205	335,103	475,821	17
Water for standard consistency (% by mass)	29,241	1,0220	29,163	0,9031	0,2738	27,8087	30,5180	17
Volume soundness (mm)	0,7000	0,3719	0,6801	0,3745	0,1298	0,1185	1,2418	13
Flexural strength - 2 days (MPa)	4,038	0,3215	4,0235	0,2861	0,0843	3,5943	4,4526	18
Flexural strength - 28 days (MPa)	8,578	0,9609	8,6844	0,7101	0,2092	7,6193	9,7495	18
Compressive strength - 2 days (MPa)	18,969	1,2286	19,013	1,2908	0,3803	17,0769	20,9494	18
Compressive strength - 28 days (MPa)	52,354	1,7768	52,354	2,0149	0,5937	49,3320	55,3769	18

+) Remark: The chromium concentration in the sample approaching zero.
++) Remark: We do not present the results for a small number of participants.

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Date: 30. 07. 2026

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List of annexes

Annex No.	Content of annex	Form
1	Summary statistics and bar charts of frequency distribution, part x, y, z	(18+14+8)xA4

SO3 - content Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	3,1425	x*	3,1298	3,1273	3,1266	3,1263	3,1261	3,1260	3,1259	3,1259	3,1259	3,1259	3,1259	...	3,1258	3,1258	3,1258	3,1258	3,1258	3,1258
1,483*Median	0,1261	s*	0,1248	0,1222	0,1204	0,1192	0,1184	0,1180	0,1177	0,1176	0,1175	0,1174	0,1174	...	0,1173	0,1173	0,1173	0,1173	0,1173	0,1173
1.5 * s*	0,1891	1.5 * s*	0,1872	0,1833	0,1805	0,1788	0,1777	0,1770	0,1766	0,1763	0,1762	0,1761	0,1760	...	0,1759	0,1759	0,1759	0,1759	0,1759	0,1759

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	2,930	0,2125	2,9534	2,9425	2,9439	2,9460	2,9475	2,9484	2,9490	2,9494	2,9496	2,9497	2,9498	...	2,9499	2,9499	2,9499	2,9499	2,9499	2,9499
2	3,015	0,1275	3,0150	3,0150	3,0150	3,0150	3,0150	3,0150	3,0150	3,0150	3,0150	3,0150	3,0150	...	3,0150	3,0150	3,0150	3,0150	3,0150	3,0150
3	3,015	0,1275	3,0150	3,0150	3,0150	3,0150	3,0150	3,0150	3,0150	3,0150	3,0150	3,0150	3,0150	...	3,0150	3,0150	3,0150	3,0150	3,0150	3,0150
4	3,035	0,1075	3,0350	3,0350	3,0350	3,0350	3,0350	3,0350	3,0350	3,0350	3,0350	3,0350	3,0350	...	3,0350	3,0350	3,0350	3,0350	3,0350	3,0350
5	3,050	0,0925	3,0500	3,0500	3,0500	3,0500	3,0500	3,0500	3,0500	3,0500	3,0500	3,0500	3,0500	...	3,0500	3,0500	3,0500	3,0500	3,0500	3,0500
6	3,055	0,0875	3,0550	3,0550	3,0550	3,0550	3,0550	3,0550	3,0550	3,0550	3,0550	3,0550	3,0550	...	3,0550	3,0550	3,0550	3,0550	3,0550	3,0550
7	3,075	0,0675	3,0750	3,0750	3,0750	3,0750	3,0750	3,0750	3,0750	3,0750	3,0750	3,0750	3,0750	...	3,0750	3,0750	3,0750	3,0750	3,0750	3,0750
8	3,125	0,0175	3,1250	3,1250	3,1250	3,1250	3,1250	3,1250	3,1250	3,1250	3,1250	3,1250	3,1250	...	3,1250	3,1250	3,1250	3,1250	3,1250	3,1250
9	3,160	0,0175	3,1600	3,1600	3,1600	3,1600	3,1600	3,1600	3,1600	3,1600	3,1600	3,1600	3,1600	...	3,1600	3,1600	3,1600	3,1600	3,1600	3,1600
10	3,170	0,0275	3,1700	3,1700	3,1700	3,1700	3,1700	3,1700	3,1700	3,1700	3,1700	3,1700	3,1700	...	3,1700	3,1700	3,1700	3,1700	3,1700	3,1700
11	3,170	0,0275	3,1700	3,1700	3,1700	3,1700	3,1700	3,1700	3,1700	3,1700	3,1700	3,1700	3,1700	...	3,1700	3,1700	3,1700	3,1700	3,1700	3,1700
12	3,175	0,0325	3,1750	3,1750	3,1750	3,1750	3,1750	3,1750	3,1750	3,1750	3,1750	3,1750	3,1750	...	3,1750	3,1750	3,1750	3,1750	3,1750	3,1750
13	3,190	0,0475	3,1900	3,1900	3,1900	3,1900	3,1900	3,1900	3,1900	3,1900	3,1900	3,1900	3,1900	...	3,1900	3,1900	3,1900	3,1900	3,1900	3,1900
14	3,225	0,0825	3,2250	3,2250	3,2250	3,2250	3,2250	3,2250	3,2250	3,2250	3,2250	3,2250	3,2250	...	3,2250	3,2250	3,2250	3,2250	3,2250	3,2250
15	3,450	0,3075	3,3316	3,3170	3,3106	3,3071	3,3050	3,3038	3,3030	3,3025	3,3022	3,3021	3,3019	...	3,3018	3,3018	3,3018	3,3018	3,3018	3,3018
16	3,460	0,3175	3,3316	3,3170	3,3106	3,3071	3,3050	3,3038	3,3030	3,3025	3,3022	3,3021	3,3019	...	3,3018	3,3018	3,3018	3,3018	3,3018	3,3018
17														...						

p (number of values) = 16

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	0,0311	0,0341	0,0334	0,0325	0,0319	0,0315	0,0313	0,0312	0,0311	0,0310	0,0310	...	0,0310	0,0310	0,0310	0,0310	0,0310	0,0310
2	0,0132	0,0126	0,0124	0,0124	0,0123	0,0123	0,0123	0,0123	0,0123	0,0123	0,0123	...	0,0123	0,0123	0,0123	0,0123	0,0123	0,0123
3	0,0132	0,0126	0,0124	0,0124	0,0123	0,0123	0,0123	0,0123	0,0123	0,0123	0,0123	...	0,0123	0,0123	0,0123	0,0123	0,0123	0,0123
4	0,0090	0,0085	0,0084	0,0083	0,0083	0,0083	0,0083	0,0083	0,0083	0,0083	0,0083	...	0,0083	0,0083	0,0083	0,0083	0,0083	0,0083
5	0,0064	0,0060	0,0059	0,0058	0,0058	0,0058	0,0058	0,0058	0,0058	0,0058	0,0058	...	0,0058	0,0058	0,0058	0,0058	0,0058	0,0058
6	0,0056	0,0052	0,0051	0,0051	0,0051	0,0050	0,0050	0,0050	0,0050	0,0050	0,0050	...	0,0050	0,0050	0,0050	0,0050	0,0050	0,0050
7	0,0030	0,0027	0,0027	0,0026	0,0026	0,0026	0,0026	0,0026	0,0026	0,0026	0,0026	...	0,0026	0,0026	0,0026	0,0026	0,0026	0,0026
8	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
9	0,0009	0,0011	0,0011	0,0011	0,0011	0,0012	0,0012	0,0012	0,0012	0,0012	0,0012	...	0,0012	0,0012	0,0012	0,0012	0,0012	0,0012
10	0,0016	0,0018	0,0019	0,0019	0,0019	0,0019	0,0019	0,0019	0,0019	0,0019	0,0019	...	0,0019	0,0019	0,0019	0,0019	0,0019	0,0019
11	0,0016	0,0018	0,0019	0,0019	0,0019	0,0019	0,0019	0,0019	0,0019	0,0019	0,0019	...	0,0019	0,0019	0,0019	0,0019	0,0019	0,0019
12	0,0020	0,0023	0,0023	0,0024	0,0024	0,0024	0,0024	0,0024	0,0024	0,0024	0,0024	...	0,0024	0,0024	0,0024	0,0024	0,0024	0,0024
13	0,0036	0,0039	0,0040	0,0041	0,0041	0,0041	0,0041	0,0041	0,0041	0,0041	0,0041	...	0,0041	0,0041	0,0041	0,0041	0,0041	0,0041
14	0,0091	0,0095	0,0097	0,0097	0,0098	0,0098	0,0098	0,0098	0,0098	0,0098	0,0098	...	0,0098	0,0098	0,0098	0,0098	0,0098	0,0098
15	0,0407	0,0360	0,0339	0,0327	0,0320	0,0316	0,0313	0,0312	0,0311	0,0310	0,0310	...	0,0310	0,0310	0,0310	0,0310	0,0310	0,0310
16	0,0407	0,0360	0,0339	0,0327	0,0320	0,0316	0,0313	0,0312	0,0311	0,0310	0,0310	...	0,0310	0,0310	0,0310	0,0310	0,0310	0,0310
17												...						

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

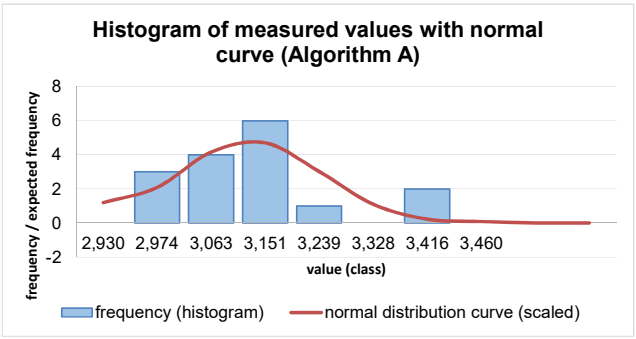
Median of all values =	3,1425
1,483 * MAD (MADe) =	0,1261
Robust average x* =	**3,12584**
Robust standard deviation s* =	**0,1173**
Standard uncertainty u(xpt) =	**0,0367**
Lower winsorisation limit x*-1.5s* =	2,9499
Upper winsorisation limit x*+1.5s* =	3,3018
Lower outlier limit x*-3s* =	2,7740
Upper outlier limit x*+3s* =	3,4777
Arithmetic mean of all values $\bar{x}$ =	**3,1438**
Standard deviation of all values s =	**0,1455**
Convergence check (3 significant figures) =	**converged**

5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

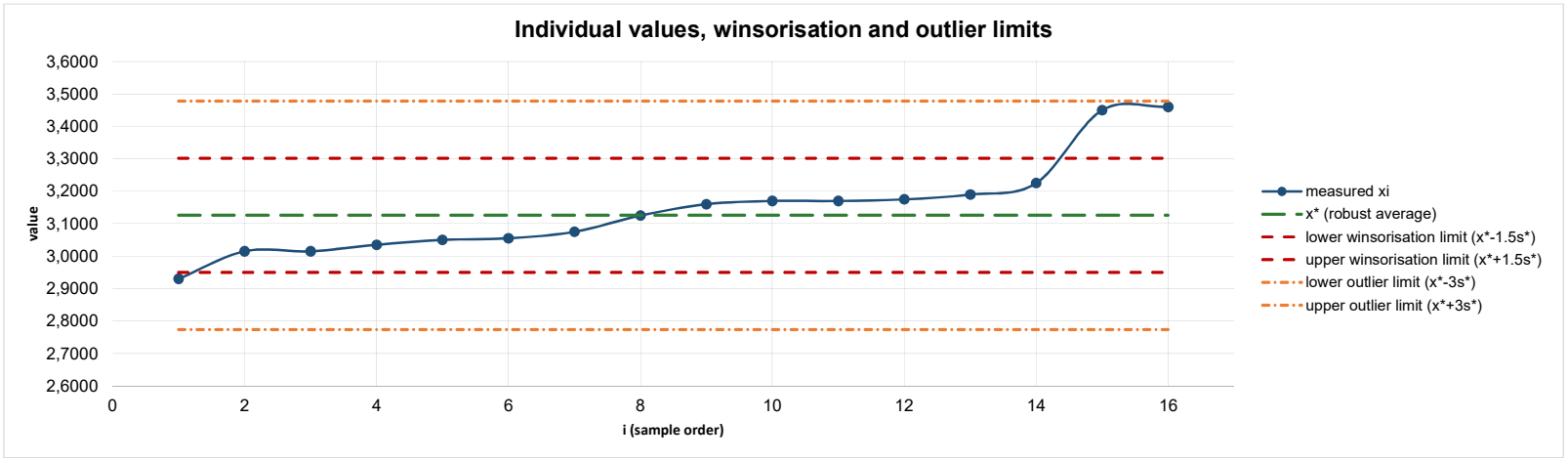
Number of classes 6 *5 <- Sturges (recommended number of classes)*
Class width = 0,0883

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
2,930				1,193
2,974	2,930	3,018	3	2,083
3,063	3,018	3,107	4	4,155
3,151	3,107	3,195	6	4,699
3,239	3,195	3,283	1	3,014
3,328	3,283	3,372	0	1,097
3,416	3,372	3,460	2	0,226
3,460				0,083



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



CI - content Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	0,0775	x*	0,0768	0,0765	0,0763	0,0762	0,0761	0,0761	0,0761	0,0761	0,0761	0,0761	0,0761	...	0,0761	0,0761	0,0761	0,0761	0,0761	0,0761
1,483*Median	0,0030	s*	0,0034	0,0039	0,0044	0,0048	0,0051	0,0052	0,0053	0,0054	0,0054	0,0054	0,0054	...	0,0054	0,0054	0,0054	0,0054	0,0054	0,0054
1.5 * s*	0,0044	1.5 * s*	0,0050	0,0058	0,0066	0,0072	0,0076	0,0078	0,0080	0,0081	0,0081	0,0081	0,0081	...	0,0081	0,0081	0,0081	0,0081	0,0081	0,0081

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	0,044	0,0335	0,0731	0,0718	0,0707	0,0697	0,0690	0,0685	0,0683	0,0681	0,0680	0,0680	0,0679	...	0,0679	0,0679	0,0679	0,0679	0,0679	0,0679
2	0,068	0,0095	0,0731	0,0718	0,0707	0,0697	0,0690	0,0685	0,0683	0,0681	0,0680	0,0680	0,0680	...	0,0680	0,0680	0,0680	0,0680	0,0680	0,0680
3	0,070	0,0075	0,0731	0,0718	0,0707	0,0700	0,0700	0,0700	0,0700	0,0700	0,0700	0,0700	0,0700	...	0,0700	0,0700	0,0700	0,0700	0,0700	0,0700
4	0,071	0,0065	0,0731	0,0718	0,0710	0,0710	0,0710	0,0710	0,0710	0,0710	0,0710	0,0710	0,0710	...	0,0710	0,0710	0,0710	0,0710	0,0710	0,0710
5	0,075	0,0025	0,0750	0,0750	0,0750	0,0750	0,0750	0,0750	0,0750	0,0750	0,0750	0,0750	0,0750	...	0,0750	0,0750	0,0750	0,0750	0,0750	0,0750
6	0,075	0,0025	0,0750	0,0750	0,0750	0,0750	0,0750	0,0750	0,0750	0,0750	0,0750	0,0750	0,0750	...	0,0750	0,0750	0,0750	0,0750	0,0750	0,0750
7	0,076	0,0015	0,0760	0,0760	0,0760	0,0760	0,0760	0,0760	0,0760	0,0760	0,0760	0,0760	0,0760	...	0,0760	0,0760	0,0760	0,0760	0,0760	0,0760
8	0,077	0,0005	0,0770	0,0770	0,0770	0,0770	0,0770	0,0770	0,0770	0,0770	0,0770	0,0770	0,0770	...	0,0770	0,0770	0,0770	0,0770	0,0770	0,0770
9	0,078	0,0005	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	...	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780
10	0,078	0,0005	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	...	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780
11	0,078	0,0005	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	...	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780
12	0,078	0,0005	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780	...	0,0780	0,0780	0,0780	0,0780	0,0780	0,0780
13	0,079	0,0015	0,0790	0,0790	0,0790	0,0790	0,0790	0,0790	0,0790	0,0790	0,0790	0,0790	0,0790	...	0,0790	0,0790	0,0790	0,0790	0,0790	0,0790
14	0,079	0,0015	0,0790	0,0790	0,0790	0,0790	0,0790	0,0790	0,0790	0,0790	0,0790	0,0790	0,0790	...	0,0790	0,0790	0,0790	0,0790	0,0790	0,0790
15	0,083	0,0055	0,0819	0,0819	0,0823	0,0829	0,0830	0,0830	0,0830	0,0830	0,0830	0,0830	0,0830	...	0,0830	0,0830	0,0830	0,0830	0,0830	0,0830
16	0,090	0,0125	0,0819	0,0819	0,0823	0,0829	0,0834	0,0838	0,0840	0,0841	0,0841	0,0842	0,0842	...	0,0842	0,0842	0,0842	0,0842	0,0842	0,0842
17														...						

p (number of values) = 16

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	0,0000	0,0000	0,0000	0,0000	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	...	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001
2	0,0000	0,0000	0,0000	0,0000	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	...	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001
3	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
4	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
5	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
6	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
7	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
8	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
9	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
10	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
11	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
12	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
13	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
14	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
15	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
16	0,0000	0,0000	0,0000	0,0000	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	...	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001
17												...						

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

Median of all values =	0,0775
1,483 * MAD (MADe) =	0,0030
Robust average x* =	**0,07607**
Robust standard deviation s* =	**0,0054**
Standard uncertainty u(xpt) =	**0,0017**
Lower winsorisation limit x*-1.5s* =	0,0679
Upper winsorisation limit x*+1.5s* =	0,0842
Lower outlier limit x*-3s* =	0,0598
Upper outlier limit x*+3s* =	0,0923
Arithmetic mean of all values x̄ =	**0,0749**
Standard deviation of all values s =	**0,0097**
Convergence check (3 significant figures) =	**converged**

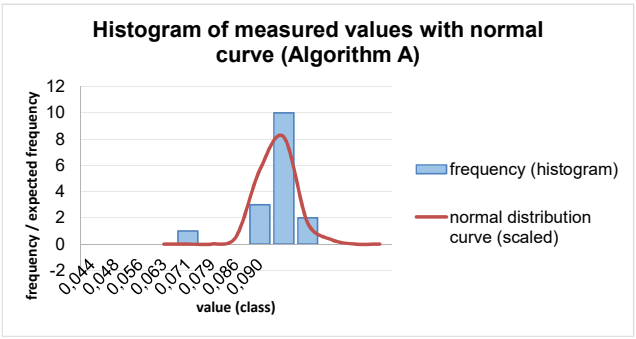
5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

Number of classes 6 *5 <- Sturges (recommended number of classes)*

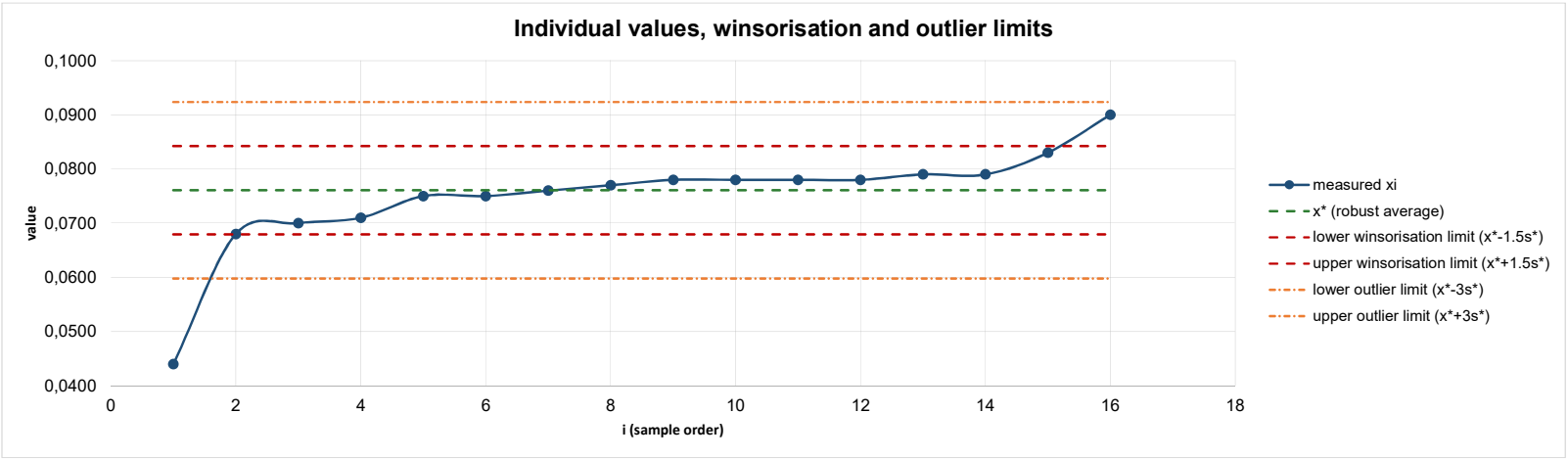
Class width = 0,0077

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
0,044				0,000
0,048	0,044	0,052	1	0,000
0,056	0,052	0,059	0	0,007
0,063	0,059	0,067	0	0,533
0,071	0,067	0,075	3	5,660
0,079	0,075	0,082	10	8,159
0,086	0,082	0,090	2	1,598
0,090				0,334



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



Loss on Ignition — Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	6,8200	x*	6,8003	6,7977	6,7974	6,7973	6,7973	6,7973	6,7973	6,7973	6,7973	6,7973	6,7973	...	6,7973	6,7973	6,7973	6,7973	6,7973	6,7973
1,483*Median	0,1112	s*	0,1023	0,0980	0,0962	0,0954	0,0951	0,0949	0,0949	0,0948	0,0948	0,0948	0,0948	...	0,0948	0,0948	0,0948	0,0948	0,0948	0,0948
1.5 * s*	0,1668	1.5 * s*	0,1535	0,1470	0,1442	0,1431	0,1426	0,1424	0,1423	0,1423	0,1422	0,1422	0,1422	...	0,1422	0,1422	0,1422	0,1422	0,1422	0,1422

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	6,365	0,4550	6,6532	6,6468	6,6507	6,6531	6,6542	6,6547	6,6549	6,6550	6,6550	6,6551	6,6551	...	6,6551	6,6551	6,6551	6,6551	6,6551	6,6551
2	6,695	0,1250	6,6950	6,6950	6,6950	6,6950	6,6950	6,6950	6,6950	6,6950	6,6950	6,6950	6,6950	...	6,6950	6,6950	6,6950	6,6950	6,6950	6,6950
3	6,715	0,1050	6,7150	6,7150	6,7150	6,7150	6,7150	6,7150	6,7150	6,7150	6,7150	6,7150	6,7150	...	6,7150	6,7150	6,7150	6,7150	6,7150	6,7150
4	6,715	0,1050	6,7150	6,7150	6,7150	6,7150	6,7150	6,7150	6,7150	6,7150	6,7150	6,7150	6,7150	...	6,7150	6,7150	6,7150	6,7150	6,7150	6,7150
5	6,735	0,0850	6,7350	6,7350	6,7350	6,7350	6,7350	6,7350	6,7350	6,7350	6,7350	6,7350	6,7350	...	6,7350	6,7350	6,7350	6,7350	6,7350	6,7350
6	6,735	0,0850	6,7350	6,7350	6,7350	6,7350	6,7350	6,7350	6,7350	6,7350	6,7350	6,7350	6,7350	...	6,7350	6,7350	6,7350	6,7350	6,7350	6,7350
7	6,795	0,0250	6,7950	6,7950	6,7950	6,7950	6,7950	6,7950	6,7950	6,7950	6,7950	6,7950	6,7950	...	6,7950	6,7950	6,7950	6,7950	6,7950	6,7950
8	6,820	0,0000	6,8200	6,8200	6,8200	6,8200	6,8200	6,8200	6,8200	6,8200	6,8200	6,8200	6,8200	...	6,8200	6,8200	6,8200	6,8200	6,8200	6,8200
9	6,835	0,0150	6,8350	6,8350	6,8350	6,8350	6,8350	6,8350	6,8350	6,8350	6,8350	6,8350	6,8350	...	6,8350	6,8350	6,8350	6,8350	6,8350	6,8350
10	6,850	0,0300	6,8500	6,8500	6,8500	6,8500	6,8500	6,8500	6,8500	6,8500	6,8500	6,8500	6,8500	...	6,8500	6,8500	6,8500	6,8500	6,8500	6,8500
11	6,850	0,0300	6,8500	6,8500	6,8500	6,8500	6,8500	6,8500	6,8500	6,8500	6,8500	6,8500	6,8500	...	6,8500	6,8500	6,8500	6,8500	6,8500	6,8500
12	6,855	0,0350	6,8550	6,8550	6,8550	6,8550	6,8550	6,8550	6,8550	6,8550	6,8550	6,8550	6,8550	...	6,8550	6,8550	6,8550	6,8550	6,8550	6,8550
13	6,870	0,0500	6,8700	6,8700	6,8700	6,8700	6,8700	6,8700	6,8700	6,8700	6,8700	6,8700	6,8700	...	6,8700	6,8700	6,8700	6,8700	6,8700	6,8700
14	6,895	0,0750	6,8950	6,8950	6,8950	6,8950	6,8950	6,8950	6,8950	6,8950	6,8950	6,8950	6,8950	...	6,8950	6,8950	6,8950	6,8950	6,8950	6,8950
15	7,460	0,6400	6,9868	6,9538	6,9447	6,9416	6,9404	6,9399	6,9397	6,9396	6,9396	6,9396	6,9396	...	6,9395	6,9395	6,9395	6,9395	6,9395	6,9395
16														...						
17														...						

p (number of values) = 15

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	0,0217	0,0228	0,0215	0,0208	0,0205	0,0203	0,0203	0,0202	0,0202	0,0202	0,0202	...	0,0202	0,0202	0,0202	0,0202	0,0202	0,0202
2	0,0111	0,0105	0,0105	0,0105	0,0105	0,0105	0,0105	0,0105	0,0105	0,0105	0,0105	...	0,0105	0,0105	0,0105	0,0105	0,0105	0,0105
3	0,0073	0,0068	0,0068	0,0068	0,0068	0,0068	0,0068	0,0068	0,0068	0,0068	0,0068	...	0,0068	0,0068	0,0068	0,0068	0,0068	0,0068
4	0,0073	0,0068	0,0068	0,0068	0,0068	0,0068	0,0068	0,0068	0,0068	0,0068	0,0068	...	0,0068	0,0068	0,0068	0,0068	0,0068	0,0068
5	0,0043	0,0039	0,0039	0,0039	0,0039	0,0039	0,0039	0,0039	0,0039	0,0039	0,0039	...	0,0039	0,0039	0,0039	0,0039	0,0039	0,0039
6	0,0043	0,0039	0,0039	0,0039	0,0039	0,0039	0,0039	0,0039	0,0039	0,0039	0,0039	...	0,0039	0,0039	0,0039	0,0039	0,0039	0,0039
7	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
8	0,0004	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	...	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005
9	0,0012	0,0014	0,0014	0,0014	0,0014	0,0014	0,0014	0,0014	0,0014	0,0014	0,0014	...	0,0014	0,0014	0,0014	0,0014	0,0014	0,0014
10	0,0025	0,0027	0,0028	0,0028	0,0028	0,0028	0,0028	0,0028	0,0028	0,0028	0,0028	...	0,0028	0,0028	0,0028	0,0028	0,0028	0,0028
11	0,0025	0,0027	0,0028	0,0028	0,0028	0,0028	0,0028	0,0028	0,0028	0,0028	0,0028	...	0,0028	0,0028	0,0028	0,0028	0,0028	0,0028
12	0,0030	0,0033	0,0033	0,0033	0,0033	0,0033	0,0033	0,0033	0,0033	0,0033	0,0033	...	0,0033	0,0033	0,0033	0,0033	0,0033	0,0033
13	0,0049	0,0052	0,0053	0,0053	0,0053	0,0053	0,0053	0,0053	0,0053	0,0053	0,0053	...	0,0053	0,0053	0,0053	0,0053	0,0053	0,0053
14	0,0090	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095	...	0,0095	0,0095	0,0095	0,0095	0,0095	0,0095
15	0,0348	0,0244	0,0217	0,0208	0,0205	0,0203	0,0203	0,0202	0,0202	0,0202	0,0202	...	0,0202	0,0202	0,0202	0,0202	0,0202	0,0202
16												...						
17												...						

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

Median of all values =	6,8200
1,483 * MAD (MADe) =	0,1112
Robust average x* =	**6,79731**
Robust standard deviation s* =	**0,0948**
Standard uncertainty u(xpt) =	**0,0306**
Lower winsorisation limit x*-1.5s* =	6,6551
Upper winsorisation limit x*+1.5s* =	6,9395
Lower outlier limit x*-3s* =	6,5128
Upper outlier limit x*+3s* =	7,0818
Arithmetic mean of all values x̄ =	**6,8127**
Standard deviation of all values s =	**0,2204**
Convergence check (3 significant figures) =	**converged**

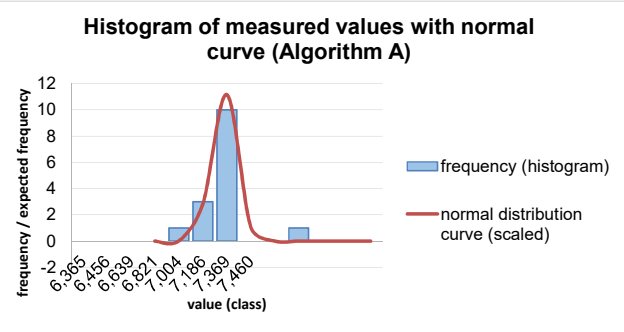
5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

Number of classes 6 *5 <- Sturges (recommended number of classes)*

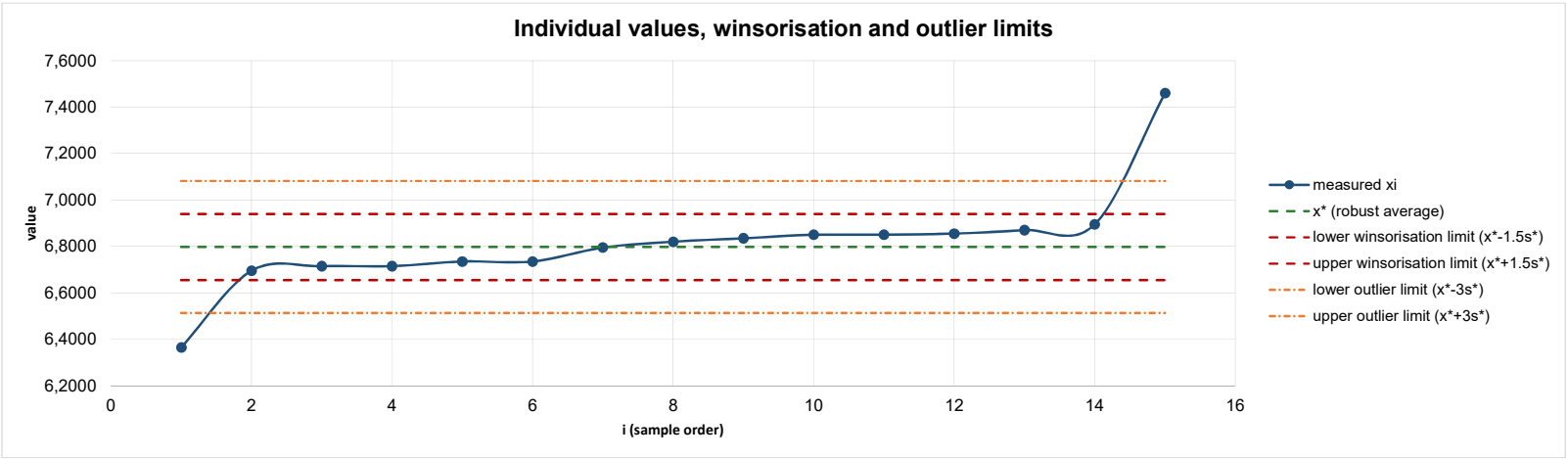
Class width = 0,1825

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
6,365				0,000
6,456	6,365	6,548	1	0,018
6,639	6,548	6,730	3	2,846
6,821	6,730	6,913	10	11,156
7,004	6,913	7,095	0	1,077
7,186	7,095	7,278	0	0,003
7,369	7,278	7,460	1	0,000
7,460				0,000



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



Insoluble residue — Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	1,8000	x*	1,8029	1,8056	1,8067	1,8069	1,8069	1,8069	1,8069	1,8069	1,8069	1,8069	1,8069	...	1,8069	1,8069	1,8069	1,8069	1,8069	1,8069
1,483*Median	0,1261	s*	0,1469	0,1588	0,1649	0,1673	0,1683	0,1688	0,1689	0,1690	0,1690	0,1690	0,1690	...	0,1690	0,1690	0,1690	0,1690	0,1690	0,1690
1.5 * s*	0,1891	1.5 * s*	0,2204	0,2382	0,2473	0,2510	0,2525	0,2531	0,2534	0,2534	0,2534	0,2535	0,2535	...	0,2535	0,2535	0,2535	0,2535	0,2535	0,2535

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	1,385	0,4150	1,6109	1,5825	1,5674	1,5594	1,5559	1,5544	1,5538	1,5535	1,5535	1,5534	1,5534	...	1,5534	1,5534	1,5534	1,5534	1,5534	1,5534
2	1,615	0,1850	1,6150	1,6150	1,6150	1,6150	1,6150	1,6150	1,6150	1,6150	1,6150	1,6150	1,6150	...	1,6150	1,6150	1,6150	1,6150	1,6150	1,6150
3	1,670	0,1300	1,6700	1,6700	1,6700	1,6700	1,6700	1,6700	1,6700	1,6700	1,6700	1,6700	1,6700	...	1,6700	1,6700	1,6700	1,6700	1,6700	1,6700
4	1,715	0,0850	1,7150	1,7150	1,7150	1,7150	1,7150	1,7150	1,7150	1,7150	1,7150	1,7150	1,7150	...	1,7150	1,7150	1,7150	1,7150	1,7150	1,7150
5	1,715	0,0850	1,7150	1,7150	1,7150	1,7150	1,7150	1,7150	1,7150	1,7150	1,7150	1,7150	1,7150	...	1,7150	1,7150	1,7150	1,7150	1,7150	1,7150
6	1,730	0,0700	1,7300	1,7300	1,7300	1,7300	1,7300	1,7300	1,7300	1,7300	1,7300	1,7300	1,7300	...	1,7300	1,7300	1,7300	1,7300	1,7300	1,7300
7	1,740	0,0600	1,7400	1,7400	1,7400	1,7400	1,7400	1,7400	1,7400	1,7400	1,7400	1,7400	1,7400	...	1,7400	1,7400	1,7400	1,7400	1,7400	1,7400
8	1,800	0,0000	1,8000	1,8000	1,8000	1,8000	1,8000	1,8000	1,8000	1,8000	1,8000	1,8000	1,8000	...	1,8000	1,8000	1,8000	1,8000	1,8000	1,8000
9	1,840	0,0400	1,8400	1,8400	1,8400	1,8400	1,8400	1,8400	1,8400	1,8400	1,8400	1,8400	1,8400	...	1,8400	1,8400	1,8400	1,8400	1,8400	1,8400
10	1,865	0,0650	1,8650	1,8650	1,8650	1,8650	1,8650	1,8650	1,8650	1,8650	1,8650	1,8650	1,8650	...	1,8650	1,8650	1,8650	1,8650	1,8650	1,8650
11	1,880	0,0800	1,8800	1,8800	1,8800	1,8800	1,8800	1,8800	1,8800	1,8800	1,8800	1,8800	1,8800	...	1,8800	1,8800	1,8800	1,8800	1,8800	1,8800
12	1,920	0,1200	1,9200	1,9200	1,9200	1,9200	1,9200	1,9200	1,9200	1,9200	1,9200	1,9200	1,9200	...	1,9200	1,9200	1,9200	1,9200	1,9200	1,9200
13	1,965	0,1650	1,9650	1,9650	1,9650	1,9650	1,9650	1,9650	1,9650	1,9650	1,9650	1,9650	1,9650	...	1,9650	1,9650	1,9650	1,9650	1,9650	1,9650
14	2,035	0,2350	1,9891	2,0233	2,0350	2,0350	2,0350	2,0350	2,0350	2,0350	2,0350	2,0350	2,0350	...	2,0350	2,0350	2,0350	2,0350	2,0350	2,0350
15	2,060	0,2600	1,9891	2,0233	2,0438	2,0541	2,0579	2,0594	2,0600	2,0600	2,0600	2,0600	2,0600	...	2,0600	2,0600	2,0600	2,0600	2,0600	2,0600
16														...						
17														...						

p (number of values) = 15

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	0,0369	0,0498	0,0573	0,0612	0,0630	0,0638	0,0641	0,0642	0,0642	0,0642	0,0642	...	0,0642	0,0642	0,0642	0,0642	0,0642	0,0642
2	0,0353	0,0363	0,0368	0,0368	0,0368	0,0368	0,0368	0,0368	0,0368	0,0368	0,0368	...	0,0368	0,0368	0,0368	0,0368	0,0368	0,0368
3	0,0177	0,0184	0,0187	0,0187	0,0187	0,0187	0,0187	0,0187	0,0187	0,0187	0,0187	...	0,0187	0,0187	0,0187	0,0187	0,0187	0,0187
4	0,0077	0,0082	0,0084	0,0084	0,0084	0,0084	0,0084	0,0084	0,0084	0,0084	0,0084	...	0,0084	0,0084	0,0084	0,0084	0,0084	0,0084
5	0,0077	0,0082	0,0084	0,0084	0,0084	0,0084	0,0084	0,0084	0,0084	0,0084	0,0084	...	0,0084	0,0084	0,0084	0,0084	0,0084	0,0084
6	0,0053	0,0057	0,0059	0,0059	0,0059	0,0059	0,0059	0,0059	0,0059	0,0059	0,0059	...	0,0059	0,0059	0,0059	0,0059	0,0059	0,0059
7	0,0040	0,0043	0,0045	0,0045	0,0045	0,0045	0,0045	0,0045	0,0045	0,0045	0,0045	...	0,0045	0,0045	0,0045	0,0045	0,0045	0,0045
8	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
9	0,0014	0,0012	0,0011	0,0011	0,0011	0,0011	0,0011	0,0011	0,0011	0,0011	0,0011	...	0,0011	0,0011	0,0011	0,0011	0,0011	0,0011
10	0,0039	0,0035	0,0034	0,0034	0,0034	0,0034	0,0034	0,0034	0,0034	0,0034	0,0034	...	0,0034	0,0034	0,0034	0,0034	0,0034	0,0034
11	0,0059	0,0055	0,0054	0,0053	0,0053	0,0053	0,0053	0,0053	0,0053	0,0053	0,0053	...	0,0053	0,0053	0,0053	0,0053	0,0053	0,0053
12	0,0137	0,0131	0,0128	0,0128	0,0128	0,0128	0,0128	0,0128	0,0128	0,0128	0,0128	...	0,0128	0,0128	0,0128	0,0128	0,0128	0,0128
13	0,0263	0,0254	0,0250	0,0250	0,0250	0,0250	0,0250	0,0250	0,0250	0,0250	0,0250	...	0,0250	0,0250	0,0250	0,0250	0,0250	0,0250
14	0,0346	0,0474	0,0521	0,0520	0,0520	0,0520	0,0520	0,0520	0,0520	0,0520	0,0520	...	0,0520	0,0520	0,0520	0,0520	0,0520	0,0520
15	0,0346	0,0474	0,0562	0,0611	0,0630	0,0638	0,0641	0,0641	0,0641	0,0641	0,0641	...	0,0641	0,0641	0,0641	0,0641	0,0641	0,0641
16												...						
17												...						

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

Median of all values =	1,8000
1,483 * MAD (MADe) =	0,1261
Robust average x* =	**1,80690**
Robust standard deviation s* =	**0,1690**
Standard uncertainty u(xpt) =	**0,0545**
Lower winsorisation limit x*-1.5s* =	1,5534
Upper winsorisation limit x*+1.5s* =	2,0604
Lower outlier limit x*-3s* =	1,3000
Upper outlier limit x*+3s* =	2,3138
Arithmetic mean of all values x̄ =	**1,7957**
Standard deviation of all values s =	**0,1738**
Convergence check (3 significant figures) =	**converged**

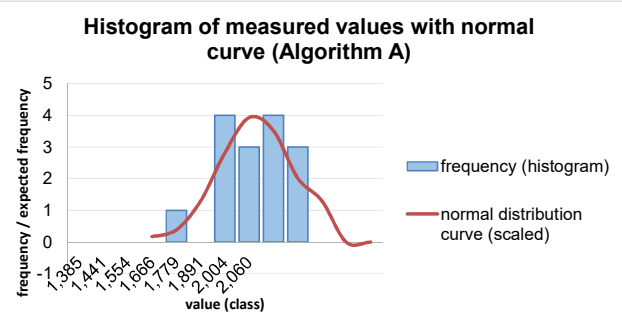
5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

Number of classes 6 *5 <- Sturges (recommended number of classes)*

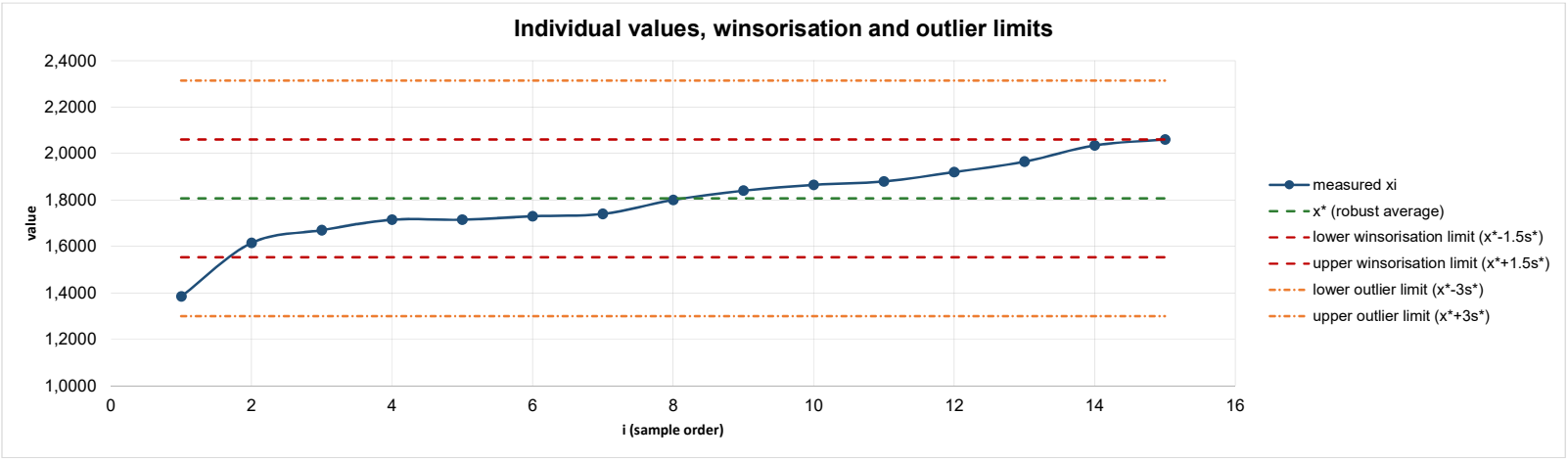
Class width = 0,1125

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
1,385				0,176
1,441	1,385	1,498	1	0,383
1,554	1,498	1,610	0	1,297
1,666	1,610	1,723	4	2,818
1,779	1,723	1,835	3	3,929
1,891	1,835	1,948	4	3,517
2,004	1,948	2,060	3	2,021
2,060				1,298



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



Natriumoxid-conter Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	0,3000	x*	0,2905	0,2884	0,2878	0,2876	0,2875	0,2875	0,2874	0,2874	0,2874	0,2873	0,2873	...	0,2873	0,2873	0,2873	0,2873	0,2873	0,2873
1,483*Median	0,0260	s*	0,0260	0,0269	0,0277	0,0284	0,0288	0,0291	0,0293	0,0295	0,0296	0,0296	0,0297	...	0,0298	0,0298	0,0298	0,0298	0,0298	0,0298
1.5 * s*	0,0389	1.5 * s*	0,0390	0,0403	0,0416	0,0425	0,0432	0,0437	0,0440	0,0442	0,0444	0,0445	0,0445	...	0,0447	0,0447	0,0447	0,0447	0,0447	0,0447

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	0,100	0,2000	0,2611	0,2515	0,2481	0,2462	0,2451	0,2443	0,2438	0,2434	0,2432	0,2430	0,2429	...	0,2426	0,2426	0,2426	0,2426	0,2426	0,2426
2	0,220	0,0800	0,2611	0,2515	0,2481	0,2462	0,2451	0,2443	0,2438	0,2434	0,2432	0,2430	0,2429	...	0,2426	0,2426	0,2426	0,2426	0,2426	0,2426
3	0,260	0,0400	0,2611	0,2600	0,2600	0,2600	0,2600	0,2600	0,2600	0,2600	0,2600	0,2600	0,2600	...	0,2600	0,2600	0,2600	0,2600	0,2600	0,2600
4	0,275	0,0250	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	...	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750
5	0,275	0,0250	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	...	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750
6	0,275	0,0250	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	...	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750
7	0,300	0,0000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	...	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000
8	0,300	0,0000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	...	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000
9	0,300	0,0000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	...	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000
10	0,300	0,0000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	...	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000
11	0,305	0,0050	0,3050	0,3050	0,3050	0,3050	0,3050	0,3050	0,3050	0,3050	0,3050	0,3050	0,3050	...	0,3050	0,3050	0,3050	0,3050	0,3050	0,3050
12	0,305	0,0050	0,3050	0,3050	0,3050	0,3050	0,3050	0,3050	0,3050	0,3050	0,3050	0,3050	0,3050	...	0,3050	0,3050	0,3050	0,3050	0,3050	0,3050
13	0,310	0,0100	0,3100	0,3100	0,3100	0,3100	0,3100	0,3100	0,3100	0,3100	0,3100	0,3100	0,3100	...	0,3100	0,3100	0,3100	0,3100	0,3100	0,3100
14	0,375	0,0750	0,3389	0,3295	0,3287	0,3295	0,3302	0,3307	0,3311	0,3314	0,3316	0,3317	0,3318	...	0,3320	0,3320	0,3320	0,3320	0,3320	0,3320
15														...						
16														...						
17														...						

p (number of values) = 14

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	0,0009	0,0014	0,0016	0,0017	0,0018	0,0019	0,0019	0,0019	0,0020	0,0020	0,0020	...	0,0020	0,0020	0,0020	0,0020	0,0020	0,0020
2	0,0009	0,0014	0,0016	0,0017	0,0018	0,0019	0,0019	0,0019	0,0020	0,0020	0,0020	...	0,0020	0,0020	0,0020	0,0020	0,0020	0,0020
3	0,0009	0,0008	0,0008	0,0008	0,0008	0,0008	0,0008	0,0007	0,0007	0,0007	0,0007	...	0,0007	0,0007	0,0007	0,0007	0,0007	0,0007
4	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	...	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002
5	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	...	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002
6	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	...	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002
7	0,0001	0,0001	0,0001	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	...	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002
8	0,0001	0,0001	0,0001	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	...	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002
9	0,0001	0,0001	0,0001	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	...	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002
10	0,0001	0,0001	0,0001	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	...	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002
11	0,0002	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	...	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003
12	0,0002	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	...	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003
13	0,0004	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005	...	0,0005	0,0005	0,0005	0,0005	0,0005	0,0005
14	0,0023	0,0017	0,0017	0,0017	0,0018	0,0019	0,0019	0,0019	0,0020	0,0020	0,0020	...	0,0020	0,0020	0,0020	0,0020	0,0020	0,0020
15												...						
16												...						
17												...						

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

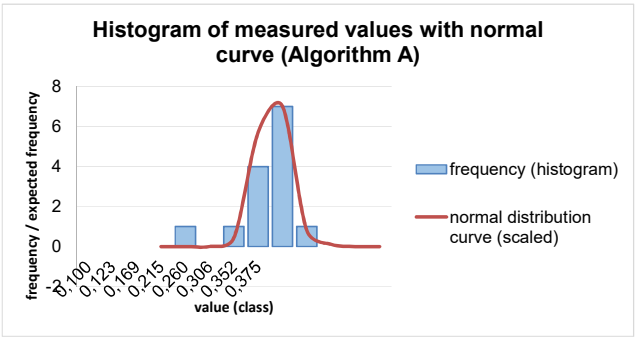
Median of all values =	0,3000
1,483 * MAD (MADe) =	0,0260
Robust average x* =	**0,28730**
Robust standard deviation s* =	**0,0298**
Standard uncertainty u(xpt) =	**0,0100**
Lower winsorisation limit x*-1.5s* =	0,2426
Upper winsorisation limit x*+1.5s* =	0,3320
Lower outlier limit x*-3s* =	0,1978
Upper outlier limit x*+3s* =	0,3767
Arithmetic mean of all values x̄ =	**0,2786**
Standard deviation of all values s =	**0,0615**
Convergence check (3 significant figures) =	**converged**

5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

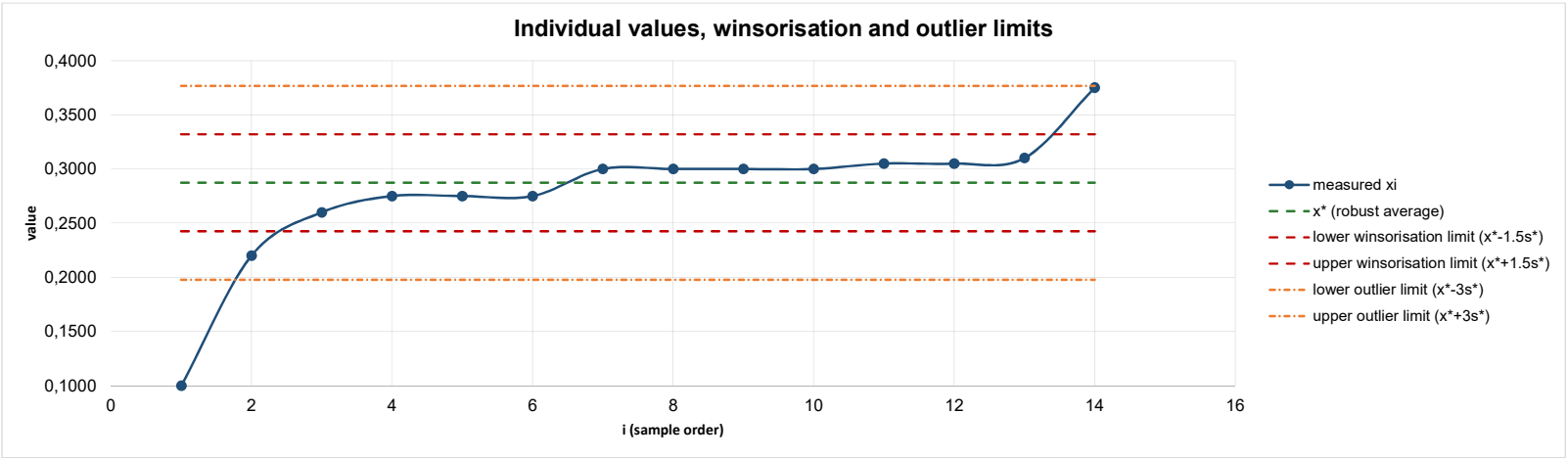
Number of classes 6 *5 <- Sturges (recommended number of classes)*
Class width = 0,0458

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
0,100				0,000
0,123	0,100	0,146	1	0,000
0,169	0,146	0,192	0	0,003
0,215	0,192	0,238	1	0,439
0,260	0,238	0,283	4	5,718
0,306	0,283	0,329	7	7,015
0,352	0,329	0,375	1	0,810
0,375				0,114



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



Potassiumoxid-con Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	0,7100	x*	0,7132	0,7137	0,7137	0,7137	0,7137	0,7137	0,7137	0,7137	0,7137	0,7137	0,7137	...	0,7138	0,7138	0,7138	0,7138	0,7138	0,7138
1,483*Median	0,0230	s*	0,0255	0,0265	0,0270	0,0272	0,0273	0,0273	0,0274	0,0274	0,0274	0,0274	0,0274	...	0,0274	0,0274	0,0274	0,0274	0,0274	0,0274
1.5 * s*	0,0345	1.5 * s*	0,0382	0,0398	0,0405	0,0408	0,0409	0,0410	0,0410	0,0410	0,0410	0,0410	0,0410	...	0,0410	0,0410	0,0410	0,0410	0,0410	0,0410

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	0,640	0,0700	0,6755	0,6749	0,6738	0,6732	0,6729	0,6728	0,6728	0,6727	0,6727	0,6727	0,6727	...	0,6727	0,6727	0,6727	0,6727	0,6727	0,6727
2	0,680	0,0300	0,6800	0,6800	0,6800	0,6800	0,6800	0,6800	0,6800	0,6800	0,6800	0,6800	0,6800	...	0,6800	0,6800	0,6800	0,6800	0,6800	0,6800
3	0,696	0,0140	0,6960	0,6960	0,6960	0,6960	0,6960	0,6960	0,6960	0,6960	0,6960	0,6960	0,6960	...	0,6960	0,6960	0,6960	0,6960	0,6960	0,6960
4	0,700	0,0100	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	...	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000
5	0,700	0,0100	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	...	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000
6	0,705	0,0050	0,7050	0,7050	0,7050	0,7050	0,7050	0,7050	0,7050	0,7050	0,7050	0,7050	0,7050	...	0,7050	0,7050	0,7050	0,7050	0,7050	0,7050
7	0,705	0,0050	0,7050	0,7050	0,7050	0,7050	0,7050	0,7050	0,7050	0,7050	0,7050	0,7050	0,7050	...	0,7050	0,7050	0,7050	0,7050	0,7050	0,7050
8	0,715	0,0050	0,7150	0,7150	0,7150	0,7150	0,7150	0,7150	0,7150	0,7150	0,7150	0,7150	0,7150	...	0,7150	0,7150	0,7150	0,7150	0,7150	0,7150
9	0,720	0,0100	0,7200	0,7200	0,7200	0,7200	0,7200	0,7200	0,7200	0,7200	0,7200	0,7200	0,7200	...	0,7200	0,7200	0,7200	0,7200	0,7200	0,7200
10	0,727	0,0170	0,7270	0,7270	0,7270	0,7270	0,7270	0,7270	0,7270	0,7270	0,7270	0,7270	0,7270	...	0,7270	0,7270	0,7270	0,7270	0,7270	0,7270
11	0,732	0,0220	0,7320	0,7320	0,7320	0,7320	0,7320	0,7320	0,7320	0,7320	0,7320	0,7320	0,7320	...	0,7320	0,7320	0,7320	0,7320	0,7320	0,7320
12	0,740	0,0300	0,7400	0,7400	0,7400	0,7400	0,7400	0,7400	0,7400	0,7400	0,7400	0,7400	0,7400	...	0,7400	0,7400	0,7400	0,7400	0,7400	0,7400
13	0,745	0,0350	0,7445	0,7450	0,7450	0,7450	0,7450	0,7450	0,7450	0,7450	0,7450	0,7450	0,7450	...	0,7450	0,7450	0,7450	0,7450	0,7450	0,7450
14	0,765	0,0550	0,7445	0,7514	0,7535	0,7542	0,7546	0,7547	0,7547	0,7548	0,7548	0,7548	0,7548	...	0,7548	0,7548	0,7548	0,7548	0,7548	0,7548
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p (number of values) = 14

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	0,0014	0,0015	0,0016	0,0016	0,0017	0,0017	0,0017	0,0017	0,0017	0,0017	0,0017	...	0,0017	0,0017	0,0017	0,0017	0,0017	0,0017
2	0,0011	0,0011	0,0011	0,0011	0,0011	0,0011	0,0011	0,0011	0,0011	0,0011	0,0011	...	0,0011	0,0011	0,0011	0,0011	0,0011	0,0011
3	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	...	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003
4	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	...	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002
5	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	...	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002
6	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	...	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001
7	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	...	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001
8	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
9	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
10	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002	...	0,0002	0,0002	0,0002	0,0002	0,0002	0,0002
11	0,0004	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003	...	0,0003	0,0003	0,0003	0,0003	0,0003	0,0003
12	0,0007	0,0007	0,0007	0,0007	0,0007	0,0007	0,0007	0,0007	0,0007	0,0007	0,0007	...	0,0007	0,0007	0,0007	0,0007	0,0007	0,0007
13	0,0010	0,0010	0,0010	0,0010	0,0010	0,0010	0,0010	0,0010	0,0010	0,0010	0,0010	...	0,0010	0,0010	0,0010	0,0010	0,0010	0,0010
14	0,0010	0,0014	0,0016	0,0016	0,0017	0,0017	0,0017	0,0017	0,0017	0,0017	0,0017	...	0,0017	0,0017	0,0017	0,0017	0,0017	0,0017
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3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

Median of all values =	0,7100
1,483 * MAD (MADe) =	0,0230
Robust average x* =	**0,71375**
Robust standard deviation s* =	**0,0274**
Standard uncertainty u(xpt) =	**0,0091**
Lower winsorisation limit x*-1.5s* =	0,6727
Upper winsorisation limit x*+1.5s* =	0,7548
Lower outlier limit x*-3s* =	0,6317
Upper outlier limit x*+3s* =	0,7958
Arithmetic mean of all values x̄ =	**0,7121**
Standard deviation of all values s =	**0,0307**
Convergence check (3 significant figures) =	**converged**

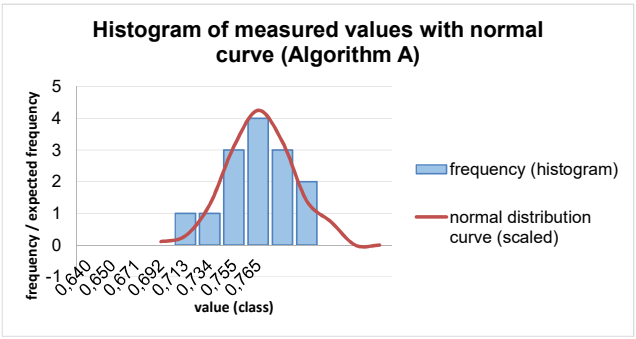
5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

Number of classes 6 *5 <- Sturges (recommended number of classes)*

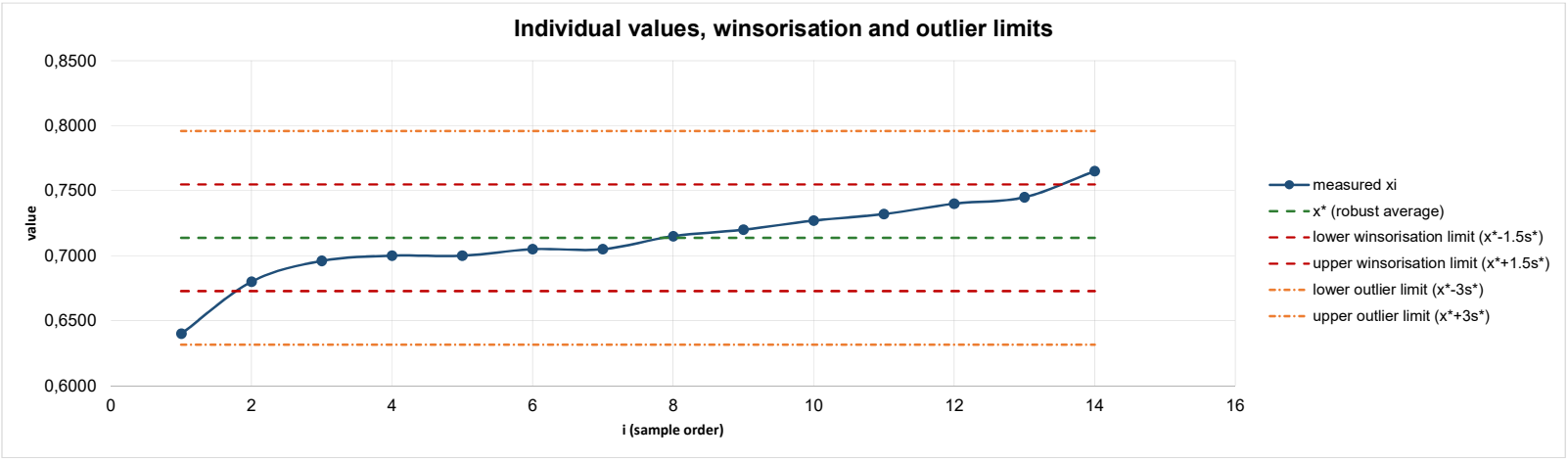
Class width = 0,0208

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
0,640				0,113
0,650	0,640	0,661	1	0,292
0,671	0,661	0,682	1	1,273
0,692	0,682	0,703	3	3,108
0,713	0,703	0,723	4	4,250
0,734	0,723	0,744	3	3,255
0,755	0,744	0,765	2	1,397
0,765				0,736



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



Slag-content - wet v Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	14,9500	x*	15,0612	15,0761	15,0884	15,0989	15,1080	15,1160	15,1231	15,1294	15,1350	15,1400	15,1446	...	15,1928	15,1928	15,1928	15,1928	15,1928	15,1928
1,483*Median	0,3708	s*	0,3460	0,3773	0,4042	0,4275	0,4481	0,4663	0,4825	0,4971	0,5101	0,5219	0,5326	...	0,6475	0,6475	0,6475	0,6475	0,6475	0,6475
1.5 * s*	0,5561	1.5 * s*	0,5190	0,5659	0,6062	0,6413	0,6722	0,6995	0,7238	0,7456	0,7652	0,7829	0,7989	...	0,9713	0,9713	0,9713	0,9713	0,9713	0,9713

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	14,700	0,2500	14,7000	14,7000	14,7000	14,7000	14,7000	14,7000	14,7000	14,7000	14,7000	14,7000	14,7000	...	14,7000	14,7000	14,7000	14,7000	14,7000	14,7000
2	14,950	0,0000	14,9500	14,9500	14,9500	14,9500	14,9500	14,9500	14,9500	14,9500	14,9500	14,9500	14,9500	...	14,9500	14,9500	14,9500	14,9500	14,9500	14,9500
3	14,950	0,0000	14,9500	14,9500	14,9500	14,9500	14,9500	14,9500	14,9500	14,9500	14,9500	14,9500	14,9500	...	14,9500	14,9500	14,9500	14,9500	14,9500	14,9500
4	15,200	0,2500	15,2000	15,2000	15,2000	15,2000	15,2000	15,2000	15,2000	15,2000	15,2000	15,2000	15,2000	...	15,2000	15,2000	15,2000	15,2000	15,2000	15,2000
5	18,360	3,4100	15,5061	15,5803	15,6420	15,6946	15,7402	15,7802	15,8155	15,8469	15,8750	15,9002	15,9229	...	16,1640	16,1641	16,1641	16,1641	16,1641	16,1641
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p (number of values) = 5

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	0,1305	0,1414	0,1509	0,1591	0,1665	0,1731	0,1790	0,1844	0,1892	0,1936	0,1977	...	0,2429	0,2429	0,2429	0,2429	0,2429	0,2429
2	0,0124	0,0159	0,0192	0,0222	0,0250	0,0276	0,0300	0,0322	0,0342	0,0361	0,0379	...	0,0590	0,0590	0,0590	0,0590	0,0590	0,0590
3	0,0124	0,0159	0,0192	0,0222	0,0250	0,0276	0,0300	0,0322	0,0342	0,0361	0,0379	...	0,0590	0,0590	0,0590	0,0590	0,0590	0,0590
4	0,0193	0,0154	0,0125	0,0102	0,0085	0,0070	0,0059	0,0050	0,0042	0,0036	0,0031	...	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001
5	0,1979	0,2542	0,3065	0,3549	0,3997	0,4411	0,4794	0,5149	0,5476	0,5779	0,6058	...	0,9433	0,9433	0,9434	0,9434	0,9434	0,9434
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3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

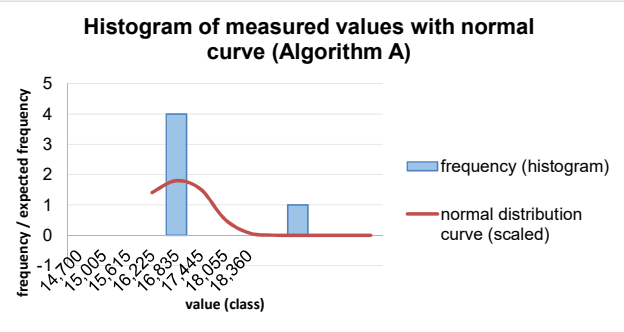
Median of all values =	14,9500
1,483 * MAD (MADe) =	0,3708
Robust average x* =	#######
Robust standard deviation s* =	**0,6475**
Standard uncertainty u(xpt) =	**0,3620**
Lower winsorisation limit x*-1.5s* =	14,2215
Upper winsorisation limit x*+1.5s* =	16,1641
Lower outlier limit x*-3s* =	13,2502
Upper outlier limit x*+3s* =	17,1355
Arithmetic mean of all values $\bar{x}$ =	**15,6320**
Standard deviation of all values s =	**1,5352**
Convergence check (3 significant figures) =	**converged**

5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

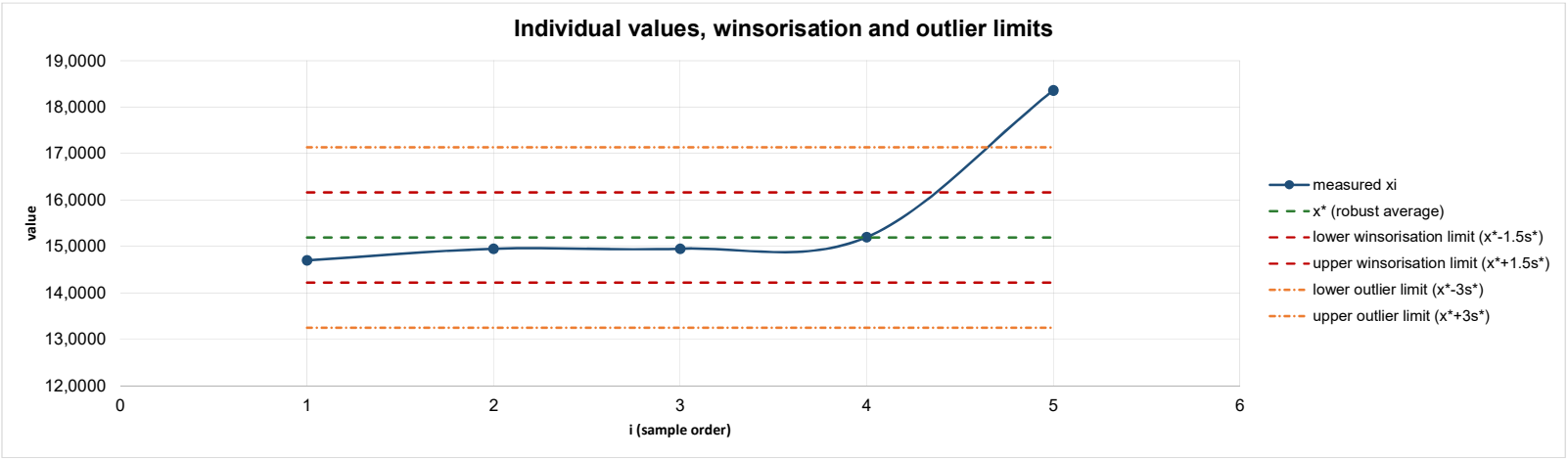
Number of classes 6 *4 <- Sturges (recommended number of classes)*
Class width = 0,6100

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
14,700				1,407
15,005	14,700	15,310	4	1,802
15,615	15,310	15,920	0	1,519
16,225	15,920	16,530	0	0,527
16,835	16,530	17,140	0	0,075
17,445	17,140	17,750	0	0,004
18,055	17,750	18,360	1	0,000
18,360				0,000



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



Slag-content - micr Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	17,4500	**x***	17,4500	17,4500	17,4500	17,4500	17,4500	17,4500	17,4500	17,4500	17,4500	17,4500	17,4500	...	17,4500	17,4500	17,4500	17,4500	17,4500	17,4500
1,483*Median	0,5932	**s***	0,6415	0,6415	0,6415	0,6415	0,6415	0,6415	0,6415	0,6415	0,6415	0,6415	0,6415	...	0,6415	0,6415	0,6415	0,6415	0,6415	0,6415
1.5 * s*	0,8898	**1.5 * s***	0,9622	0,9622	0,9622	0,9622	0,9622	0,9622	0,9622	0,9622	0,9622	0,9622	0,9622	...	0,9622	0,9622	0,9622	0,9622	0,9622	0,9622

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	17,050	0,4000	17,0500	17,0500	17,0500	17,0500	17,0500	17,0500	17,0500	17,0500	17,0500	17,0500	17,0500	...	17,0500	17,0500	17,0500	17,0500	17,0500	17,0500
2	17,850	0,4000	17,8500	17,8500	17,8500	17,8500	17,8500	17,8500	17,8500	17,8500	17,8500	17,8500	17,8500	...	17,8500	17,8500	17,8500	17,8500	17,8500	17,8500
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p (number of values) = 2

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	0,1600	0,1600	0,1600	0,1600	0,1600	0,1600	0,1600	0,1600	0,1600	0,1600	0,1600	...	0,1600	0,1600	0,1600	0,1600	0,1600	0,1600
2	0,1600	0,1600	0,1600	0,1600	0,1600	0,1600	0,1600	0,1600	0,1600	0,1600	0,1600	...	0,1600	0,1600	0,1600	0,1600	0,1600	0,1600
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3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

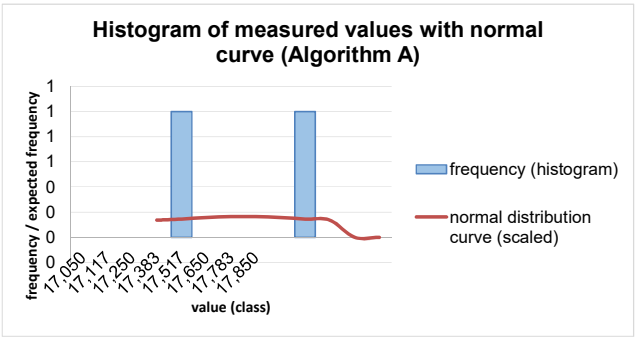
Median of all values =	17,4500
1,483 * MAD (MADe) =	0,5932
Robust average x* =	#######
Robust standard deviation s* =	**0,6415**
Standard uncertainty u(xpt) =	**0,5670**
Lower winsorisation limit x*-1.5s* =	16,4878
Upper winsorisation limit x*+1.5s* =	18,4122
Lower outlier limit x*-3s* =	15,5255
Upper outlier limit x*+3s* =	19,3745
Arithmetic mean of all values $\bar{x}$ =	**17,4500**
Standard deviation of all values s =	**0,5657**
Convergence check (3 significant figures) =	**converged**

5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

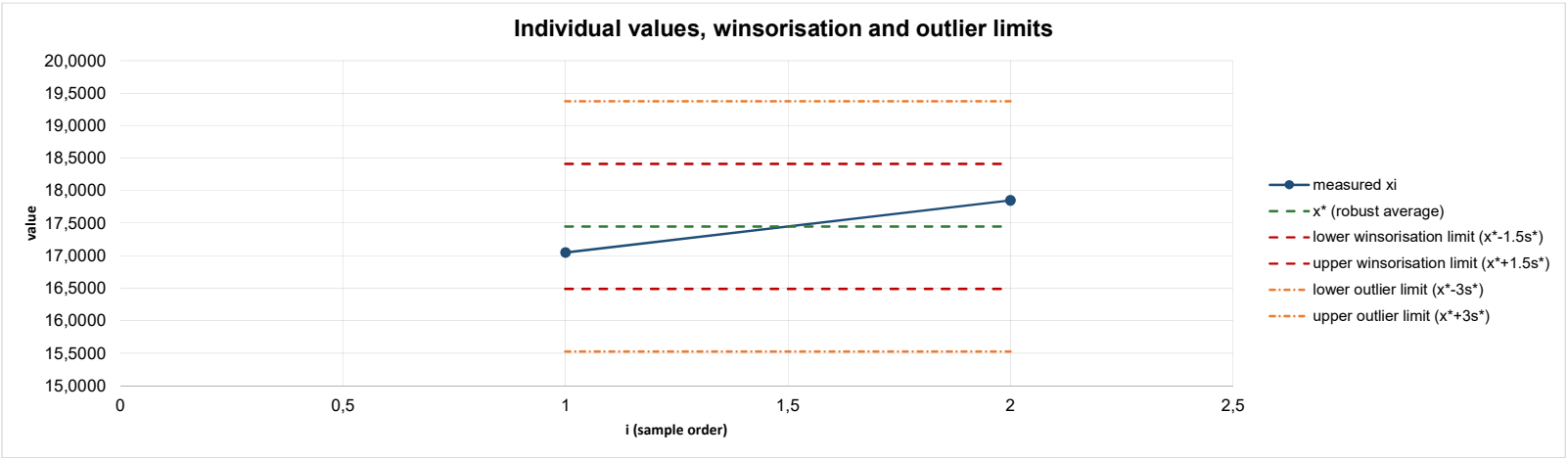
Number of classes 6 *2 <- Sturges (recommended number of classes)*
Class width = 0,1333

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
17,050				0,137
17,117	17,050	17,183	1	0,145
17,250	17,183	17,317	0	0,158
17,383	17,317	17,450	0	0,165
17,517	17,450	17,583	0	0,165
17,650	17,583	17,717	0	0,158
17,783	17,717	17,850	1	0,145
17,850				0,137



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



Cr-content Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	0,0400	x*	0,0514	0,0549	0,0570	0,0584	0,0593	0,0599	0,0603	0,0606	0,0608	0,0610	0,0610	...	0,0613	0,0613	0,0613	0,0613	0,0613	0,0613
1,483*Median	0,0593	s*	0,0620	0,0682	0,0723	0,0750	0,0768	0,0781	0,0789	0,0795	0,0799	0,0802	0,0804	...	0,0808	0,0808	0,0808	0,0808	0,0808	0,0808
1.5 * s*	0,0890	1.5 * s*	0,0930	0,1024	0,1085	0,1125	0,1153	0,1171	0,1184	0,1193	0,1199	0,1203	0,1206	...	0,1213	0,1213	0,1213	0,1213	0,1213	0,1213

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	0,000	0,0400	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
2	0,000	0,0400	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
3	0,000	0,0400	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
4	0,000	0,0400	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
5	0,000	0,0400	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
6	0,030	0,0100	0,0300	0,0300	0,0300	0,0300	0,0300	0,0300	0,0300	0,0300	0,0300	0,0300	0,0300	...	0,0300	0,0300	0,0300	0,0300	0,0300	0,0300
7	0,050	0,0100	0,0500	0,0500	0,0500	0,0500	0,0500	0,0500	0,0500	0,0500	0,0500	0,0500	0,0500	...	0,0500	0,0500	0,0500	0,0500	0,0500	0,0500
8	0,070	0,0300	0,0700	0,0700	0,0700	0,0700	0,0700	0,0700	0,0700	0,0700	0,0700	0,0700	0,0700	...	0,0700	0,0700	0,0700	0,0700	0,0700	0,0700
9	0,080	0,0400	0,0800	0,0800	0,0800	0,0800	0,0800	0,0800	0,0800	0,0800	0,0800	0,0800	0,0800	...	0,0800	0,0800	0,0800	0,0800	0,0800	0,0800
10	0,140	0,1000	0,1290	0,1400	0,1400	0,1400	0,1400	0,1400	0,1400	0,1400	0,1400	0,1400	0,1400	...	0,1400	0,1400	0,1400	0,1400	0,1400	0,1400
11	1,000	0,9600	0,1290	0,1444	0,1573	0,1655	0,1709	0,1746	0,1771	0,1788	0,1799	0,1807	0,1813	...	0,1825	0,1825	0,1825	0,1825	0,1825	0,1825
12	3,650	3,6100	0,1290	0,1444	0,1573	0,1655	0,1709	0,1746	0,1771	0,1788	0,1799	0,1807	0,1813	...	0,1825	0,1825	0,1825	0,1825	0,1825	0,1825
13														...						
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16														...						
17														...						

p (number of values) = 12

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	0,0026	0,0030	0,0033	0,0034	0,0035	0,0036	0,0036	0,0037	0,0037	0,0037	0,0037	...	0,0038	0,0038	0,0038	0,0038	0,0038	0,0038
2	0,0026	0,0030	0,0033	0,0034	0,0035	0,0036	0,0036	0,0037	0,0037	0,0037	0,0037	...	0,0038	0,0038	0,0038	0,0038	0,0038	0,0038
3	0,0026	0,0030	0,0033	0,0034	0,0035	0,0036	0,0036	0,0037	0,0037	0,0037	0,0037	...	0,0038	0,0038	0,0038	0,0038	0,0038	0,0038
4	0,0026	0,0030	0,0033	0,0034	0,0035	0,0036	0,0036	0,0037	0,0037	0,0037	0,0037	...	0,0038	0,0038	0,0038	0,0038	0,0038	0,0038
5	0,0026	0,0030	0,0033	0,0034	0,0035	0,0036	0,0036	0,0037	0,0037	0,0037	0,0037	...	0,0038	0,0038	0,0038	0,0038	0,0038	0,0038
6	0,0005	0,0006	0,0007	0,0008	0,0009	0,0009	0,0009	0,0009	0,0009	0,0010	0,0010	...	0,0010	0,0010	0,0010	0,0010	0,0010	0,0010
7	0,0000	0,0000	0,0000	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	...	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001
8	0,0003	0,0002	0,0002	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	...	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001
9	0,0008	0,0006	0,0005	0,0005	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	...	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004
10	0,0060	0,0072	0,0069	0,0067	0,0065	0,0064	0,0063	0,0063	0,0063	0,0062	0,0062	...	0,0062	0,0062	0,0062	0,0062	0,0062	0,0062
11	0,0060	0,0080	0,0100	0,0115	0,0125	0,0131	0,0136	0,0140	0,0142	0,0143	0,0145	...	0,0147	0,0147	0,0147	0,0147	0,0147	0,0147
12	0,0060	0,0080	0,0100	0,0115	0,0125	0,0131	0,0136	0,0140	0,0142	0,0143	0,0145	...	0,0147	0,0147	0,0147	0,0147	0,0147	0,0147
13												...						
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16												...						
17												...						

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

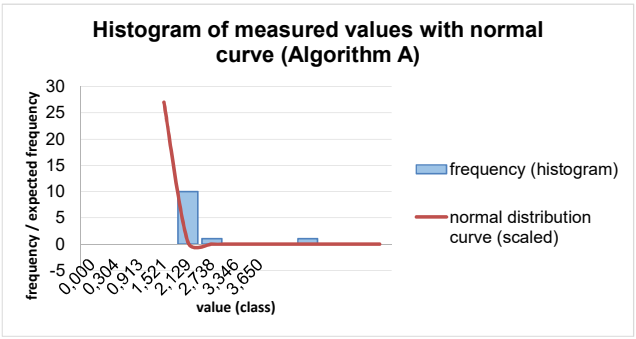
Median of all values =	0,0400
1,483 * MAD (MADe) =	0,0593
Robust average x* =	**0,06125**
Robust standard deviation s* =	**0,0808**
Standard uncertainty u(xpt) =	**0,0292**
Lower winsorisation limit x*-1.5s* =	-0,0600
Upper winsorisation limit x*+1.5s* =	0,1825
Lower outlier limit x*-3s* =	-0,1813
Upper outlier limit x*+3s* =	0,3038
Arithmetic mean of all values x̄ =	**0,4183**
Standard deviation of all values s =	**1,0556**
Convergence check (3 significant figures) =	**converged**

5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

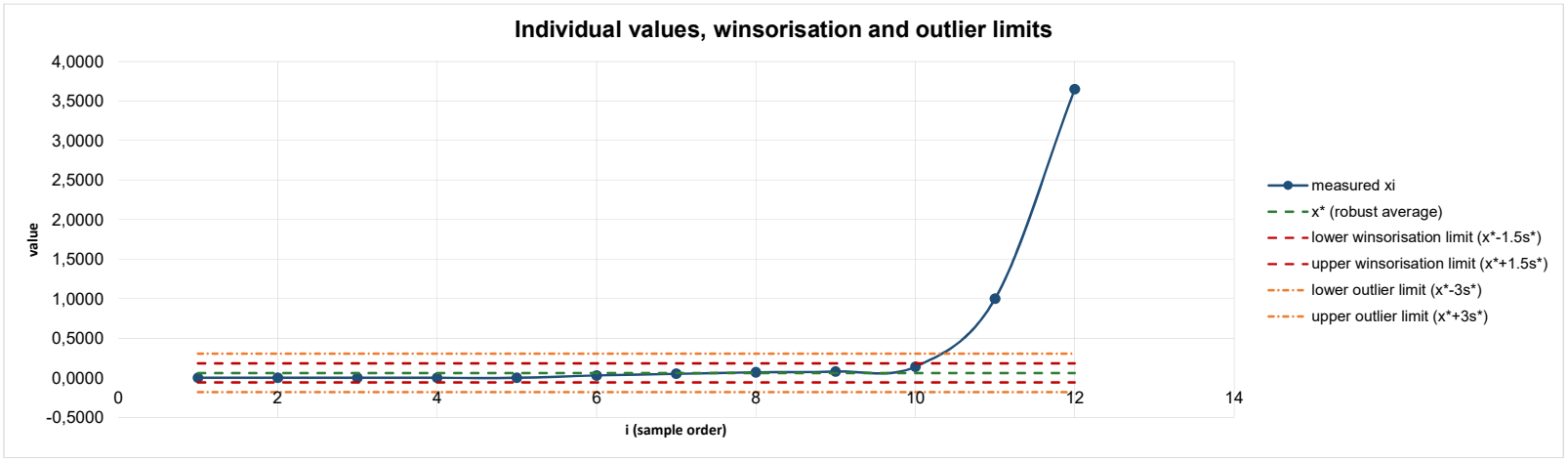
Number of classes 6 *5 <- Sturges (recommended number of classes)*
Class width = 0,6083

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
0,000				27,037
0,304	0,000	0,608	10	0,394
0,913	0,608	1,217	1	0,000
1,521	1,217	1,825	0	0,000
2,129	1,825	2,433	0	0,000
2,738	2,433	3,042	0	0,000
3,346	3,042	3,650	1	0,000
3,650				0,000



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



Hydrating heat — Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	305,0000	**x***	305,000	305,000	305,000	305,000	305,000	305,000	305,000	305,000	305,000	305,000	305,000	...	305,000	305,000	305,000	305,000	305,000	305,000
1,483*Median	26,6940	**s***	28,867	28,867	28,867	28,867	28,867	28,867	28,867	28,867	28,867	28,867	28,867	...	28,867	28,867	28,867	28,867	28,867	28,867
1.5 * s*	40,0410	**1.5 * s***	43,300	43,300	43,300	43,300	43,300	43,300	43,300	43,300	43,300	43,300	43,300	...	43,300	43,300	43,300	43,300	43,300	43,300

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	287,000	18,0000	287,000	287,000	287,000	287,000	287,000	287,000	287,000	287,000	287,000	287,000	287,000	...	287,000	287,000	287,000	287,000	287,000	287,000
2	323,000	18,0000	323,000	323,000	323,000	323,000	323,000	323,000	323,000	323,000	323,000	323,000	323,000	...	323,000	323,000	323,000	323,000	323,000	323,000
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15														...						
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17														...						

p (number of values) = 2

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	**(xi-x*)^2**	**(xi-x*)^2**	**(xi-x*)^2**	**(xi-x*)^2**	**(xi-x*)^2**	**(xi-x*)^2**	**(xi-x*)^2**	**(xi-x*)^2**	**(xi-x*)^2**	**(xi-x*)^2**	**(xi-x*)^2**	**...**	**(xi-x*)^2**	**(xi-x*)^2**	**(xi-x*)^2**	**(xi-x*)^2**	**(xi-x*)^2**	**(xi-x*)^2**
1	324,000	324,000	324,000	324,000	324,000	324,000	324,000	324,000	324,000	324,000	324,000	...	324,000	324,000	324,000	324,000	324,000	324,000
2	324,000	324,000	324,000	324,000	324,000	324,000	324,000	324,000	324,000	324,000	324,000	...	324,000	324,000	324,000	324,000	324,000	324,000
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3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

Median of all values =	305,0000
1,483 * MAD (MADe) =	26,6940
Robust average x* =	**305,000**
Robust standard deviation s* =	**28,8669**
Standard uncertainty u(xpt) =	**25,5150**
Lower winsorisation limit x*-1.5s* =	261,6996
Upper winsorisation limit x*+1.5s* =	348,3004
Lower outlier limit x*-3s* =	218,3992
Upper outlier limit x*+3s* =	391,6008
Arithmetic mean of all values x̄ =	**305,000**
Standard deviation of all values s =	**25,4558**
Convergence check (3 significant figures) =	**converged**

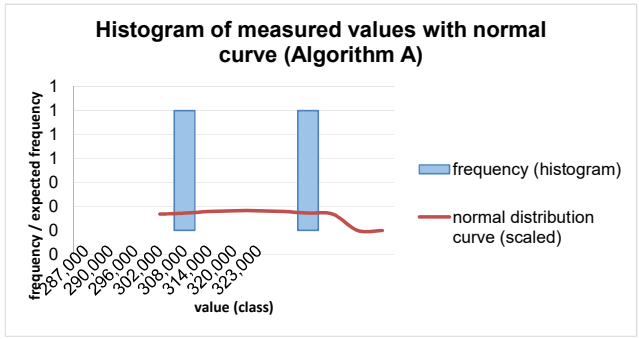
5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

Number of classes 6 *2 <- Sturges (recommended number of classes)*

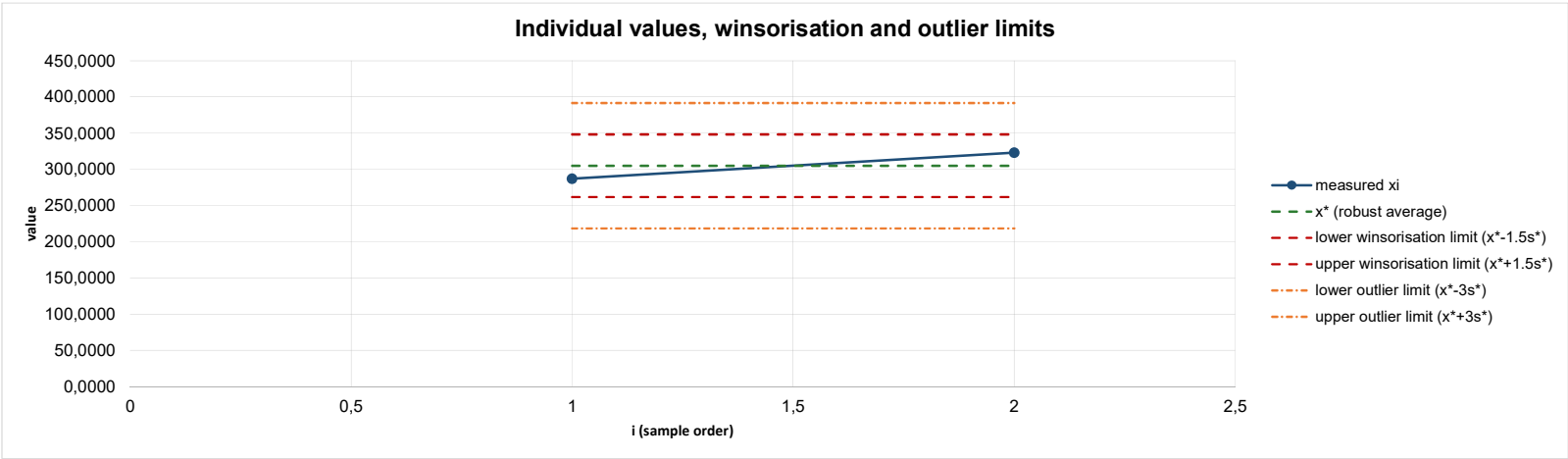
Class width = 6,0000

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
287,000				0,137
290,000	287,000	293,000	1	0,145
296,000	293,000	299,000	0	0,158
302,000	299,000	305,000	0	0,165
308,000	305,000	311,000	0	0,165
314,000	311,000	317,000	0	0,158
320,000	317,000	323,000	1	0,145
323,000				0,137



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



Specific surface (B Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	526,5000	x*	527,006	527,083	527,108	527,115	527,116	527,117	527,117	527,117	527,117	527,117	527,117	...	527,117	527,117	527,117	527,117	527,117	527,117
1,483*Median	12,0865	s*	12,748	12,965	13,016	13,029	13,033	13,034	13,034	13,034	13,034	13,034	13,034	...	13,034	13,034	13,034	13,034	13,034	13,034
1.5 * s*	18,1297	1.5 * s*	19,122	19,448	19,525	19,544	19,549	19,550	19,551	19,551	19,551	19,551	19,551	...	19,551	19,551	19,551	19,551	19,551	19,551

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	508,100	18,400	508,370	508,100	508,100	508,100	508,100	508,100	508,100	508,100	508,100	508,100	508,100	...	508,100	508,100	508,100	508,100	508,100	508,100
2	509,000	17,500	509,000	509,000	509,000	509,000	509,000	509,000	509,000	509,000	509,000	509,000	509,000	...	509,000	509,000	509,000	509,000	509,000	509,000
3	512,100	14,400	512,100	512,100	512,100	512,100	512,100	512,100	512,100	512,100	512,100	512,100	512,100	...	512,100	512,100	512,100	512,100	512,100	512,100
4	518,700	7,800	518,700	518,700	518,700	518,700	518,700	518,700	518,700	518,700	518,700	518,700	518,700	...	518,700	518,700	518,700	518,700	518,700	518,700
5	521,000	5,500	521,000	521,000	521,000	521,000	521,000	521,000	521,000	521,000	521,000	521,000	521,000	...	521,000	521,000	521,000	521,000	521,000	521,000
6	524,200	2,300	524,200	524,200	524,200	524,200	524,200	524,200	524,200	524,200	524,200	524,200	524,200	...	524,200	524,200	524,200	524,200	524,200	524,200
7	525,500	1,000	525,500	525,500	525,500	525,500	525,500	525,500	525,500	525,500	525,500	525,500	525,500	...	525,500	525,500	525,500	525,500	525,500	525,500
8	525,500	1,000	525,500	525,500	525,500	525,500	525,500	525,500	525,500	525,500	525,500	525,500	525,500	...	525,500	525,500	525,500	525,500	525,500	525,500
9	527,500	1,000	527,500	527,500	527,500	527,500	527,500	527,500	527,500	527,500	527,500	527,500	527,500	...	527,500	527,500	527,500	527,500	527,500	527,500
10	529,400	2,900	529,400	529,400	529,400	529,400	529,400	529,400	529,400	529,400	529,400	529,400	529,400	...	529,400	529,400	529,400	529,400	529,400	529,400
11	533,500	7,000	533,500	533,500	533,500	533,500	533,500	533,500	533,500	533,500	533,500	533,500	533,500	...	533,500	533,500	533,500	533,500	533,500	533,500
12	535,000	8,500	535,000	535,000	535,000	535,000	535,000	535,000	535,000	535,000	535,000	535,000	535,000	...	535,000	535,000	535,000	535,000	535,000	535,000
13	537,500	11,000	537,500	537,500	537,500	537,500	537,500	537,500	537,500	537,500	537,500	537,500	537,500	...	537,500	537,500	537,500	537,500	537,500	537,500
14	538,000	11,500	538,000	538,000	538,000	538,000	538,000	538,000	538,000	538,000	538,000	538,000	538,000	...	538,000	538,000	538,000	538,000	538,000	538,000
15	542,200	15,700	542,200	542,200	542,200	542,200	542,200	542,200	542,200	542,200	542,200	542,200	542,200	...	542,200	542,200	542,200	542,200	542,200	542,200
16	559,300	32,800	544,630	546,128	546,531	546,633	546,659	546,665	546,667	546,667	546,668	546,668	546,668	...	546,668	546,668	546,668	546,668	546,668	546,668
17														...						

p (number of values) = 16

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	347,298	360,355	361,311	361,553	361,615	361,630	361,634	361,635	361,636	361,636	361,636	...	361,636	361,636	361,636	361,636	361,636	361,636
2	324,225	326,996	327,906	328,137	328,196	328,211	328,214	328,215	328,216	328,216	328,216	...	328,216	328,216	328,216	328,216	328,216	328,216
3	222,196	224,491	225,246	225,437	225,485	225,498	225,501	225,502	225,502	225,502	225,502	...	225,502	225,502	225,502	225,502	225,502	225,502
4	68,994	70,275	70,698	70,805	70,832	70,839	70,841	70,841	70,841	70,841	70,841	...	70,841	70,841	70,841	70,841	70,841	70,841
5	36,075	37,003	37,310	37,388	37,408	37,413	37,414	37,414	37,414	37,414	37,414	...	37,414	37,414	37,414	37,414	37,414	37,414
6	7,875	8,312	8,458	8,495	8,504	8,506	8,507	8,507	8,507	8,507	8,507	...	8,507	8,507	8,507	8,507	8,507	8,507
7	2,269	2,506	2,586	2,607	2,612	2,613	2,614	2,614	2,614	2,614	2,614	...	2,614	2,614	2,614	2,614	2,614	2,614
8	2,269	2,506	2,586	2,607	2,612	2,613	2,614	2,614	2,614	2,614	2,614	...	2,614	2,614	2,614	2,614	2,614	2,614
9	0,244	0,174	0,154	0,149	0,147	0,147	0,147	0,147	0,147	0,147	0,147	...	0,147	0,147	0,147	0,147	0,147	0,147
10	5,730	5,368	5,252	5,223	5,216	5,214	5,214	5,213	5,213	5,213	5,213	...	5,213	5,213	5,213	5,213	5,213	5,213
11	42,169	41,177	40,855	40,774	40,753	40,748	40,747	40,746	40,746	40,746	40,746	...	40,746	40,746	40,746	40,746	40,746	40,746
12	63,900	62,678	62,281	62,180	62,155	62,148	62,147	62,146	62,146	62,146	62,146	...	62,146	62,146	62,146	62,146	62,146	62,146
13	110,119	108,513	107,990	107,858	107,824	107,815	107,813	107,813	107,812	107,812	107,812	...	107,812	107,812	107,812	107,812	107,812	107,812
14	120,863	119,180	118,632	118,493	118,458	118,449	118,446	118,446	118,446	118,446	118,446	...	118,446	118,446	118,446	118,446	118,446	118,446
15	230,850	228,523	227,763	227,571	227,522	227,509	227,506	227,505	227,505	227,505	227,505	...	227,505	227,505	227,505	227,505	227,505	227,505
16	310,585	362,730	377,245	380,962	381,911	382,154	382,216	382,232	382,236	382,237	382,237	...	382,237	382,237	382,237	382,237	382,237	382,237
17												...						

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

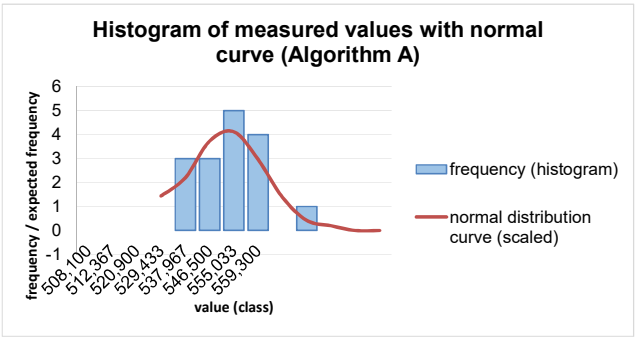
Median of all values =	526,5000
1,483 * MAD (MADe) =	12,0865
Robust average x* =	**527,117**
Robust standard deviation s* =	**13,0339**
Standard uncertainty u(xpt) =	**4,0731**
Lower winsorisation limit x*-1.5s* =	507,5658
Upper winsorisation limit x*+1.5s* =	546,6676
Lower outlier limit x*-3s* =	488,0150
Upper outlier limit x*+3s* =	566,2185
Arithmetic mean of all values x̄ =	**527,906**
Standard deviation of all values s =	**13,2291**
Convergence check (3 significant figures) =	**converged**

5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

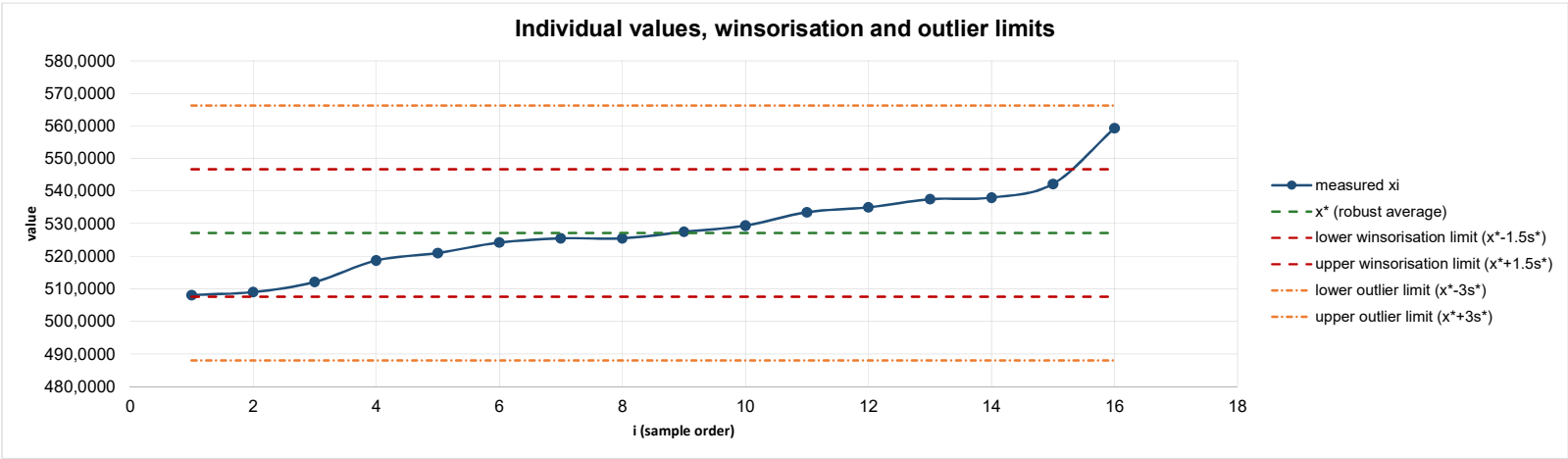
Number of classes 6 *5 <- Sturges (recommended number of classes)*
Class width = 8,5333

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
508,100				1,442
512,367	508,100	516,633	3	2,203
520,900	516,633	525,167	3	3,730
529,433	525,167	533,700	5	4,114
537,967	533,700	542,233	4	2,955
546,500	542,233	550,767	0	1,383
555,033	550,767	559,300	1	0,422
559,300				0,198



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



Specific gravity — Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	3,0100	x*	3,0030	3,0015	3,0010	3,0008	3,0008	3,0008	3,0008	3,0008	3,0008	3,0008	3,0008	...	3,0008	3,0008	3,0008	3,0008	3,0008	3,0008
1,483*Median	0,0297	s*	0,0312	0,0328	0,0339	0,0346	0,0349	0,0351	0,0351	0,0351	0,0351	0,0351	0,0352	...	0,0352	0,0352	0,0352	0,0352	0,0352	0,0352
1.5 * s*	0,0445	1.5 * s*	0,0468	0,0492	0,0508	0,0519	0,0524	0,0526	0,0527	0,0527	0,0527	0,0527	0,0527	...	0,0527	0,0527	0,0527	0,0527	0,0527	0,0527

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	2,940	0,0700	2,9655	2,9562	2,9523	2,9502	2,9489	2,9484	2,9482	2,9481	2,9481	2,9481	2,9480	...	2,9480	2,9480	2,9480	2,9480	2,9480	2,9480
2	2,950	0,0600	2,9655	2,9562	2,9523	2,9502	2,9500	2,9500	2,9500	2,9500	2,9500	2,9500	2,9500	...	2,9500	2,9500	2,9500	2,9500	2,9500	2,9500
3	2,970	0,0400	2,9700	2,9700	2,9700	2,9700	2,9700	2,9700	2,9700	2,9700	2,9700	2,9700	2,9700	...	2,9700	2,9700	2,9700	2,9700	2,9700	2,9700
4	2,970	0,0400	2,9700	2,9700	2,9700	2,9700	2,9700	2,9700	2,9700	2,9700	2,9700	2,9700	2,9700	...	2,9700	2,9700	2,9700	2,9700	2,9700	2,9700
5	2,990	0,0200	2,9900	2,9900	2,9900	2,9900	2,9900	2,9900	2,9900	2,9900	2,9900	2,9900	2,9900	...	2,9900	2,9900	2,9900	2,9900	2,9900	2,9900
6	2,990	0,0200	2,9900	2,9900	2,9900	2,9900	2,9900	2,9900	2,9900	2,9900	2,9900	2,9900	2,9900	...	2,9900	2,9900	2,9900	2,9900	2,9900	2,9900
7	3,000	0,0100	3,0000	3,0000	3,0000	3,0000	3,0000	3,0000	3,0000	3,0000	3,0000	3,0000	3,0000	...	3,0000	3,0000	3,0000	3,0000	3,0000	3,0000
8	3,010	0,0000	3,0100	3,0100	3,0100	3,0100	3,0100	3,0100	3,0100	3,0100	3,0100	3,0100	3,0100	...	3,0100	3,0100	3,0100	3,0100	3,0100	3,0100
9	3,010	0,0000	3,0100	3,0100	3,0100	3,0100	3,0100	3,0100	3,0100	3,0100	3,0100	3,0100	3,0100	...	3,0100	3,0100	3,0100	3,0100	3,0100	3,0100
10	3,020	0,0100	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	...	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200
11	3,020	0,0100	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	...	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200
12	3,020	0,0100	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	...	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200
13	3,020	0,0100	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200	...	3,0200	3,0200	3,0200	3,0200	3,0200	3,0200
14	3,040	0,0300	3,0400	3,0400	3,0400	3,0400	3,0400	3,0400	3,0400	3,0400	3,0400	3,0400	3,0400	...	3,0400	3,0400	3,0400	3,0400	3,0400	3,0400
15	3,190	0,1800	3,0545	3,0499	3,0506	3,0518	3,0527	3,0532	3,0534	3,0534	3,0535	3,0535	3,0535	...	3,0535	3,0535	3,0535	3,0535	3,0535	3,0535
16														...						
17														...						

p (number of values) = 15

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	0,0014	0,0021	0,0024	0,0026	0,0027	0,0027	0,0028	0,0028	0,0028	0,0028	0,0028	...	0,0028	0,0028	0,0028	0,0028	0,0028	0,0028
2	0,0014	0,0021	0,0024	0,0026	0,0026	0,0026	0,0026	0,0026	0,0026	0,0026	0,0026	...	0,0026	0,0026	0,0026	0,0026	0,0026	0,0026
3	0,0011	0,0010	0,0010	0,0009	0,0009	0,0009	0,0009	0,0009	0,0009	0,0009	0,0009	...	0,0009	0,0009	0,0009	0,0009	0,0009	0,0009
4	0,0011	0,0010	0,0010	0,0009	0,0009	0,0009	0,0009	0,0009	0,0009	0,0009	0,0009	...	0,0009	0,0009	0,0009	0,0009	0,0009	0,0009
5	0,0002	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	...	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001
6	0,0002	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	...	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001
7	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
8	0,0000	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	...	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001
9	0,0000	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001	...	0,0001	0,0001	0,0001	0,0001	0,0001	0,0001
10	0,0003	0,0003	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	...	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004
11	0,0003	0,0003	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	...	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004
12	0,0003	0,0003	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	...	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004
13	0,0003	0,0003	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	...	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004
14	0,0014	0,0015	0,0015	0,0015	0,0015	0,0015	0,0015	0,0015	0,0015	0,0015	0,0015	...	0,0015	0,0015	0,0015	0,0015	0,0015	0,0015
15	0,0026	0,0023	0,0025	0,0026	0,0027	0,0027	0,0028	0,0028	0,0028	0,0028	0,0028	...	0,0028	0,0028	0,0028	0,0028	0,0028	0,0028
16												...						
17												...						

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

Median of all values =	3,0100
1,483 * MAD (MADe) =	0,0297
Robust average x* =	**3,00077**
Robust standard deviation s* =	**0,0352**
Standard uncertainty u(xpt) =	**0,0113**
Lower winsorisation limit x*-1.5s* =	2,9480
Upper winsorisation limit x*+1.5s* =	3,0535
Lower outlier limit x*-3s* =	2,8953
Upper outlier limit x*+3s* =	3,1062
Arithmetic mean of all values x̄ =	**3,0093**
Standard deviation of all values s =	**0,0575**
Convergence check (3 significant figures) =	**converged**

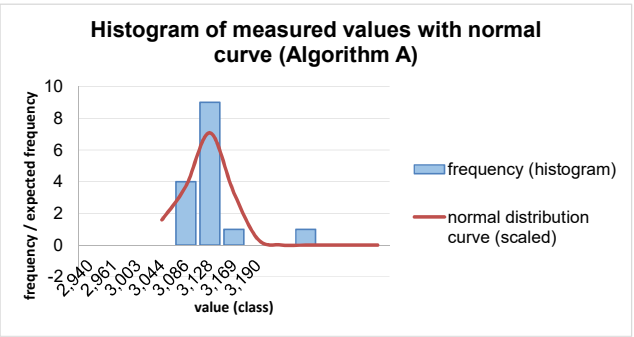
5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

Number of classes 6 *5 <- Sturges (recommended number of classes)*

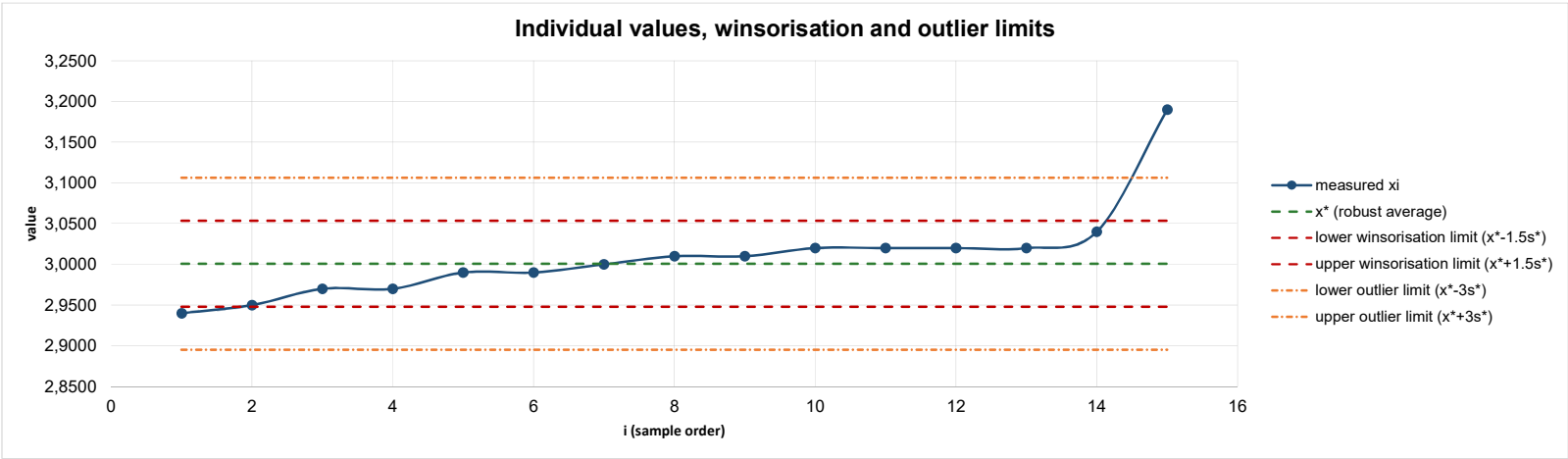
Class width = 0,0417

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
2,940				1,592
2,961	2,940	2,982	4	3,720
3,003	2,982	3,023	9	7,084
3,044	3,023	3,065	1	3,310
3,086	3,065	3,107	0	0,380
3,128	3,107	3,148	0	0,011
3,169	3,148	3,190	1	0,000
3,190				0,000



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



Initial setting time Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	302,0000	x*	298,059	297,440	297,284	297,246	297,237	297,235	297,235	297,235	297,235	297,235	297,235	...	297,235	297,235	297,235	297,235	297,235	297,235
1,483*Median	72,6670	s*	68,279	66,928	66,604	66,526	66,507	66,503	66,502	66,501	66,501	66,501	66,501	...	66,501	66,501	66,501	66,501	66,501	66,501
1.5 * s*	109,0005	1.5 * s*	102,418	100,392	99,905	99,789	99,761	99,754	99,753	99,752	99,752	99,752	99,752	...	99,752	99,752	99,752	99,752	99,752	99,752

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	198,000	104,000	198,000	198,000	198,000	198,000	198,000	198,000	198,000	198,000	198,000	198,000	198,000	...	198,000	198,000	198,000	198,000	198,000	198,000
2	228,000	74,000	228,000	228,000	228,000	228,000	228,000	228,000	228,000	228,000	228,000	228,000	228,000	...	228,000	228,000	228,000	228,000	228,000	228,000
3	235,000	67,000	235,000	235,000	235,000	235,000	235,000	235,000	235,000	235,000	235,000	235,000	235,000	...	235,000	235,000	235,000	235,000	235,000	235,000
4	236,000	66,000	236,000	236,000	236,000	236,000	236,000	236,000	236,000	236,000	236,000	236,000	236,000	...	236,000	236,000	236,000	236,000	236,000	236,000
5	240,000	62,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	...	240,000	240,000	240,000	240,000	240,000	240,000
6	263,000	39,000	263,000	263,000	263,000	263,000	263,000	263,000	263,000	263,000	263,000	263,000	263,000	...	263,000	263,000	263,000	263,000	263,000	263,000
7	272,000	30,000	272,000	272,000	272,000	272,000	272,000	272,000	272,000	272,000	272,000	272,000	272,000	...	272,000	272,000	272,000	272,000	272,000	272,000
8	288,000	14,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	288,000	...	288,000	288,000	288,000	288,000	288,000	288,000
9	302,000	0,000	302,000	302,000	302,000	302,000	302,000	302,000	302,000	302,000	302,000	302,000	302,000	...	302,000	302,000	302,000	302,000	302,000	302,000
10	303,000	1,000	303,000	303,000	303,000	303,000	303,000	303,000	303,000	303,000	303,000	303,000	303,000	...	303,000	303,000	303,000	303,000	303,000	303,000
11	327,000	25,000	327,000	327,000	327,000	327,000	327,000	327,000	327,000	327,000	327,000	327,000	327,000	...	327,000	327,000	327,000	327,000	327,000	327,000
12	330,000	28,000	330,000	330,000	330,000	330,000	330,000	330,000	330,000	330,000	330,000	330,000	330,000	...	330,000	330,000	330,000	330,000	330,000	330,000
13	343,000	41,000	343,000	343,000	343,000	343,000	343,000	343,000	343,000	343,000	343,000	343,000	343,000	...	343,000	343,000	343,000	343,000	343,000	343,000
14	351,000	49,000	351,000	351,000	351,000	351,000	351,000	351,000	351,000	351,000	351,000	351,000	351,000	...	351,000	351,000	351,000	351,000	351,000	351,000
15	365,000	63,000	365,000	365,000	365,000	365,000	365,000	365,000	365,000	365,000	365,000	365,000	365,000	...	365,000	365,000	365,000	365,000	365,000	365,000
16	375,000	73,000	375,000	375,000	375,000	375,000	375,000	375,000	375,000	375,000	375,000	375,000	375,000	...	375,000	375,000	375,000	375,000	375,000	375,000
17	450,000	148,000	411,001	400,477	397,831	397,190	397,035	396,998	396,989	396,987	396,987	396,987	396,987	...	396,987	396,987	396,987	396,987	396,987	396,987

p (number of values) = 17

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	10011,77	9888,28	9857,35	9849,86	9848,06	9847,62	9847,52	9847,49	9847,49	9847,49	9847,49	...	9847,49	9847,49	9847,49	9847,49	9847,49	9847,49
2	4908,24	4821,89	4800,30	4795,07	4793,81	4793,51	4793,44	4793,42	4793,42	4793,42	4793,42	...	4793,42	4793,42	4793,42	4793,42	4793,42	4793,42
3	3976,42	3898,73	3879,32	3874,62	3873,49	3873,22	3873,15	3873,14	3873,13	3873,13	3873,13	...	3873,13	3873,13	3873,13	3873,13	3873,13	3873,13
4	3851,30	3774,85	3755,75	3751,13	3750,02	3749,75	3749,68	3749,67	3749,67	3749,66	3749,66	...	3749,66	3749,66	3749,66	3749,66	3749,66	3749,66
5	3370,83	3299,33	3281,48	3277,16	3276,12	3275,87	3275,81	3275,79	3275,79	3275,79	3275,79	...	3275,79	3275,79	3275,79	3275,79	3275,79	3275,79
6	1229,12	1186,10	1175,41	1172,82	1172,20	1172,05	1172,01	1172,00	1172,00	1172,00	1172,00	...	1172,00	1172,00	1172,00	1172,00	1172,00	1172,00
7	679,06	647,18	639,29	637,38	636,92	636,81	636,79	636,78	636,78	636,78	636,78	...	636,78	636,78	636,78	636,78	636,78	636,78
8	101,18	89,11	86,20	85,50	85,33	85,29	85,28	85,28	85,28	85,28	85,28	...	85,28	85,28	85,28	85,28	85,28	85,28
9	15,53	20,80	22,24	22,60	22,68	22,70	22,71	22,71	22,71	22,71	22,71	...	22,71	22,71	22,71	22,71	22,71	22,71
10	24,41	30,92	32,67	33,10	33,21	33,23	33,24	33,24	33,24	33,24	33,24	...	33,24	33,24	33,24	33,24	33,24	33,24
11	837,59	873,80	883,03	885,27	885,81	885,94	885,97	885,98	885,98	885,98	885,98	...	885,98	885,98	885,98	885,98	885,98	885,98
12	1020,24	1060,16	1070,32	1072,80	1073,39	1073,53	1073,57	1073,58	1073,58	1073,58	1073,58	...	1073,58	1073,58	1073,58	1073,58	1073,58	1073,58
13	2019,71	2075,73	2089,93	2093,39	2094,22	2094,42	2094,47	2094,48	2094,48	2094,48	2094,48	...	2094,48	2094,48	2094,48	2094,48	2094,48	2094,48
14	2802,77	2868,69	2885,39	2889,44	2890,42	2890,65	2890,71	2890,72	2890,73	2890,73	2890,73	...	2890,73	2890,73	2890,73	2890,73	2890,73	2890,73
15	4481,12	4564,38	4585,43	4590,54	4591,77	4592,07	4592,14	4592,16	4592,16	4592,16	4592,16	...	4592,16	4592,16	4592,16	4592,16	4592,16	4592,16
16	5919,94	6015,58	6039,75	6045,62	6047,03	6047,37	6047,45	6047,47	6047,47	6047,47	6047,47	...	6047,47	6047,47	6047,47	6047,47	6047,47	6047,47
17	12755,82	10616,67	10109,75	9988,62	9959,62	9952,67	9951,00	9950,60	9950,50	9950,48	9950,48	...	9950,47	9950,47	9950,47	9950,47	9950,47	9950,47

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

Median of all values =	302,0000
1,483 * MAD (MADe) =	72,6670
Robust average x* =	**297,235**
Robust standard deviation s* =	**66,5014**
Standard uncertainty u(xpt) =	**20,1612**
Lower winsorisation limit x*-1.5s* =	197,4824
Upper winsorisation limit x*+1.5s* =	396,9866
Lower outlier limit x*-3s* =	97,7304
Upper outlier limit x*+3s* =	496,7386
Arithmetic mean of all values x̄ =	**300,353**
Standard deviation of all values s =	**65,3098**
Convergence check (3 significant figures) =	**converged**

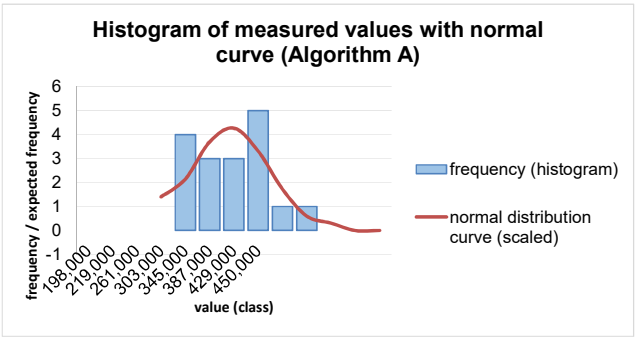
5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

Number of classes 6 *6 <- Sturges (recommended number of classes)*

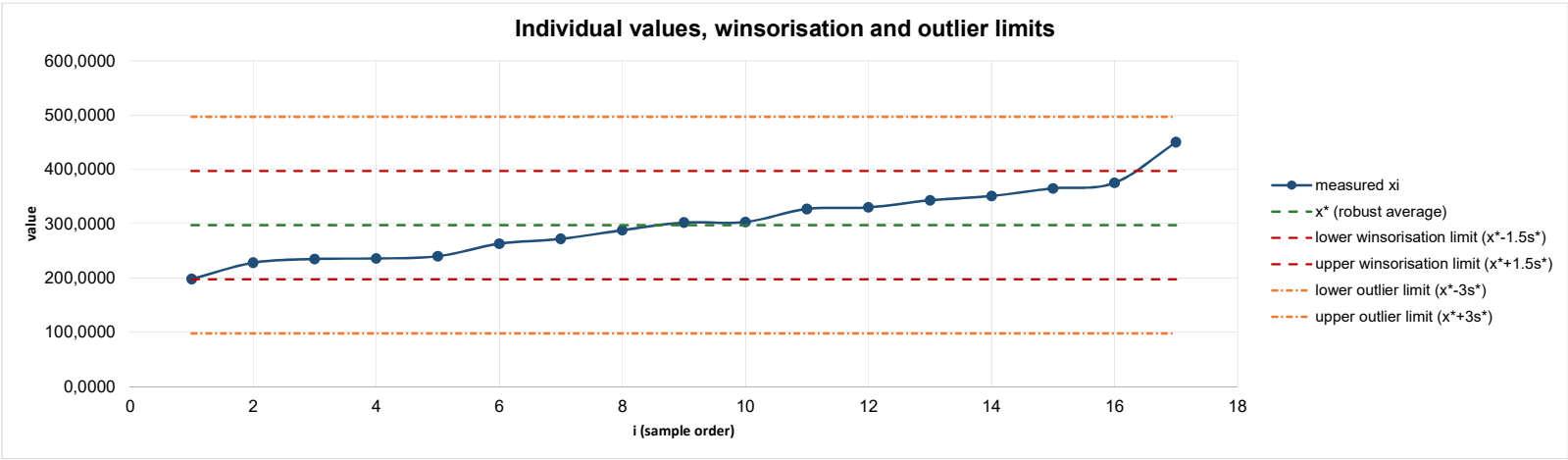
Class width = 42,0000

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
198,000				1,407
219,000	198,000	240,000	4	2,144
261,000	240,000	282,000	3	3,692
303,000	282,000	324,000	3	4,267
345,000	324,000	366,000	5	3,309
387,000	366,000	408,000	1	1,722
429,000	408,000	450,000	1	0,602
450,000				0,306



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



Final setting time Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	402,0000	x*	404,647	405,270	405,416	405,451	405,459	405,461	405,461	405,462	405,462	405,462	405,462	...	405,462	405,462	405,462	405,462	405,462	405,462
1,483*Median	34,1090	s*	38,121	40,743	42,538	43,790	44,674	45,302	45,752	46,074	46,306	46,472	46,593	...	46,906	46,906	46,906	46,906	46,906	46,906
1.5 * s*	51,1635	1.5 * s*	57,181	61,115	63,806	65,685	67,010	67,953	68,627	69,111	69,458	69,709	69,889	...	70,359	70,359	70,359	70,359	70,359	70,359

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	250,000	152,000	350,837	347,466	344,155	341,610	339,766	338,449	337,508	336,834	336,351	336,003	335,753	...	335,103	335,103	335,103	335,103	335,103	335,103
2	300,000	102,000	350,837	347,466	344,155	341,610	339,766	338,449	337,508	336,834	336,351	336,003	335,753	...	335,103	335,103	335,103	335,103	335,103	335,103
3	357,000	45,000	357,000	357,000	357,000	357,000	357,000	357,000	357,000	357,000	357,000	357,000	357,000	...	357,000	357,000	357,000	357,000	357,000	357,000
4	381,000	21,000	381,000	381,000	381,000	381,000	381,000	381,000	381,000	381,000	381,000	381,000	381,000	...	381,000	381,000	381,000	381,000	381,000	381,000
5	387,000	15,000	387,000	387,000	387,000	387,000	387,000	387,000	387,000	387,000	387,000	387,000	387,000	...	387,000	387,000	387,000	387,000	387,000	387,000
6	388,000	14,000	388,000	388,000	388,000	388,000	388,000	388,000	388,000	388,000	388,000	388,000	388,000	...	388,000	388,000	388,000	388,000	388,000	388,000
7	395,000	7,000	395,000	395,000	395,000	395,000	395,000	395,000	395,000	395,000	395,000	395,000	395,000	...	395,000	395,000	395,000	395,000	395,000	395,000
8	401,000	1,000	401,000	401,000	401,000	401,000	401,000	401,000	401,000	401,000	401,000	401,000	401,000	...	401,000	401,000	401,000	401,000	401,000	401,000
9	402,000	0,000	402,000	402,000	402,000	402,000	402,000	402,000	402,000	402,000	402,000	402,000	402,000	...	402,000	402,000	402,000	402,000	402,000	402,000
10	405,000	3,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000	405,000	...	405,000	405,000	405,000	405,000	405,000	405,000
11	413,000	11,000	413,000	413,000	413,000	413,000	413,000	413,000	413,000	413,000	413,000	413,000	413,000	...	413,000	413,000	413,000	413,000	413,000	413,000
12	425,000	23,000	425,000	425,000	425,000	425,000	425,000	425,000	425,000	425,000	425,000	425,000	425,000	...	425,000	425,000	425,000	425,000	425,000	425,000
13	435,000	33,000	435,000	435,000	435,000	435,000	435,000	435,000	435,000	435,000	435,000	435,000	435,000	...	435,000	435,000	435,000	435,000	435,000	435,000
14	440,000	38,000	440,000	440,000	440,000	440,000	440,000	440,000	440,000	440,000	440,000	440,000	440,000	...	440,000	440,000	440,000	440,000	440,000	440,000
15	442,000	40,000	442,000	442,000	442,000	442,000	442,000	442,000	442,000	442,000	442,000	442,000	442,000	...	442,000	442,000	442,000	442,000	442,000	442,000
16	493,000	91,000	453,164	461,828	466,385	469,223	471,136	472,469	473,414	474,089	474,572	474,920	475,170	...	475,821	475,821	475,821	475,821	475,821	475,821
17	503,000	101,000	453,164	461,828	466,385	469,223	471,136	472,469	473,414	474,089	474,572	474,920	475,170	...	475,821	475,821	475,821	475,821	475,821	475,821

p (number of values) = 17

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	2895,58	3341,29	3752,94	4075,67	4315,54	4490,66	4617,72	4709,72	4776,30	4824,46	4859,30	...	4950,39	4950,39	4950,39	4950,39	4950,39	4950,39
2	2895,58	3341,29	3752,94	4075,67	4315,54	4490,66	4617,72	4709,72	4776,30	4824,46	4859,30	...	4950,39	4950,39	4950,39	4950,39	4950,39	4950,39
3	2270,24	2329,98	2344,15	2347,49	2348,28	2348,46	2348,51	2348,52	2348,52	2348,52	2348,52	...	2348,52	2348,52	2348,52	2348,52	2348,52	2348,52
4	559,18	589,03	596,16	597,85	598,24	598,34	598,36	598,37	598,37	598,37	598,37	...	598,37	598,37	598,37	598,37	598,37	598,37
5	311,42	333,79	339,17	340,44	340,74	340,81	340,82	340,83	340,83	340,83	340,83	...	340,83	340,83	340,83	340,83	340,83	340,83
6	277,12	298,25	303,33	304,53	304,82	304,88	304,90	304,90	304,91	304,91	304,91	...	304,91	304,91	304,91	304,91	304,91	304,91
7	93,07	105,47	108,50	109,22	109,39	109,43	109,44	109,44	109,44	109,44	109,44	...	109,44	109,44	109,44	109,44	109,44	109,44
8	13,30	18,23	19,50	19,81	19,88	19,90	19,90	19,91	19,91	19,91	19,91	...	19,91	19,91	19,91	19,91	19,91	19,91
9	7,01	10,69	11,67	11,91	11,96	11,98	11,98	11,98	11,98	11,98	11,98	...	11,98	11,98	11,98	11,98	11,98	11,98
10	0,12	0,07	0,17	0,20	0,21	0,21	0,21	0,21	0,21	0,21	0,21	...	0,21	0,21	0,21	0,21	0,21	0,21
11	69,77	59,75	57,51	56,99	56,87	56,84	56,83	56,83	56,83	56,83	56,83	...	56,83	56,83	56,83	56,83	56,83	56,83
12	414,24	389,28	383,52	382,17	381,85	381,77	381,76	381,75	381,75	381,75	381,75	...	381,75	381,75	381,75	381,75	381,75	381,75
13	921,30	883,88	875,19	873,15	872,67	872,56	872,53	872,52	872,52	872,52	872,52	...	872,52	872,52	872,52	872,52	872,52	872,52
14	1249,83	1206,18	1196,02	1193,64	1193,08	1192,95	1192,91	1192,91	1192,91	1192,91	1192,91	...	1192,91	1192,91	1192,91	1192,91	1192,91	1192,91
15	1395,24	1349,10	1338,36	1335,83	1335,24	1335,10	1335,07	1335,06	1335,06	1335,06	1335,06	...	1335,06	1335,06	1335,06	1335,06	1335,06	1335,06
16	2353,85	3198,83	3717,12	4066,86	4313,41	4490,15	4617,60	4709,69	4776,29	4824,46	4859,30	...	4950,39	4950,39	4950,39	4950,39	4950,39	4950,39
17	2353,85	3198,83	3717,12	4066,86	4313,41	4490,15	4617,60	4709,69	4776,29	4824,46	4859,30	...	4950,39	4950,39	4950,39	4950,39	4950,39	4950,39

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

Median of all values =	402,0000
1,483 * MAD (MADe) =	34,1090
Robust average x* =	**405,462**
Robust standard deviation s* =	**46,9060**
Standard uncertainty u(xpt) =	**14,2205**
Lower winsorisation limit x*-1.5s* =	335,1025
Upper winsorisation limit x*+1.5s* =	475,8206
Lower outlier limit x*-3s* =	264,7435
Upper outlier limit x*+3s* =	546,1796
Arithmetic mean of all values x̄ =	**401,000**
Standard deviation of all values s =	**61,0850**
Convergence check (3 significant figures) =	**converged**

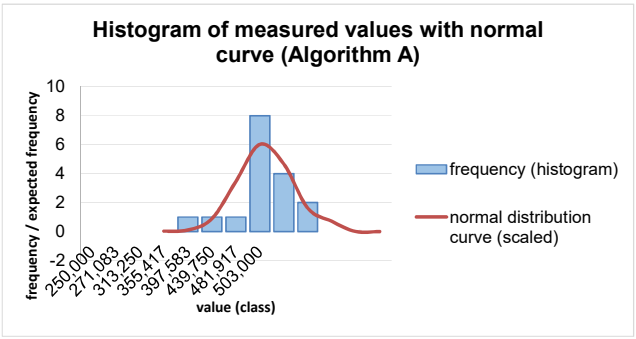
5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

Number of classes 6 *6 <- Sturges (recommended number of classes)*

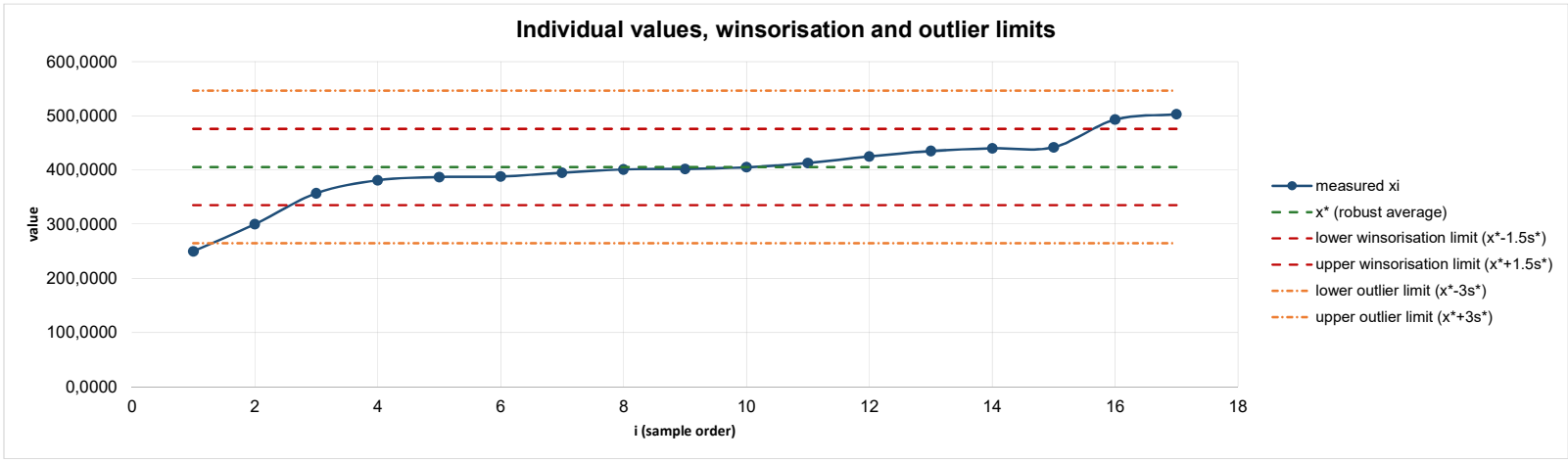
Class width = 42,1667

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
250,000				0,025
271,083	250,000	292,167	1	0,101
313,250	292,167	334,333	1	0,883
355,417	334,333	376,500	1	3,451
397,583	376,500	418,667	8	6,011
439,750	418,667	460,833	4	4,667
481,917	460,833	503,000	2	1,615
503,000				0,702



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



Water content — Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	29,2000	x*	29,1618	29,1565	29,1593	29,1617	29,1631	29,1633	29,1633	29,1633	29,1633	29,1633	29,1633	...	29,1633	29,1633	29,1633	29,1633	29,1633	29,1633
1,483*Median	0,7415	s*	0,8163	0,8592	0,8809	0,8928	0,8994	0,9018	0,9026	0,9029	0,9030	0,9031	0,9031	...	0,9031	0,9031	0,9031	0,9031	0,9031	0,9031
1.5 * s*	1,1123	1.5 * s*	1,2245	1,2887	1,3214	1,3392	1,3491	1,3526	1,3539	1,3544	1,3545	1,3546	1,3546	...	1,3546	1,3546	1,3546	1,3546	1,3546	1,3546

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	27,650	1,5500	28,0878	27,9373	27,8677	27,8379	27,8225	27,8141	27,8107	27,8094	27,8090	27,8088	27,8087	...	27,8087	27,8087	27,8087	27,8087	27,8087	27,8087
2	28,000	1,2000	28,0878	28,0000	28,0000	28,0000	28,0000	28,0000	28,0000	28,0000	28,0000	28,0000	28,0000	...	28,0000	28,0000	28,0000	28,0000	28,0000	28,0000
3	28,100	1,1000	28,1000	28,1000	28,1000	28,1000	28,1000	28,1000	28,1000	28,1000	28,1000	28,1000	28,1000	...	28,1000	28,1000	28,1000	28,1000	28,1000	28,1000
4	28,450	0,7500	28,4500	28,4500	28,4500	28,4500	28,4500	28,4500	28,4500	28,4500	28,4500	28,4500	28,4500	...	28,4500	28,4500	28,4500	28,4500	28,4500	28,4500
5	28,700	0,5000	28,7000	28,7000	28,7000	28,7000	28,7000	28,7000	28,7000	28,7000	28,7000	28,7000	28,7000	...	28,7000	28,7000	28,7000	28,7000	28,7000	28,7000
6	29,000	0,2000	29,0000	29,0000	29,0000	29,0000	29,0000	29,0000	29,0000	29,0000	29,0000	29,0000	29,0000	...	29,0000	29,0000	29,0000	29,0000	29,0000	29,0000
7	29,000	0,2000	29,0000	29,0000	29,0000	29,0000	29,0000	29,0000	29,0000	29,0000	29,0000	29,0000	29,0000	...	29,0000	29,0000	29,0000	29,0000	29,0000	29,0000
8	29,100	0,1000	29,1000	29,1000	29,1000	29,1000	29,1000	29,1000	29,1000	29,1000	29,1000	29,1000	29,1000	...	29,1000	29,1000	29,1000	29,1000	29,1000	29,1000
9	29,200	0,0000	29,2000	29,2000	29,2000	29,2000	29,2000	29,2000	29,2000	29,2000	29,2000	29,2000	29,2000	...	29,2000	29,2000	29,2000	29,2000	29,2000	29,2000
10	29,250	0,0500	29,2500	29,2500	29,2500	29,2500	29,2500	29,2500	29,2500	29,2500	29,2500	29,2500	29,2500	...	29,2500	29,2500	29,2500	29,2500	29,2500	29,2500
11	29,250	0,0500	29,2500	29,2500	29,2500	29,2500	29,2500	29,2500	29,2500	29,2500	29,2500	29,2500	29,2500	...	29,2500	29,2500	29,2500	29,2500	29,2500	29,2500
12	29,500	0,3000	29,5000	29,5000	29,5000	29,5000	29,5000	29,5000	29,5000	29,5000	29,5000	29,5000	29,5000	...	29,5000	29,5000	29,5000	29,5000	29,5000	29,5000
13	29,600	0,4000	29,6000	29,6000	29,6000	29,6000	29,6000	29,6000	29,6000	29,6000	29,6000	29,6000	29,6000	...	29,6000	29,6000	29,6000	29,6000	29,6000	29,6000
14	29,800	0,6000	29,8000	29,8000	29,8000	29,8000	29,8000	29,8000	29,8000	29,8000	29,8000	29,8000	29,8000	...	29,8000	29,8000	29,8000	29,8000	29,8000	29,8000
15	30,000	0,8000	30,0000	30,0000	30,0000	30,0000	30,0000	30,0000	30,0000	30,0000	30,0000	30,0000	30,0000	...	30,0000	30,0000	30,0000	30,0000	30,0000	30,0000
16	30,500	1,3000	30,3123	30,3862	30,4452	30,4807	30,5000	30,5000	30,5000	30,5000	30,5000	30,5000	30,5000	...	30,5000	30,5000	30,5000	30,5000	30,5000	30,5000
17	32,000	2,8000	30,3123	30,3862	30,4452	30,4807	30,5010	30,5122	30,5159	30,5172	30,5177	30,5179	30,5179	...	30,5180	30,5180	30,5180	30,5180	30,5180	30,5180

p (number of values) = 17

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	1,1535	1,4864	1,6682	1,7524	1,7974	1,8205	1,8297	1,8331	1,8343	1,8348	1,8349	...	1,8350	1,8350	1,8350	1,8350	1,8350	1,8350
2	1,1535	1,3374	1,3440	1,3496	1,3529	1,3533	1,3533	1,3533	1,3533	1,3533	1,3533	...	1,3533	1,3533	1,3533	1,3533	1,3533	1,3533
3	1,1273	1,1161	1,1221	1,1273	1,1303	1,1306	1,1307	1,1307	1,1307	1,1307	1,1307	...	1,1307	1,1307	1,1307	1,1307	1,1307	1,1307
4	0,5066	0,4991	0,5031	0,5065	0,5086	0,5088	0,5088	0,5088	0,5088	0,5088	0,5088	...	0,5088	0,5088	0,5088	0,5088	0,5088	0,5088
5	0,2132	0,2084	0,2110	0,2132	0,2145	0,2147	0,2147	0,2147	0,2147	0,2147	0,2147	...	0,2147	0,2147	0,2147	0,2147	0,2147	0,2147
6	0,0262	0,0245	0,0254	0,0262	0,0266	0,0267	0,0267	0,0267	0,0267	0,0267	0,0267	...	0,0267	0,0267	0,0267	0,0267	0,0267	0,0267
7	0,0262	0,0245	0,0254	0,0262	0,0266	0,0267	0,0267	0,0267	0,0267	0,0267	0,0267	...	0,0267	0,0267	0,0267	0,0267	0,0267	0,0267
8	0,0038	0,0032	0,0035	0,0038	0,0040	0,0040	0,0040	0,0040	0,0040	0,0040	0,0040	...	0,0040	0,0040	0,0040	0,0040	0,0040	0,0040
9	0,0015	0,0019	0,0017	0,0015	0,0014	0,0013	0,0013	0,0013	0,0013	0,0013	0,0013	...	0,0013	0,0013	0,0013	0,0013	0,0013	0,0013
10	0,0078	0,0088	0,0082	0,0078	0,0075	0,0075	0,0075	0,0075	0,0075	0,0075	0,0075	...	0,0075	0,0075	0,0075	0,0075	0,0075	0,0075
11	0,0078	0,0088	0,0082	0,0078	0,0075	0,0075	0,0075	0,0075	0,0075	0,0075	0,0075	...	0,0075	0,0075	0,0075	0,0075	0,0075	0,0075
12	0,1144	0,1180	0,1161	0,1144	0,1135	0,1134	0,1133	0,1133	0,1133	0,1133	0,1133	...	0,1133	0,1133	0,1133	0,1133	0,1133	0,1133
13	0,1921	0,1967	0,1942	0,1921	0,1908	0,1907	0,1907	0,1907	0,1907	0,1907	0,1907	...	0,1907	0,1907	0,1907	0,1907	0,1907	0,1907
14	0,4073	0,4141	0,4105	0,4074	0,4056	0,4054	0,4053	0,4053	0,4053	0,4053	0,4053	...	0,4053	0,4053	0,4053	0,4053	0,4053	0,4053
15	0,7026	0,7116	0,7068	0,7027	0,7003	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	...	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000
16	1,3236	1,5124	1,6535	1,7396	1,7872	1,7867	1,7867	1,7867	1,7867	1,7867	1,7867	...	1,7867	1,7867	1,7867	1,7867	1,7867	1,7867
17	1,3236	1,5124	1,6535	1,7396	1,7898	1,8196	1,8296	1,8331	1,8343	1,8348	1,8349	...	1,8350	1,8350	1,8350	1,8350	1,8350	1,8350

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

Median of all values =	29,2000
1,483 * MAD (MADe) =	0,7415
Robust average x* =	**29,1633**
Robust standard deviation s* =	**0,9031**
Standard uncertainty u(xpt) =	**0,2738**
Lower winsorisation limit x*-1.5s* =	27,8087
Upper winsorisation limit x*+1.5s* =	30,5180
Lower outlier limit x*-3s* =	26,4541
Upper outlier limit x*+3s* =	31,8726
Arithmetic mean of all values x̄ =	**29,2412**
Standard deviation of all values s =	**1,0220**
Convergence check (3 significant figures) =	**converged**

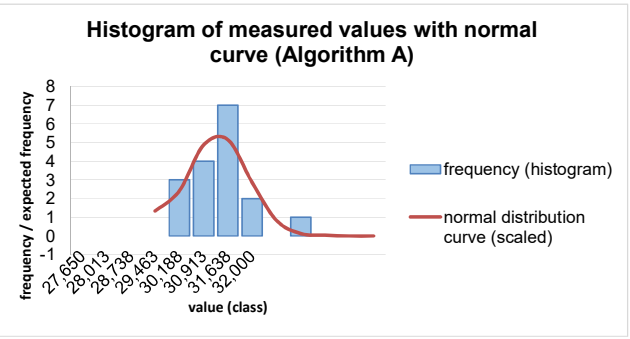
5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

Number of classes 6 *6 <- Sturges (recommended number of classes)*

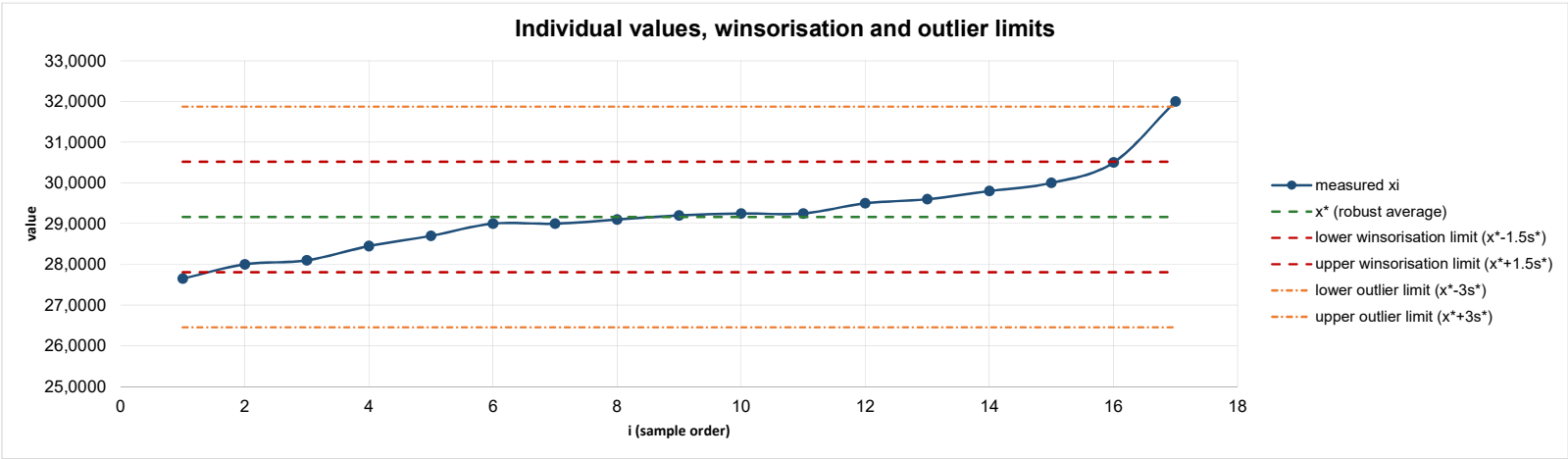
Class width = 0,7250

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
27,650				1,337
28,013	27,650	28,375	3	2,417
28,738	28,375	29,100	4	4,872
29,463	29,100	29,825	7	5,154
30,188	29,825	30,550	2	2,862
30,913	30,550	31,275	0	0,834
31,638	31,275	32,000	1	0,128
32,000				0,039



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



Volume soundness Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	0,5000	x*	0,6403	0,6700	0,6771	0,6792	0,6798	0,6800	0,6801	0,6801	0,6801	0,6801	0,6801	...	0,6801	0,6801	0,6801	0,6801	0,6801	0,6801
1,483*Median	0,2966	s*	0,3129	0,3550	0,3683	0,3725	0,3738	0,3743	0,3744	0,3744	0,3744	0,3745	0,3745	...	0,3745	0,3745	0,3745	0,3745	0,3745	0,3745
1.5 * s*	0,4449	1.5 * s*	0,4693	0,5325	0,5524	0,5587	0,5607	0,5614	0,5616	0,5617	0,5617	0,5617	0,5617	...	0,5617	0,5617	0,5617	0,5617	0,5617	0,5617

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	0,200	0,3000	0,2000	0,2000	0,2000	0,2000	0,2000	0,2000	0,2000	0,2000	0,2000	0,2000	0,2000	...	0,2000	0,2000	0,2000	0,2000	0,2000	0,2000
2	0,300	0,2000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000	...	0,3000	0,3000	0,3000	0,3000	0,3000	0,3000
3	0,400	0,1000	0,4000	0,4000	0,4000	0,4000	0,4000	0,4000	0,4000	0,4000	0,4000	0,4000	0,4000	...	0,4000	0,4000	0,4000	0,4000	0,4000	0,4000
4	0,500	0,0000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	...	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000
5	0,500	0,0000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	...	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000
6	0,500	0,0000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	...	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000
7	0,500	0,0000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000	...	0,5000	0,5000	0,5000	0,5000	0,5000	0,5000
8	0,700	0,2000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000	...	0,7000	0,7000	0,7000	0,7000	0,7000	0,7000
9	1,000	0,5000	0,9449	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	...	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000
10	1,000	0,5000	0,9449	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	...	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000
11	1,000	0,5000	0,9449	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	...	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000
12	1,000	0,5000	0,9449	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000	...	1,0000	1,0000	1,0000	1,0000	1,0000	1,0000
13	1,500	1,0000	0,9449	1,1097	1,2025	1,2295	1,2379	1,2406	1,2414	1,2417	1,2418	1,2418	1,2418	...	1,2418	1,2418	1,2418	1,2418	1,2418	1,2418
14														...						
15														...						
16														...						
17														...						

p (number of values) = 13

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	0,1939	0,2209	0,2276	0,2296	0,2302	0,2304	0,2305	0,2305	0,2305	0,2305	0,2305	...	0,2305	0,2305	0,2305	0,2305	0,2305	0,2305
2	0,1158	0,1369	0,1422	0,1438	0,1443	0,1444	0,1445	0,1445	0,1445	0,1445	0,1445	...	0,1445	0,1445	0,1445	0,1445	0,1445	0,1445
3	0,0578	0,0729	0,0768	0,0780	0,0783	0,0784	0,0785	0,0785	0,0785	0,0785	0,0785	...	0,0785	0,0785	0,0785	0,0785	0,0785	0,0785
4	0,0197	0,0289	0,0314	0,0321	0,0323	0,0324	0,0324	0,0324	0,0324	0,0325	0,0325	...	0,0325	0,0325	0,0325	0,0325	0,0325	0,0325
5	0,0197	0,0289	0,0314	0,0321	0,0323	0,0324	0,0324	0,0324	0,0324	0,0325	0,0325	...	0,0325	0,0325	0,0325	0,0325	0,0325	0,0325
6	0,0197	0,0289	0,0314	0,0321	0,0323	0,0324	0,0324	0,0324	0,0324	0,0325	0,0325	...	0,0325	0,0325	0,0325	0,0325	0,0325	0,0325
7	0,0197	0,0289	0,0314	0,0321	0,0323	0,0324	0,0324	0,0324	0,0324	0,0325	0,0325	...	0,0325	0,0325	0,0325	0,0325	0,0325	0,0325
8	0,0036	0,0009	0,0005	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004	...	0,0004	0,0004	0,0004	0,0004	0,0004	0,0004
9	0,0928	0,1089	0,1043	0,1029	0,1025	0,1024	0,1023	0,1023	0,1023	0,1023	0,1023	...	0,1023	0,1023	0,1023	0,1023	0,1023	0,1023
10	0,0928	0,1089	0,1043	0,1029	0,1025	0,1024	0,1023	0,1023	0,1023	0,1023	0,1023	...	0,1023	0,1023	0,1023	0,1023	0,1023	0,1023
11	0,0928	0,1089	0,1043	0,1029	0,1025	0,1024	0,1023	0,1023	0,1023	0,1023	0,1023	...	0,1023	0,1023	0,1023	0,1023	0,1023	0,1023
12	0,0928	0,1089	0,1043	0,1029	0,1025	0,1024	0,1023	0,1023	0,1023	0,1023	0,1023	...	0,1023	0,1023	0,1023	0,1023	0,1023	0,1023
13	0,0928	0,1934	0,2760	0,3029	0,3115	0,3142	0,3151	0,3154	0,3154	0,3155	0,3155	...	0,3155	0,3155	0,3155	0,3155	0,3155	0,3155
14												...						
15												...						
16												...						
17												...						

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

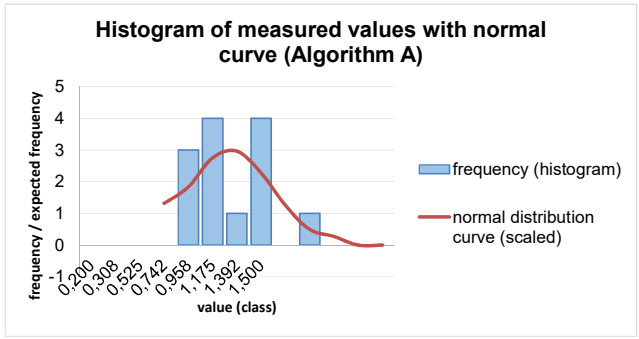
Median of all values =	0,5000
1,483 * MAD (MADe) =	0,2966
Robust average x* =	**0,68014**
Robust standard deviation s* =	**0,3745**
Standard uncertainty u(xpt) =	**0,1298**
Lower winsorisation limit x*-1.5s* =	0,1185
Upper winsorisation limit x*+1.5s* =	1,2418
Lower outlier limit x*-3s* =	-0,4432
Upper outlier limit x*+3s* =	1,8035
Arithmetic mean of all values x̄ =	**0,7000**
Standard deviation of all values s =	**0,3719**
Convergence check (3 significant figures) =	**converged**

5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

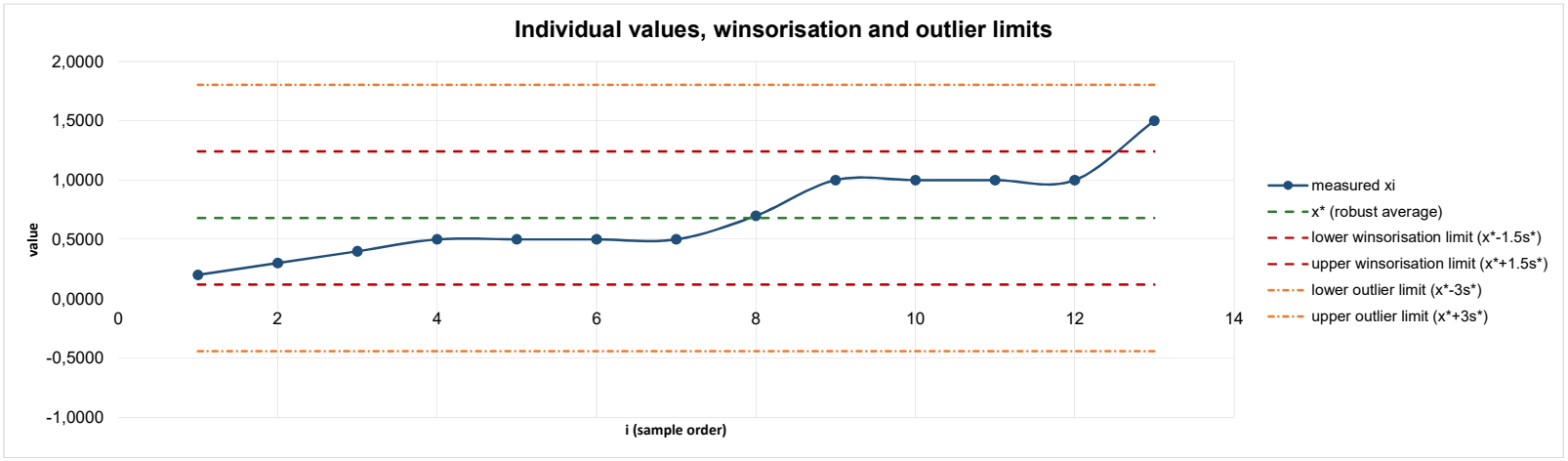
Number of classes 6 *5 <- Sturges (recommended number of classes)*
Class width = 0,2167

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
0,200				1,319
0,308	0,200	0,417	3	1,833
0,525	0,417	0,633	4	2,754
0,742	0,633	0,850	1	2,961
0,958	0,850	1,067	4	2,277
1,175	1,067	1,283	0	1,253
1,392	1,283	1,500	1	0,493
1,500				0,273



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



2D Flexural strength

Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	3,9700	x*	3,9872	3,9963	4,0027	4,0080	4,0111	4,0132	4,0149	4,0162	4,0173	4,0182	4,0192	...	4,0235	4,0235	4,0235	4,0235	4,0235	4,0235
1,483*Median	0,1261	s*	0,1466	0,1672	0,1873	0,2065	0,2219	0,2346	0,2450	0,2538	0,2611	0,2673	0,2723	...	0,2861	0,2861	0,2861	0,2861	0,2861	0,2861
1.5 * s*	0,1891	1.5 * s*	0,2198	0,2508	0,2809	0,3097	0,3329	0,3519	0,3676	0,3806	0,3917	0,4009	0,4084	...	0,4292	0,4292	0,4292	0,4292	0,4292	0,4292

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	3,400	0,5700	3,7809	3,7673	3,7455	3,7218	3,6983	3,6782	3,6614	3,6473	3,6356	3,6257	3,6173	...	3,5943	3,5943	3,5943	3,5943	3,5943	3,5943
2	3,620	0,3500	3,7809	3,7673	3,7455	3,7218	3,6983	3,6782	3,6614	3,6473	3,6356	3,6257	3,6200	...	3,6200	3,6200	3,6200	3,6200	3,6200	3,6200
3	3,780	0,1900	3,7809	3,7800	3,7800	3,7800	3,7800	3,7800	3,7800	3,7800	3,7800	3,7800	3,7800	...	3,7800	3,7800	3,7800	3,7800	3,7800	3,7800
4	3,900	0,0700	3,9000	3,9000	3,9000	3,9000	3,9000	3,9000	3,9000	3,9000	3,9000	3,9000	3,9000	...	3,9000	3,9000	3,9000	3,9000	3,9000	3,9000
5	3,930	0,0400	3,9300	3,9300	3,9300	3,9300	3,9300	3,9300	3,9300	3,9300	3,9300	3,9300	3,9300	...	3,9300	3,9300	3,9300	3,9300	3,9300	3,9300
6	3,940	0,0300	3,9400	3,9400	3,9400	3,9400	3,9400	3,9400	3,9400	3,9400	3,9400	3,9400	3,9400	...	3,9400	3,9400	3,9400	3,9400	3,9400	3,9400
7	3,950	0,0200	3,9500	3,9500	3,9500	3,9500	3,9500	3,9500	3,9500	3,9500	3,9500	3,9500	3,9500	...	3,9500	3,9500	3,9500	3,9500	3,9500	3,9500
8	3,950	0,0200	3,9500	3,9500	3,9500	3,9500	3,9500	3,9500	3,9500	3,9500	3,9500	3,9500	3,9500	...	3,9500	3,9500	3,9500	3,9500	3,9500	3,9500
9	3,960	0,0100	3,9600	3,9600	3,9600	3,9600	3,9600	3,9600	3,9600	3,9600	3,9600	3,9600	3,9600	...	3,9600	3,9600	3,9600	3,9600	3,9600	3,9600
10	3,980	0,0100	3,9800	3,9800	3,9800	3,9800	3,9800	3,9800	3,9800	3,9800	3,9800	3,9800	3,9800	...	3,9800	3,9800	3,9800	3,9800	3,9800	3,9800
11	3,980	0,0100	3,9800	3,9800	3,9800	3,9800	3,9800	3,9800	3,9800	3,9800	3,9800	3,9800	3,9800	...	3,9800	3,9800	3,9800	3,9800	3,9800	3,9800
12	4,030	0,0600	4,0300	4,0300	4,0300	4,0300	4,0300	4,0300	4,0300	4,0300	4,0300	4,0300	4,0300	...	4,0300	4,0300	4,0300	4,0300	4,0300	4,0300
13	4,070	0,1000	4,0700	4,0700	4,0700	4,0700	4,0700	4,0700	4,0700	4,0700	4,0700	4,0700	4,0700	...	4,0700	4,0700	4,0700	4,0700	4,0700	4,0700
14	4,100	0,1300	4,1000	4,1000	4,1000	4,1000	4,1000	4,1000	4,1000	4,1000	4,1000	4,1000	4,1000	...	4,1000	4,1000	4,1000	4,1000	4,1000	4,1000
15	4,280	0,3100	4,1591	4,2070	4,2470	4,2800	4,2800	4,2800	4,2800	4,2800	4,2800	4,2800	4,2800	...	4,2800	4,2800	4,2800	4,2800	4,2800	4,2800
16	4,570	0,6000	4,1591	4,2070	4,2470	4,2837	4,3177	4,3440	4,3651	4,3825	4,3969	4,4090	4,4192	...	4,4526	4,4526	4,4526	4,4526	4,4526	4,4526
17	4,580	0,6100	4,1591	4,2070	4,2470	4,2837	4,3177	4,3440	4,3651	4,3825	4,3969	4,4090	4,4192	...	4,4526	4,4526	4,4526	4,4526	4,4526	4,4526
18	4,670	0,7000	4,1591	4,2070	4,2470	4,2837	4,3177	4,3440	4,3651	4,3825	4,3969	4,4090	4,4192	...	4,4526	4,4526	4,4526	4,4526	4,4526	4,4526

p (number of values) = 18

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	0,0425	0,0524	0,0662	0,0819	0,0978	0,1122	0,1250	0,1361	0,1457	0,1541	0,1615	...	0,1842	0,1842	0,1842	0,1842	0,1842	0,1842
2	0,0425	0,0524	0,0662	0,0819	0,0978	0,1122	0,1250	0,1361	0,1457	0,1541	0,1593	...	0,1628	0,1628	0,1628	0,1628	0,1628	0,1628
3	0,0425	0,0468	0,0496	0,0520	0,0534	0,0544	0,0552	0,0558	0,0563	0,0568	0,0572	...	0,0593	0,0593	0,0593	0,0593	0,0593	0,0593
4	0,0076	0,0093	0,0106	0,0117	0,0123	0,0128	0,0132	0,0135	0,0138	0,0140	0,0142	...	0,0152	0,0152	0,0152	0,0152	0,0152	0,0152
5	0,0033	0,0044	0,0053	0,0061	0,0066	0,0069	0,0072	0,0074	0,0076	0,0078	0,0079	...	0,0087	0,0087	0,0087	0,0087	0,0087	0,0087
6	0,0022	0,0032	0,0039	0,0046	0,0051	0,0054	0,0056	0,0058	0,0060	0,0061	0,0063	...	0,0070	0,0070	0,0070	0,0070	0,0070	0,0070
7	0,0014	0,0021	0,0028	0,0034	0,0037	0,0040	0,0042	0,0044	0,0045	0,0047	0,0048	...	0,0054	0,0054	0,0054	0,0054	0,0054	0,0054
8	0,0014	0,0021	0,0028	0,0034	0,0037	0,0040	0,0042	0,0044	0,0045	0,0047	0,0048	...	0,0054	0,0054	0,0054	0,0054	0,0054	0,0054
9	0,0007	0,0013	0,0018	0,0023	0,0026	0,0028	0,0030	0,0032	0,0033	0,0034	0,0035	...	0,0040	0,0040	0,0040	0,0040	0,0040	0,0040
10	0,0001	0,0003	0,0005	0,0008	0,0010	0,0011	0,0012	0,0013	0,0014	0,0015	0,0015	...	0,0019	0,0019	0,0019	0,0019	0,0019	0,0019
11	0,0001	0,0003	0,0005	0,0008	0,0010	0,0011	0,0012	0,0013	0,0014	0,0015	0,0015	...	0,0019	0,0019	0,0019	0,0019	0,0019	0,0019
12	0,0018	0,0011	0,0007	0,0005	0,0004	0,0003	0,0002	0,0002	0,0002	0,0001	0,0001	...	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
13	0,0069	0,0054	0,0045	0,0038	0,0035	0,0032	0,0030	0,0029	0,0028	0,0027	0,0026	...	0,0022	0,0022	0,0022	0,0022	0,0022	0,0022
14	0,0127	0,0108	0,0095	0,0085	0,0079	0,0075	0,0072	0,0070	0,0068	0,0067	0,0065	...	0,0059	0,0059	0,0059	0,0059	0,0059	0,0059
15	0,0296	0,0444	0,0597	0,0740	0,0723	0,0712	0,0703	0,0696	0,0690	0,0685	0,0680	...	0,0658	0,0658	0,0658	0,0658	0,0658	0,0658
16	0,0296	0,0444	0,0597	0,0760	0,0940	0,1094	0,1227	0,1341	0,1441	0,1527	0,1600	...	0,1842	0,1842	0,1842	0,1842	0,1842	0,1842
17	0,0296	0,0444	0,0597	0,0760	0,0940	0,1094	0,1227	0,1341	0,1441	0,1527	0,1600	...	0,1842	0,1842	0,1842	0,1842	0,1842	0,1842
18	0,02955	0,04442	0,05969	0,07597	0,09401	0,10940	0,12265	0,13412	0,14406	0,15267	0,16002	...	0,18421	0,18421	0,18421	0,18421	0,18421	0,18421

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

Median of all values =	3,9700
1,483 * MAD (MADe) =	0,1261
Robust average x* =	**4,02346**
Robust standard deviation s* =	**0,2861**
Standard uncertainty u(xpt) =	**0,0843**
Lower winsorisation limit x*-1.5s* =	3,5943
Upper winsorisation limit x*+1.5s* =	4,4526
Lower outlier limit x*-3s* =	3,1651
Upper outlier limit x*+3s* =	4,8818
Arithmetic mean of all values x̄ =	**4,0383**
Standard deviation of all values s =	**0,3215**
Convergence check (3 significant figures) =	**converged**

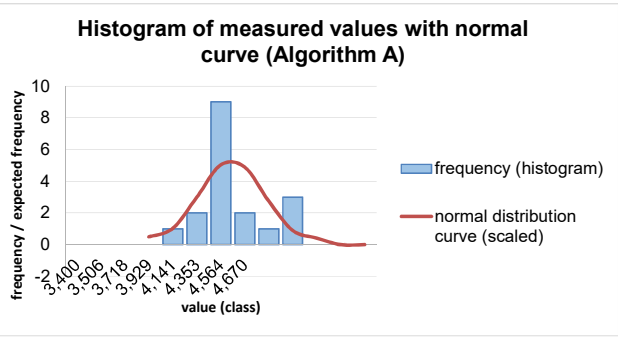
5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

Number of classes 6 *6 <- Sturges (recommended number of classes)*

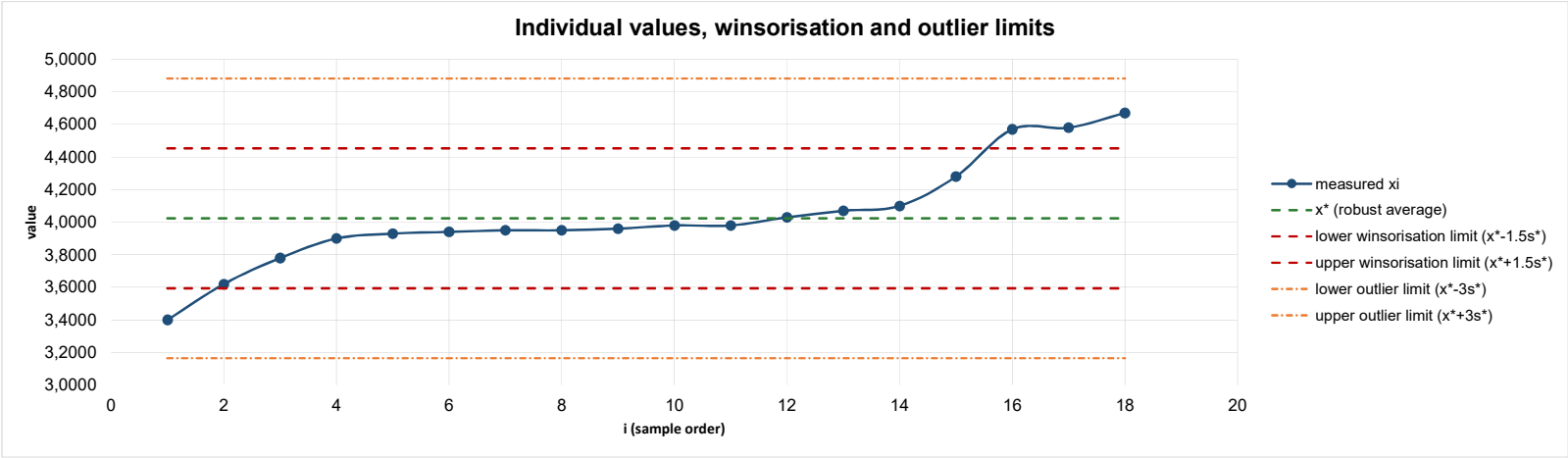
Class width = 0,2117

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
3,400				0,495
3,506	3,400	3,612	1	1,034
3,718	3,612	3,823	2	2,999
3,929	3,823	4,035	9	5,031
4,141	4,035	4,247	2	4,884
4,353	4,247	4,458	1	2,742
4,564	4,458	4,670	3	0,891
4,670				0,414



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



28D Flexural strength

Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	8,5600	x*	8,6554	8,6803	8,6839	8,6843	8,6844	8,6844	8,6844	8,6844	8,6844	8,6844	8,6844	...	8,6844	8,6844	8,6844	8,6844	8,6844	8,6844
1,483*Median	0,6154	s*	0,6532	0,6898	0,7032	0,7078	0,7093	0,7098	0,7100	0,7100	0,7101	0,7101	0,7101	...	0,7101	0,7101	0,7101	0,7101	0,7101	0,7101
1.5 * s*	0,9232	1.5 * s*	0,9798	1,0346	1,0548	1,0616	1,0639	1,0647	1,0650	1,0651	1,0651	1,0651	1,0651	...	1,0651	1,0651	1,0651	1,0651	1,0651	1,0651

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	5,530	3,0300	7,6368	7,6756	7,6457	7,6291	7,6227	7,6204	7,6197	7,6194	7,6193	7,6193	7,6193	...	7,6193	7,6193	7,6193	7,6193	7,6193	7,6193
2	7,750	0,8100	7,7500	7,7500	7,7500	7,7500	7,7500	7,7500	7,7500	7,7500	7,7500	7,7500	7,7500	...	7,7500	7,7500	7,7500	7,7500	7,7500	7,7500
3	8,130	0,4300	8,1300	8,1300	8,1300	8,1300	8,1300	8,1300	8,1300	8,1300	8,1300	8,1300	8,1300	...	8,1300	8,1300	8,1300	8,1300	8,1300	8,1300
4	8,160	0,4000	8,1600	8,1600	8,1600	8,1600	8,1600	8,1600	8,1600	8,1600	8,1600	8,1600	8,1600	...	8,1600	8,1600	8,1600	8,1600	8,1600	8,1600
5	8,220	0,3400	8,2200	8,2200	8,2200	8,2200	8,2200	8,2200	8,2200	8,2200	8,2200	8,2200	8,2200	...	8,2200	8,2200	8,2200	8,2200	8,2200	8,2200
6	8,370	0,1900	8,3700	8,3700	8,3700	8,3700	8,3700	8,3700	8,3700	8,3700	8,3700	8,3700	8,3700	...	8,3700	8,3700	8,3700	8,3700	8,3700	8,3700
7	8,400	0,1600	8,4000	8,4000	8,4000	8,4000	8,4000	8,4000	8,4000	8,4000	8,4000	8,4000	8,4000	...	8,4000	8,4000	8,4000	8,4000	8,4000	8,4000
8	8,500	0,0600	8,5000	8,5000	8,5000	8,5000	8,5000	8,5000	8,5000	8,5000	8,5000	8,5000	8,5000	...	8,5000	8,5000	8,5000	8,5000	8,5000	8,5000
9	8,540	0,0200	8,5400	8,5400	8,5400	8,5400	8,5400	8,5400	8,5400	8,5400	8,5400	8,5400	8,5400	...	8,5400	8,5400	8,5400	8,5400	8,5400	8,5400
10	8,580	0,0200	8,5800	8,5800	8,5800	8,5800	8,5800	8,5800	8,5800	8,5800	8,5800	8,5800	8,5800	...	8,5800	8,5800	8,5800	8,5800	8,5800	8,5800
11	8,750	0,1900	8,7500	8,7500	8,7500	8,7500	8,7500	8,7500	8,7500	8,7500	8,7500	8,7500	8,7500	...	8,7500	8,7500	8,7500	8,7500	8,7500	8,7500
12	8,830	0,2700	8,8300	8,8300	8,8300	8,8300	8,8300	8,8300	8,8300	8,8300	8,8300	8,8300	8,8300	...	8,8300	8,8300	8,8300	8,8300	8,8300	8,8300
13	9,070	0,5100	9,0700	9,0700	9,0700	9,0700	9,0700	9,0700	9,0700	9,0700	9,0700	9,0700	9,0700	...	9,0700	9,0700	9,0700	9,0700	9,0700	9,0700
14	9,130	0,5700	9,1300	9,1300	9,1300	9,1300	9,1300	9,1300	9,1300	9,1300	9,1300	9,1300	9,1300	...	9,1300	9,1300	9,1300	9,1300	9,1300	9,1300
15	9,280	0,7200	9,2800	9,2800	9,2800	9,2800	9,2800	9,2800	9,2800	9,2800	9,2800	9,2800	9,2800	...	9,2800	9,2800	9,2800	9,2800	9,2800	9,2800
16	9,590	1,0300	9,4832	9,5900	9,5900	9,5900	9,5900	9,5900	9,5900	9,5900	9,5900	9,5900	9,5900	...	9,5900	9,5900	9,5900	9,5900	9,5900	9,5900
17	9,650	1,0900	9,4832	9,6351	9,6500	9,6500	9,6500	9,6500	9,6500	9,6500	9,6500	9,6500	9,6500	...	9,6500	9,6500	9,6500	9,6500	9,6500	9,6500
18	9,930	1,3700	9,4832	9,6351	9,7150	9,7388	9,7460	9,7483	9,7491	9,7494	9,7494	9,7495	9,7495	...	9,7495	9,7495	9,7495	9,7495	9,7495	9,7495

p (number of values) = 18

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	1,0374	1,0096	1,0779	1,1135	1,1272	1,1320	1,1336	1,1342	1,1344	1,1344	1,1345	...	1,1345	1,1345	1,1345	1,1345	1,1345	1,1345
2	0,8197	0,8655	0,8722	0,8730	0,8730	0,8731	0,8731	0,8731	0,8731	0,8731	0,8731	...	0,8731	0,8731	0,8731	0,8731	0,8731	0,8731
3	0,2760	0,3029	0,3068	0,3073	0,3073	0,3073	0,3073	0,3073	0,3073	0,3073	0,3073	...	0,3073	0,3073	0,3073	0,3073	0,3073	0,3073
4	0,2454	0,2707	0,2745	0,2749	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750	...	0,2750	0,2750	0,2750	0,2750	0,2750	0,2750
5	0,1895	0,2119	0,2152	0,2156	0,2156	0,2156	0,2156	0,2156	0,2156	0,2156	0,2156	...	0,2156	0,2156	0,2156	0,2156	0,2156	0,2156
6	0,0814	0,0963	0,0985	0,0988	0,0988	0,0988	0,0988	0,0988	0,0988	0,0988	0,0988	...	0,0988	0,0988	0,0988	0,0988	0,0988	0,0988
7	0,0652	0,0786	0,0806	0,0808	0,0809	0,0809	0,0809	0,0809	0,0809	0,0809	0,0809	...	0,0809	0,0809	0,0809	0,0809	0,0809	0,0809
8	0,0241	0,0325	0,0338	0,0340	0,0340	0,0340	0,0340	0,0340	0,0340	0,0340	0,0340	...	0,0340	0,0340	0,0340	0,0340	0,0340	0,0340
9	0,0133	0,0197	0,0207	0,0208	0,0208	0,0208	0,0208	0,0208	0,0208	0,0208	0,0208	...	0,0208	0,0208	0,0208	0,0208	0,0208	0,0208
10	0,0057	0,0101	0,0108	0,0109	0,0109	0,0109	0,0109	0,0109	0,0109	0,0109	0,0109	...	0,0109	0,0109	0,0109	0,0109	0,0109	0,0109
11	0,0090	0,0049	0,0044	0,0043	0,0043	0,0043	0,0043	0,0043	0,0043	0,0043	0,0043	...	0,0043	0,0043	0,0043	0,0043	0,0043	0,0043
12	0,0305	0,0224	0,0213	0,0212	0,0212	0,0212	0,0212	0,0212	0,0212	0,0212	0,0212	...	0,0212	0,0212	0,0212	0,0212	0,0212	0,0212
13	0,1719	0,1518	0,1491	0,1487	0,1487	0,1487	0,1487	0,1487	0,1487	0,1487	0,1487	...	0,1487	0,1487	0,1487	0,1487	0,1487	0,1487
14	0,2253	0,2022	0,1990	0,1986	0,1986	0,1986	0,1986	0,1986	0,1986	0,1986	0,1986	...	0,1986	0,1986	0,1986	0,1986	0,1986	0,1986
15	0,3902	0,3596	0,3553	0,3548	0,3548	0,3548	0,3548	0,3548	0,3548	0,3548	0,3548	...	0,3548	0,3548	0,3548	0,3548	0,3548	0,3548
16	0,6853	0,8275	0,8210	0,8202	0,8202	0,8202	0,8202	0,8202	0,8202	0,8202	0,8202	...	0,8202	0,8202	0,8202	0,8202	0,8202	0,8202
17	0,6853	0,9117	0,9333	0,9325	0,9324	0,9324	0,9324	0,9324	0,9324	0,9324	0,9324	...	0,9324	0,9324	0,9324	0,9324	0,9324	0,9324
18	0,68528	0,91168	1,06304	1,11185	1,12697	1,13194	1,13362	1,13418	1,13438	1,13444	1,13446	...	1,13448	1,13448	1,13448	1,13448	1,13448	1,13448

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

Median of all values =	8,5600
1,483 * MAD (MADe) =	0,6154
Robust average x* =	**8,68438**
Robust standard deviation s* =	**0,7101**
Standard uncertainty u(xpt) =	**0,2092**
Lower winsorisation limit x*-1.5s* =	7,6193
Upper winsorisation limit x*+1.5s* =	9,7495
Lower outlier limit x*-3s* =	6,5541
Upper outlier limit x*+3s* =	10,8146
Arithmetic mean of all values x̄ =	**8,5783**
Standard deviation of all values s =	**0,9609**
Convergence check (3 significant figures) =	**converged**

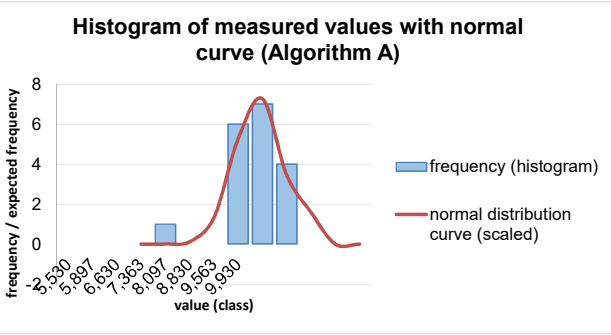
5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

Number of classes 6 *6 <- Sturges (recommended number of classes)*

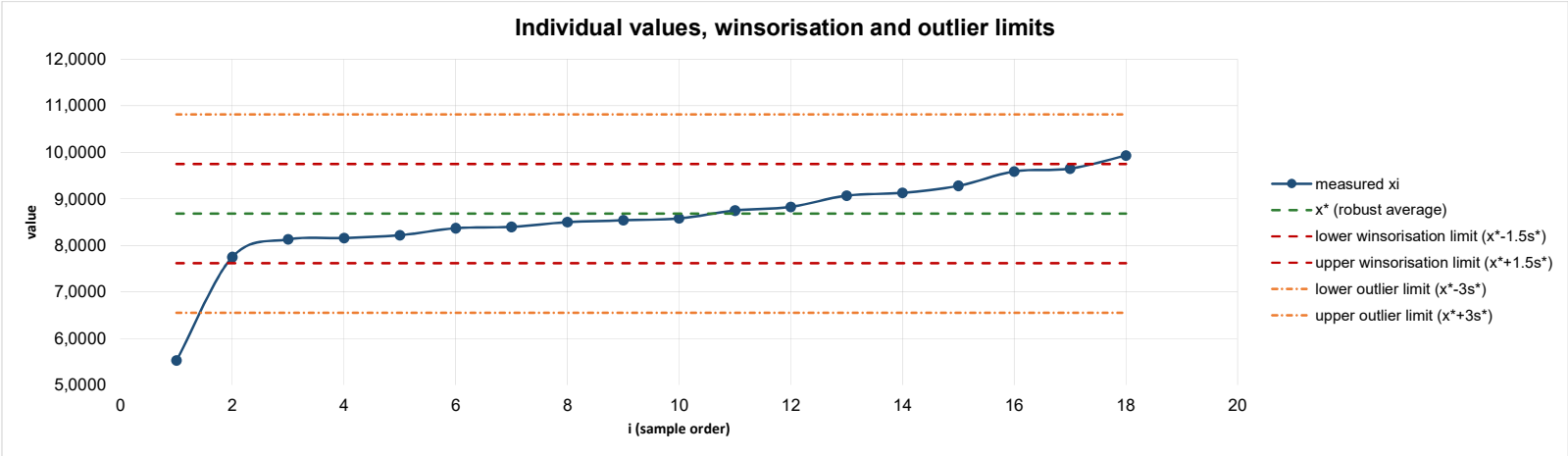
Class width = 0,7333

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
5,530				0,000
5,897	5,530	6,263	1	0,003
6,630	6,263	6,997	0	0,113
7,363	6,997	7,730	0	1,314
8,097	7,730	8,463	6	5,265
8,830	8,463	9,197	7	7,262
9,563	9,197	9,930	4	3,447
9,930				1,592



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



2D Compressive strength **Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)**

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	18,7600	**x***	18,9908	19,0144	19,0134	19,0132	19,0132	19,0132	19,0132	19,0132	19,0132	19,0132	19,0132	...	19,0132	19,0132	19,0132	19,0132	19,0132	19,0132
1,483*Median	1,1493	**s***	1,2610	1,2883	1,2903	1,2907	1,2908	1,2908	1,2908	1,2908	1,2908	1,2908	1,2908	...	1,2908	1,2908	1,2908	1,2908	1,2908	1,2908
1.5 * s*	1,7240	**1.5 * s***	1,8915	1,9325	1,9354	1,9361	1,9362	1,9362	1,9363	1,9363	1,9363	1,9363	1,9363	...	1,9363	1,9363	1,9363	1,9363	1,9363	1,9363

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	16,290	2,4700	17,0360	17,0992	17,0819	17,0780	17,0772	17,0770	17,0769	17,0769	17,0769	17,0769	17,0769	...	17,0769	17,0769	17,0769	17,0769	17,0769	17,0769
2	17,380	1,3800	17,3800	17,3800	17,3800	17,3800	17,3800	17,3800	17,3800	17,3800	17,3800	17,3800	17,3800	...	17,3800	17,3800	17,3800	17,3800	17,3800	17,3800
3	17,380	1,3800	17,3800	17,3800	17,3800	17,3800	17,3800	17,3800	17,3800	17,3800	17,3800	17,3800	17,3800	...	17,3800	17,3800	17,3800	17,3800	17,3800	17,3800
4	18,120	0,6400	18,1200	18,1200	18,1200	18,1200	18,1200	18,1200	18,1200	18,1200	18,1200	18,1200	18,1200	...	18,1200	18,1200	18,1200	18,1200	18,1200	18,1200
5	18,350	0,4100	18,3500	18,3500	18,3500	18,3500	18,3500	18,3500	18,3500	18,3500	18,3500	18,3500	18,3500	...	18,3500	18,3500	18,3500	18,3500	18,3500	18,3500
6	18,490	0,2700	18,4900	18,4900	18,4900	18,4900	18,4900	18,4900	18,4900	18,4900	18,4900	18,4900	18,4900	...	18,4900	18,4900	18,4900	18,4900	18,4900	18,4900
7	18,710	0,0500	18,7100	18,7100	18,7100	18,7100	18,7100	18,7100	18,7100	18,7100	18,7100	18,7100	18,7100	...	18,7100	18,7100	18,7100	18,7100	18,7100	18,7100
8	18,750	0,0100	18,7500	18,7500	18,7500	18,7500	18,7500	18,7500	18,7500	18,7500	18,7500	18,7500	18,7500	...	18,7500	18,7500	18,7500	18,7500	18,7500	18,7500
9	18,750	0,0100	18,7500	18,7500	18,7500	18,7500	18,7500	18,7500	18,7500	18,7500	18,7500	18,7500	18,7500	...	18,7500	18,7500	18,7500	18,7500	18,7500	18,7500
10	18,770	0,0100	18,7700	18,7700	18,7700	18,7700	18,7700	18,7700	18,7700	18,7700	18,7700	18,7700	18,7700	...	18,7700	18,7700	18,7700	18,7700	18,7700	18,7700
11	19,220	0,4600	19,2200	19,2200	19,2200	19,2200	19,2200	19,2200	19,2200	19,2200	19,2200	19,2200	19,2200	...	19,2200	19,2200	19,2200	19,2200	19,2200	19,2200
12	19,290	0,5300	19,2900	19,2900	19,2900	19,2900	19,2900	19,2900	19,2900	19,2900	19,2900	19,2900	19,2900	...	19,2900	19,2900	19,2900	19,2900	19,2900	19,2900
13	19,670	0,9100	19,6700	19,6700	19,6700	19,6700	19,6700	19,6700	19,6700	19,6700	19,6700	19,6700	19,6700	...	19,6700	19,6700	19,6700	19,6700	19,6700	19,6700
14	20,230	1,4700	20,2300	20,2300	20,2300	20,2300	20,2300	20,2300	20,2300	20,2300	20,2300	20,2300	20,2300	...	20,2300	20,2300	20,2300	20,2300	20,2300	20,2300
15	20,350	1,5900	20,3500	20,3500	20,3500	20,3500	20,3500	20,3500	20,3500	20,3500	20,3500	20,3500	20,3500	...	20,3500	20,3500	20,3500	20,3500	20,3500	20,3500
16	20,370	1,6100	20,3700	20,3700	20,3700	20,3700	20,3700	20,3700	20,3700	20,3700	20,3700	20,3700	20,3700	...	20,3700	20,3700	20,3700	20,3700	20,3700	20,3700
17	20,550	1,7900	20,4840	20,5500	20,5500	20,5500	20,5500	20,5500	20,5500	20,5500	20,5500	20,5500	20,5500	...	20,5500	20,5500	20,5500	20,5500	20,5500	20,5500
18	20,780	2,0200	20,4840	20,7800	20,7800	20,7800	20,7800	20,7800	20,7800	20,7800	20,7800	20,7800	20,7800	...	20,7800	20,7800	20,7800	20,7800	20,7800	20,7800

p (number of values) = 18

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	3,8211	3,6678	3,7307	3,7449	3,7482	3,7489	3,7490	3,7491	3,7491	3,7491	3,7491	...	3,7491	3,7491	3,7491	3,7491	3,7491	3,7491
2	2,5946	2,6713	2,6681	2,6674	2,6673	2,6672	2,6672	2,6672	2,6672	2,6672	2,6672	...	2,6672	2,6672	2,6672	2,6672	2,6672	2,6672
3	2,5946	2,6713	2,6681	2,6674	2,6673	2,6672	2,6672	2,6672	2,6672	2,6672	2,6672	...	2,6672	2,6672	2,6672	2,6672	2,6672	2,6672
4	0,7583	0,8000	0,7982	0,7978	0,7978	0,7977	0,7977	0,7977	0,7977	0,7977	0,7977	...	0,7977	0,7977	0,7977	0,7977	0,7977	0,7977
5	0,4106	0,4414	0,4402	0,4399	0,4398	0,4398	0,4398	0,4398	0,4398	0,4398	0,4398	...	0,4398	0,4398	0,4398	0,4398	0,4398	0,4398
6	0,2508	0,2750	0,2740	0,2738	0,2737	0,2737	0,2737	0,2737	0,2737	0,2737	0,2737	...	0,2737	0,2737	0,2737	0,2737	0,2737	0,2737
7	0,0788	0,0927	0,0921	0,0919	0,0919	0,0919	0,0919	0,0919	0,0919	0,0919	0,0919	...	0,0919	0,0919	0,0919	0,0919	0,0919	0,0919
8	0,0580	0,0699	0,0694	0,0693	0,0693	0,0693	0,0693	0,0693	0,0693	0,0693	0,0693	...	0,0693	0,0693	0,0693	0,0693	0,0693	0,0693
9	0,0580	0,0699	0,0694	0,0693	0,0693	0,0693	0,0693	0,0693	0,0693	0,0693	0,0693	...	0,0693	0,0693	0,0693	0,0693	0,0693	0,0693
10	0,0487	0,0597	0,0593	0,0592	0,0591	0,0591	0,0591	0,0591	0,0591	0,0591	0,0591	...	0,0591	0,0591	0,0591	0,0591	0,0591	0,0591
11	0,0525	0,0423	0,0427	0,0428	0,0428	0,0428	0,0428	0,0428	0,0428	0,0428	0,0428	...	0,0428	0,0428	0,0428	0,0428	0,0428	0,0428
12	0,0895	0,0760	0,0765	0,0766	0,0766	0,0766	0,0766	0,0766	0,0766	0,0766	0,0766	...	0,0766	0,0766	0,0766	0,0766	0,0766	0,0766
13	0,4613	0,4298	0,4311	0,4314	0,4314	0,4314	0,4314	0,4314	0,4314	0,4314	0,4314	...	0,4314	0,4314	0,4314	0,4314	0,4314	0,4314
14	1,5357	1,4777	1,4800	1,4805	1,4807	1,4807	1,4807	1,4807	1,4807	1,4807	1,4807	...	1,4807	1,4807	1,4807	1,4807	1,4807	1,4807
15	1,8475	1,7838	1,7864	1,7870	1,7871	1,7871	1,7871	1,7871	1,7871	1,7871	1,7871	...	1,7871	1,7871	1,7871	1,7871	1,7871	1,7871
16	1,9023	1,8376	1,8403	1,8408	1,8410	1,8410	1,8410	1,8410	1,8410	1,8410	1,8410	...	1,8410	1,8410	1,8410	1,8410	1,8410	1,8410
17	2,2297	2,3581	2,3610	2,3617	2,3618	2,3619	2,3619	2,3619	2,3619	2,3619	2,3619	...	2,3619	2,3619	2,3619	2,3619	2,3619	2,3619
18	2,22968	3,11733	3,12073	3,12150	3,12167	3,12171	3,12172	3,12172	3,12172	3,12172	3,12172	...	3,12172	3,12172	3,12172	3,12172	3,12172	3,12172

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only.
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

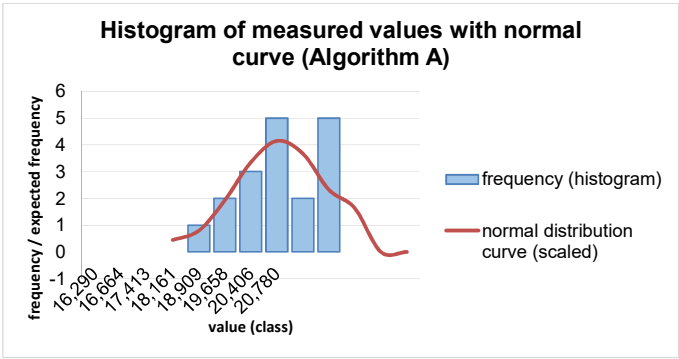
Median of all values =	18,7600
1,483 * MAD (MADe) =	1,1493
Robust average x* =	**19,0132**
Robust standard deviation s* =	**1,2908**
Standard uncertainty u(xpt) =	**0,3803**
Lower winsorisation limit x*-1.5s* =	17,0769
Upper winsorisation limit x*+1.5s* =	20,9494
Lower outlier limit x*-3s* =	15,1406
Upper outlier limit x*+3s* =	22,8857
Arithmetic mean of all values x̄ =	**18,9694**
Standard deviation of all values s =	**1,2286**
Convergence check (3 significant figures) =	**converged**

5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

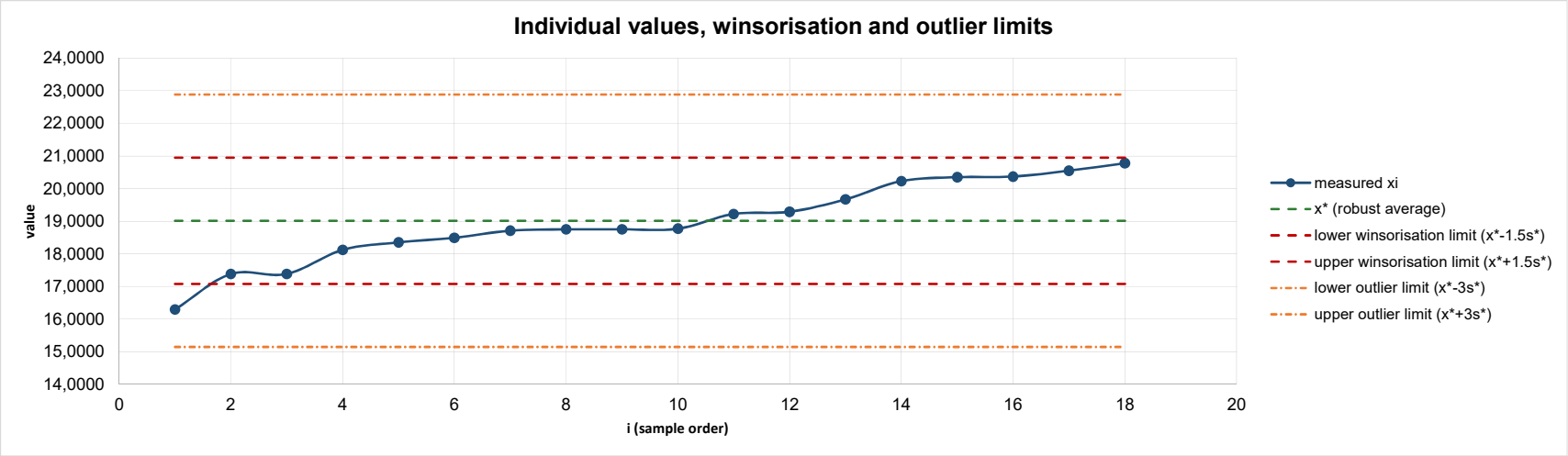
Number of classes 6 *6 <- Sturges (recommended number of classes)*
Class width = 0,7483

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
16,290				0,450
16,664	16,290	17,038	1	0,795
17,413	17,038	17,787	2	1,930
18,161	17,787	18,535	3	3,348
18,909	18,535	19,283	5	4,150
19,658	19,283	20,032	2	3,675
20,406	20,032	20,780	5	2,326
20,780				1,631



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*



28D Compressive strength

Algorithm A - robust average and robust standard deviation (ISO 13528, Annex C.3)

Robust method per ISO 13528 (clause 6.5.1) - does not require rejection of results; extreme values are only trimmed (winsorised). Input values (column 'xi') are linked live to 'SO3 - content'!vyber_1.

1) Input data and iterative calculation of the robust average x* (ISO 13528, C.2-C.7)

Column 'xi' = live link to the source data. Initial estimate (iter. 0): x=median(xi); s*=1.483*median(|xi-x*|). In the following iterations xi are trimmed (winsorised) to the limit x*+/-1.5s* and a new average/standard deviation is recalculated. The table covers the first 20 samples (margin above the current 16) - if you add more values, extend the table downwards by copying the formulas. Columns M-T (squared deviations) are auxiliary and collapsed by default.*

Iteration:	0		1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
Median	52,6250	**x***	52,3988	52,3621	52,3547	52,3544	52,3544	52,3544	52,3544	52,3544	52,3544	52,3544	52,3544	...	52,3544	52,3544	52,3544	52,3544	52,3544	52,3544
1,483*Median	1,8538	**s***	1,9310	1,9987	2,0145	2,0149	2,0149	2,0149	2,0149	2,0149	2,0149	2,0149	2,0149	...	2,0149	2,0149	2,0149	2,0149	2,0149	2,0149
1.5 * s*	2,7806	**1.5 * s***	2,8965	2,9981	3,0217	3,0224	3,0224	3,0224	3,0224	3,0224	3,0224	3,0224	3,0224	...	3,0224	3,0224	3,0224	3,0224	3,0224	3,0224

i	xi	|xi-x*0|	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	d xi	...	ed xi	ed xi	ed xi	ed xi	ed xi	ed xi
1	49,360	3,2650	49,8444	49,5023	49,3640	49,3600	49,3600	49,3600	49,3600	49,3600	49,3600	49,3600	49,3600	...	49,3600	49,3600	49,3600	49,3600	49,3600	49,3600
2	49,530	3,0950	49,8444	49,5300	49,5300	49,5300	49,5300	49,5300	49,5300	49,5300	49,5300	49,5300	49,5300	...	49,5300	49,5300	49,5300	49,5300	49,5300	49,5300
3	50,430	2,1950	50,4300	50,4300	50,4300	50,4300	50,4300	50,4300	50,4300	50,4300	50,4300	50,4300	50,4300	...	50,4300	50,4300	50,4300	50,4300	50,4300	50,4300
4	50,460	2,1650	50,4600	50,4600	50,4600	50,4600	50,4600	50,4600	50,4600	50,4600	50,4600	50,4600	50,4600	...	50,4600	50,4600	50,4600	50,4600	50,4600	50,4600
5	50,590	2,0350	50,5900	50,5900	50,5900	50,5900	50,5900	50,5900	50,5900	50,5900	50,5900	50,5900	50,5900	...	50,5900	50,5900	50,5900	50,5900	50,5900	50,5900
6	51,470	1,1550	51,4700	51,4700	51,4700	51,4700	51,4700	51,4700	51,4700	51,4700	51,4700	51,4700	51,4700	...	51,4700	51,4700	51,4700	51,4700	51,4700	51,4700
7	51,580	1,0450	51,5800	51,5800	51,5800	51,5800	51,5800	51,5800	51,5800	51,5800	51,5800	51,5800	51,5800	...	51,5800	51,5800	51,5800	51,5800	51,5800	51,5800
8	52,410	0,2150	52,4100	52,4100	52,4100	52,4100	52,4100	52,4100	52,4100	52,4100	52,4100	52,4100	52,4100	...	52,4100	52,4100	52,4100	52,4100	52,4100	52,4100
9	52,420	0,2050	52,4200	52,4200	52,4200	52,4200	52,4200	52,4200	52,4200	52,4200	52,4200	52,4200	52,4200	...	52,4200	52,4200	52,4200	52,4200	52,4200	52,4200
10	52,830	0,2050	52,8300	52,8300	52,8300	52,8300	52,8300	52,8300	52,8300	52,8300	52,8300	52,8300	52,8300	...	52,8300	52,8300	52,8300	52,8300	52,8300	52,8300
11	52,920	0,2950	52,9200	52,9200	52,9200	52,9200	52,9200	52,9200	52,9200	52,9200	52,9200	52,9200	52,9200	...	52,9200	52,9200	52,9200	52,9200	52,9200	52,9200
12	52,950	0,3250	52,9500	52,9500	52,9500	52,9500	52,9500	52,9500	52,9500	52,9500	52,9500	52,9500	52,9500	...	52,9500	52,9500	52,9500	52,9500	52,9500	52,9500
13	53,390	0,7650	53,3900	53,3900	53,3900	53,3900	53,3900	53,3900	53,3900	53,3900	53,3900	53,3900	53,3900	...	53,3900	53,3900	53,3900	53,3900	53,3900	53,3900
14	53,690	1,0650	53,6900	53,6900	53,6900	53,6900	53,6900	53,6900	53,6900	53,6900	53,6900	53,6900	53,6900	...	53,6900	53,6900	53,6900	53,6900	53,6900	53,6900
15	53,970	1,3450	53,9700	53,9700	53,9700	53,9700	53,9700	53,9700	53,9700	53,9700	53,9700	53,9700	53,9700	...	53,9700	53,9700	53,9700	53,9700	53,9700	53,9700
16	54,130	1,5050	54,1300	54,1300	54,1300	54,1300	54,1300	54,1300	54,1300	54,1300	54,1300	54,1300	54,1300	...	54,1300	54,1300	54,1300	54,1300	54,1300	54,1300
17	54,950	2,3250	54,9500	54,9500	54,9500	54,9500	54,9500	54,9500	54,9500	54,9500	54,9500	54,9500	54,9500	...	54,9500	54,9500	54,9500	54,9500	54,9500	54,9500
18	55,300	2,6750	55,3000	55,2953	55,3000	55,3000	55,3000	55,3000	55,3000	55,3000	55,3000	55,3000	55,3000	...	55,3000	55,3000	55,3000	55,3000	55,3000	55,3000

p (number of values) = 18

z-scores (columns DD,DE - outside print area): Z1 = (xi - arithmetic mean)/classical SD; Z2 = (xi - x)/s* (robust). ISO 13528 evaluation: |z|<=2 satisfactory, 2<|z|<3 questionable, |z|>=3 unsatisfactory.*

2) Calculation of the robust standard deviation s* (ISO 13528, C.2-C.7)

	1	2	3	4	5	6	7	8	9	10	11	...	95	96	97	98	99	100
i	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	...	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2	(xi-x*)^2
1	6,5252	8,1783	8,9440	8,9667	8,9667	8,9667	8,9667	8,9667	8,9667	8,9667	8,9667	...	8,9667	8,9667	8,9667	8,9667	8,9667	8,9667
2	6,5252	8,0207	7,9787	7,9775	7,9775	7,9775	7,9775	7,9775	7,9775	7,9775	7,9775	...	7,9775	7,9775	7,9775	7,9775	7,9775	7,9775
3	3,8763	3,7330	3,7043	3,7035	3,7035	3,7035	3,7035	3,7035	3,7035	3,7035	3,7035	...	3,7035	3,7035	3,7035	3,7035	3,7035	3,7035
4	3,7590	3,6180	3,5898	3,5889	3,5889	3,5889	3,5889	3,5889	3,5889	3,5889	3,5889	...	3,5889	3,5889	3,5889	3,5889	3,5889	3,5889
5	3,2718	3,1403	3,1141	3,1133	3,1133	3,1133	3,1133	3,1133	3,1133	3,1133	3,1133	...	3,1133	3,1133	3,1133	3,1133	3,1133	3,1133
6	0,8627	0,7958	0,7826	0,7822	0,7822	0,7822	0,7822	0,7822	0,7822	0,7822	0,7822	...	0,7822	0,7822	0,7822	0,7822	0,7822	0,7822
7	0,6705	0,6117	0,6001	0,5998	0,5998	0,5998	0,5998	0,5998	0,5998	0,5998	0,5998	...	0,5998	0,5998	0,5998	0,5998	0,5998	0,5998
8	0,0001	0,0023	0,0031	0,0031	0,0031	0,0031	0,0031	0,0031	0,0031	0,0031	0,0031	...	0,0031	0,0031	0,0031	0,0031	0,0031	0,0031
9	0,0004	0,0034	0,0043	0,0043	0,0043	0,0043	0,0043	0,0043	0,0043	0,0043	0,0043	...	0,0043	0,0043	0,0043	0,0043	0,0043	0,0043
10	0,1859	0,2189	0,2259	0,2262	0,2262	0,2262	0,2262	0,2262	0,2262	0,2262	0,2262	...	0,2262	0,2262	0,2262	0,2262	0,2262	0,2262
11	0,2716	0,3113	0,3196	0,3199	0,3199	0,3199	0,3199	0,3199	0,3199	0,3199	0,3199	...	0,3199	0,3199	0,3199	0,3199	0,3199	0,3199
12	0,3038	0,3456	0,3544	0,3547	0,3547	0,3547	0,3547	0,3547	0,3547	0,3547	0,3547	...	0,3547	0,3547	0,3547	0,3547	0,3547	0,3547
13	0,9824	1,0566	1,0719	1,0724	1,0724	1,0724	1,0724	1,0724	1,0724	1,0724	1,0724	...	1,0724	1,0724	1,0724	1,0724	1,0724	1,0724
14	1,6671	1,7633	1,7831	1,7837	1,7837	1,7837	1,7837	1,7837	1,7837	1,7837	1,7837	...	1,7837	1,7837	1,7837	1,7837	1,7837	1,7837
15	2,4686	2,5854	2,6093	2,6100	2,6100	2,6100	2,6100	2,6100	2,6100	2,6100	2,6100	...	2,6100	2,6100	2,6100	2,6100	2,6100	2,6100
16	2,9970	3,1255	3,1518	3,1526	3,1526	3,1526	3,1526	3,1526	3,1526	3,1526	3,1526	...	3,1526	3,1526	3,1526	3,1526	3,1526	3,1526
17	6,5085	6,6973	6,7358	6,7369	6,7369	6,7369	6,7369	6,7369	6,7369	6,7369	6,7369	...	6,7369	6,7369	6,7369	6,7369	6,7369	6,7369
18	8,41685	8,60381	8,67498	8,67630	8,67630	8,67630	8,67630	8,67630	8,67630	8,67630	8,67630	...	8,67630	8,67630	8,67630	8,67630	8,67630	8,67630

3) Notes and references (STN ISO 13528: 2023)

- Formulae C.2-C.7: STN ISO 13528, Annex C (normative), C.3 Robust analysis: Algorithm A. The iteration is repeated until x and s* no longer change in the third significant figure.*
*- Standard uncertainty of the assigned value u(x_pt) = 1,25*s*/SQRT(p): STN ISO 13528, clause 7.7.2.2, formula (7).*
- Clause 6.5.1: robust methods (such as Algorithm A) work without the need to identify and reject specific outliers; the standard prefers them over methods that delete results flagged as outliers.
- Clause 5.4 and Annex D.1: a robust consensus requires approximately p >= 15 participants. For a smaller number the assigned value and sigma_pt should not be derived from the single-round consensus; z-scores are then reported for information only (th
*- Clause 9.2: the assigned value is fit for performance evaluation when u(x_pt) <= 0,3*sigma_pt; with a consensus assigned value this is met only for approximately p >= 18.*

4) Result of Algorithm A (after 100 iterations)

Median of all values =	52,6250
1,483 * MAD (MADe) =	1,8538
Robust average x* =	**52,3544**
Robust standard deviation s* =	**2,0149**
Standard uncertainty u(xpt) =	**0,5937**
Lower winsorisation limit x*-1.5s* =	49,3320
Upper winsorisation limit x*+1.5s* =	55,3769
Lower outlier limit x*-3s* =	46,3096
Upper outlier limit x*+3s* =	58,3993
Arithmetic mean of all values x̄ =	**52,3544**
Standard deviation of all values s =	**1,7768**
Convergence check (3 significant figures) =	**converged**

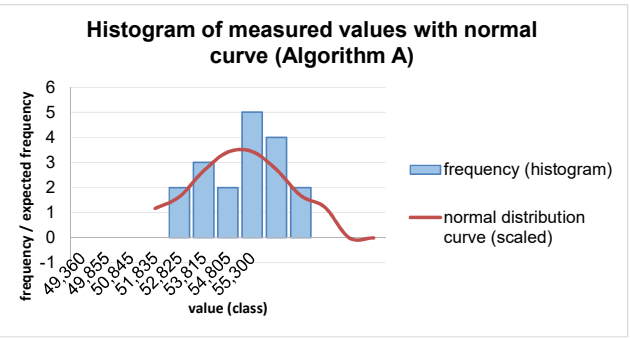
5) Chart 1: Histogram of data

The histogram divides the measured values into classes and shows how many values fall into each band. Column G below contains the expected frequency for

Number of classes 6 *6 <- Sturges (recommended number of classes)*

Class width = 0,9900

class (midpoint)	lower boundary	upper boundary	frequency (histogram)	normal distribution curve (scaled)
49,360				1,169
49,855	49,360	50,350	2	1,635
50,845	50,350	51,340	3	2,665
51,835	51,340	52,330	2	3,413
52,825	52,330	53,320	5	3,433
53,815	53,320	54,310	4	2,713
54,805	54,310	55,300	2	1,684
55,300				1,212



6) Chart 2: Individual values and winsorisation limits

Each point = one measured xi (from the table in section 1, column C). Horizontal lines = x and the limits x*+/-1.5s* (columns U, V, W in the table in section 1) - values outside the band are those that Algorithm A trimmed instead of rejecting. The chart shows exactly the current number of reported values.*