



SLOVENSKI STANDARD

SIST EN 14358:2007

01-julij-2007

Lesene konstrukcije - Računske lastnosti 5-percentilne vrednosti in privzemni kriteriji za vzorce

Timber structures - Calculation of characteristic 5-percentile values and acceptance criteria for a sample

Holzbauwerke - Berechnung der 5%-Quantile für charakteristische Werte und Annahmekriterien für Proben

Structures en bois - Détermination des valeurs correspondant au fractile a 5 % d'exclusion inférieure et criteres d'acceptation pour un échantillon

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ICS:

91.080.20 Lesene konstrukcije Timber structures

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EUROPEAN STANDARD

EN 14358

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Timber structures - Calculation of characteristic 5-percentile values and acceptance criteria for a sample

Structures en bois - Détermination des valeurs correspondant au fractile à 5 % d'exclusion inférieure et critères d'acceptation pour un échantillon

Holzbauwerke - Berechnung der 5%-Quantile für charakteristische Werte und Annahmekriterien für Proben

This European Standard was approved by CEN on 25 October 2006.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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Foreword

This document (EN 14358:2006) has been prepared by Technical Committee CEN/TC 124 "Timber Structures", the secretariat of which is held by SFS.

This document (EN 14358:2006) is based on Annex D of EN 1990:2002, Eurocode – Basis of structural design.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007.

It is anticipated that the standard will replace the corresponding parts of EN 1058: Wood-based panels – Determination of characteristics values of mechanical properties and density.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN/CENELEC shall not be held responsible for identifying any or all such patent rights.

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EN 14358:2006 (E)**1 Scope**

This document specifies a method for the determination of characteristic 5-percentile values from test results for fasteners and wood-based products.

This document also gives corresponding acceptance criteria for a sample.

Structural timber is not covered by this document but by EN 384.

Sampling is not covered by this document, but reference is made to the relevant product standards.

2 Normative references

Not applicable.

3 Symbols

k_n Factor (see Table 2)

k_s Factor (see Table 1)

m_i Test value

m_k Characteristic value

n Number of test values

s_y Standard deviation

u_x x-fractile in the standardised normal distribution

y Stochastic value, $y_i = \ln m_i$

\bar{y} Mean value

α Confidence level (%)

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4 Calculation of characteristic values from test results

4.1 The characteristic value of a material parameter or a resistance shall be determined at a confidence level of $\alpha = 75\%$, where the confidence level α is defined as the probability of which the characteristic value is greater than the estimator on the characteristic value.

NOTE The confidence level $\alpha = 75\%$ corresponds to the value recommended in EN 1990.

4.2 The characteristic value of m_k for a material strength parameter or a resistance m modelled as a stochastic variable is defined as the p -percentile in the distribution function for m , corresponding to an assumed infinitely large test series.

4.3 $p = 5\%$ shall be assumed.

4.4 It is assumed that n test values are available and that these may be assumed to originate from a homogeneous population. The test values, which are assumed to be logarithmically normally distributed and independent, are denoted m_1, m_2, \dots, m_n .

4.5 The mean value \bar{y} and the standard deviation s_y for the stochastic variable $y = \ln m$ shall be determined as

$$\bar{y} = \frac{1}{n} \sum_{i=1}^n \ln m_i \quad \text{iTeh STANDARD PREVIEW} \quad (1)$$

$$s_y = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (\ln m_i - \bar{y})^2} \quad \text{(standards.iteh.ai)} \quad (2)$$

4.6 The characteristic value shall be determined as

$$m_k = \exp(\bar{y} - k_s s_y) \quad \text{SIST EN 14358:2007} \quad (3)$$

where k_s is given in Table 1.

NOTE k_s is determined as: $k_s = \frac{k}{\sqrt{n}}$ where k is the α -percentile in a non-central t -distribution with $n-1$

degrees of freedom and the non-centrality parameter $\lambda = u_{1-p} \sqrt{n}$. u_{1-p} is the $(1 - p)$ percentile of the standardised normal distribution function.

4.7 The coefficient of variation shall not be assumed to be less than 0,05.

Use the value $s_y = 0,05$ in equation $m_k = \exp(\bar{y} - k_s s_y)$ in the case where coefficient of variation is less than 0,05.

Table 1 - Factor k_s values

| Number of test specimens | Factor |
|--------------------------|--------|
| n | k_s |
| 3 | 3,15 |
| 5 | 2,46 |
| 10 | 2,10 |
| 15 | 1,99 |
| 20 | 1,93 |
| 30 | 1,87 |
| 50 | 1,81 |
| 100 | 1,76 |
| 500 | 1,71 |
| ∞ | 1,65 |

5 Acceptance criteria for a sample

5.1 If a variable control method is applied to control of material parameters or resistance, such control method shall be composed with a significance level of $\alpha = 75 \%$, where the significance level α is defined as the probability of not accepting a delivery having the required characteristic value.

NOTE The significance level $\alpha = 75 \%$ corresponds to the value required in Clause 4.

5.2 It is assumed that n test values are available and that these may be assumed to be derived from a homogeneous population described by the stochastic variable m . The test values which are assumed to be logarithmically normally distributed, are denoted m_1, m_2, \dots, m_n .

5.3 The mean value \bar{y} and the standard deviation s_y for the stochastic variable $y = \ln m$ shall be determined as:

$$\bar{y} = \frac{1}{n} \sum_{i=1}^n \ln m_i \quad (4)$$

$$s_y = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (\ln m_i - \bar{y})^2} \quad (5)$$

5.4 The control shall be performed by showing that, for the random sample with n test specimens

$$\exp(\bar{y} - k(n)s_y) > m_k \quad (6)$$

where

m_k is the assumed characteristic value

5.5 If the standard deviation is unknown from prior knowledge, the coefficient $k(n)$ shall be taken as k_s (see 4.6 and Table 1)

5.6 If the standard deviation is known, e.g. from production control of a period of 1 year or more, the coefficient $k(n)$ shall be taken as:

$$k(n) = u_{1-p} + \frac{u_{\alpha}}{\sqrt{n}} \quad (7)$$

where

u_{1-p} is the (1-p) percentile of the standardised normal distribution function (p = 5% shall be assumed);

u_{α} is the α percentile of the standardised normal distribution function ($\alpha = 75\%$ shall be assumed).

The values of $k(n)$ for known standard deviation are given in Table 2

Table 2 - Factor $k(n)$ values

| Number of test specimens | Factor |
|--------------------------|--------|
| n | $k(n)$ |
| 3 | 2.03 |
| 5 | 1.95 |
| 10 | 1.86 |
| 15 | 1.82 |
| 20 | 1.8 |
| 30 | 1.77 |
| 50 | 1.74 |
| 100 | 1.69 |
| 500 | 1.67 |
| ∞ | 1.65 |

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