BS EN 14358:2016

BSI Standards Publication

Timber structures — Calculation and verification of characteristic values

bsi.

National foreword

This British Standard is the UK implementation of EN 14358:2016. It supersedes BS EN 14358:2006 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/518, Structural timber.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2016

ISBN 978 0 580 83527 8

ICS 79.040; 91.080.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2016.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 14358

June 2016

ICS 79.040; 91.080.20

Supersedes EN 14358:2006

English Version

Timber structures - Calculation and verification of characteristic values

Structures en bois - Détermination et vérification des valeurs caractéristiques

Holzbauwerke - Berechnung und Kontrolle charakteristischer Werte

This European Standard was approved by CEN on 23 January 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 14358:2016 E

Contents

Page

European foreword ... 3

1 Scope ... 4

2 Symbols ... 4

3 Calculation of characteristic properties from test results in the frame of initial type testing ... 5

3.1 General ... 5

3.2 Calculation of 5 and 95 percentiles values ... 5

3.2.1 General ... 5

3.2.2 Parametric calculation ... 5

3.2.3 Non parametric calculation ... 7

3.3 Calculation of characteristic mean values ... 7

4 Calculation of characteristic properties from test results in the frame of internal factory production control ... 9

4.1 General ... 9

4.2 Calculation of characteristic strength, density or resistance properties (5-percentile) ... 9

4.3 Calculation of characteristic stiffness properties (mean values) ... 11

5 Acceptance procedure for verification of a lot ... 12

5.1 General ... 12

5.2 Verification of mean values (e.g. mean modulus of elasticity) ... 12

5.2.1 Method keeping the consumer's risk at 10 % ... 12

5.2.2 Alternative method limiting the sample size for large *COV*s ... 13

5.3 Verification of 5-percentile values (e.g. characteristic strength) ... 13

5.3.1 Method with consumer's risk equal to 10 % ... 13

5.3.2 Alternative method limiting the sample size for large *COV*s ... 14

Bibliography ... 15

European foreword

This document (EN 14358:2016) has been prepared by Technical Committee CEN/TC 124 “Timber structures”, the secretariat of which is held by AFNOR.

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 December 2016, and conflicting national standards shall be withdrawn at the latest by December 2016.

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

This document supersedes EN 14358:2006.

This document is based on Annex D of EN 1990:2002, *Eurocode – Basis of structural design*.

Compared to EN 14358:2006, the following modifications have been made:

— integration of normal distributions, and non parametric estimation;

— proposals for simplified equations to evaluate correction factors;

— estimation of mean values;

— acceptance procedure for verification of a lot (taken from EN 384: 2010).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This standard gives statistical methods for the determination of characteristic values from test results on a sample drawn from a clearly defined reference population of e.g. solid wood, fasteners, connectors and wood-based products. The characteristic value is an estimate of the property of the reference population and can be based on a 5-percentile value of strength, resistance or density as well as on a mean value for stiffness.

Parametric methods are given for the determination of lower and upper 5-percentiles. The upper 5-percentile is the 95-percentile.

This standard is suitable for use with any structural product in the frame of type testing as well as factory production control.

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

This standard also provides the acceptance procedure for verification of a lot.

Depending on the product, characteristic values determined in accordance with this standard may be used directly or may need additional adjustments specified in the relevant product standards.

Note: For example, in the case of solid timber, specific adjustment factors for calculation of characteristic values are given in EN 384.

2 Symbols

$k_s(n)$ Factor used to calculate characteristic properties for initial type testing (see Tables 1 and 2)

$k(n)$ Factor used to calculate characteristic properties for factory production control (see Tables 3 and 4)

m_i Individual test value i of stochastic variable m

m_k 5-percentile value of stochastic variable m

m_{mean} Population mean value of stochastic variable m

n Number of test values

s_y Standard deviation

u_x x-percentile in the standardised normal distribution

$\bar{y}$ Sample mean value

— $y = m$ for normally distributed variable

— $y = \ln m$ for logarithmically normally distributed variable

$y_{0.5}$ Sample 5-percentile from the test data

α Confidence level (%)

3 Calculation of characteristic properties from test results in the frame of initial type testing

3.1 General

The characteristic value of a material parameter or a resistance shall be determined at a confidence level of α = 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 α = 75 % corresponds to the value recommended in EN 1990.

3.2 Calculation of 5 and 95 percentiles values

3.2.1 General

a) The characteristic value 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;

b) p = 5 % shall be assumed.

3.2.2 Parametric calculation

a) The parametric approach shall not be used on test data not fitting the assumed distribution. In that case, a non-parametric method should be used;

b) It is assumed that n test values are available and that these may be assumed to originate from a statistically homogeneous population. The test values, which are assumed to be logarithmically normally distributed or normally distributed and independent, are denoted $m_1, m_2, \ldots, m_n$. The n test values constitute the sample;

c) Strength parameters should be assumed as logarithmically normally distributed unless analysis of the data shows that a normal distribution is more appropriate. Density shall be assumed as normally distributed;

NOTE Some product standards define the statistical distribution to be used.

d) The mean value $\bar{y}$ and the standard deviation s_y shall be determined as:

logarithmically normally distributed	normally distributed
$\bar{y} = \frac{1}{n}\sum_{i=1}^{n} \ln m_i$ (1)	$\bar{y} = \frac{1}{n}\sum_{i=1}^{n} m_i$ (2)
$s_y = \max\begin{cases}\sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(\ln m_i - \bar{y})^2} \\ 0{,}05\end{cases}$ (3)	$s_y = \max\begin{cases}\sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(m_i - \bar{y})^2} \\ 0{,}05\bar{y}\end{cases}$ (4)

The sample coefficient of variation shall not be taken as less than 0,05. For logarithmically normally distributed test values, the standard deviation s_y shall not be less than $\sqrt{\ln\left(1+0{,}05^2\right)} \approx 0{,}05$.

For normally distributed test values, the standard deviation s_y shall not be less than $0{,}05\overline{y}$.

e) The characteristic value of the sample shall be determined as follows:

percentile	logarithmically normally distributed	normally distributed
5-percentile	$m_k = \exp\left(\overline{y} - k_s(n)s_y\right)$ (5)	$m_k = \overline{y} - k_s(n)s_y$ (6)
95-percentile	$m_k = \exp\left(\overline{y} + k_s(n)s_y\right)$ (7)	$m_k = \overline{y} + k_s(n)s_y$ (8)

f) $k_s(n)$ shall be taken as:

$$k_s(n) = \frac{k_\alpha(n)}{\sqrt{n}} \tag{9}$$

where $k_\alpha(n)$ is the α-percentile in a non-central t-distribution with $n - 1$ degrees of freedom and the non-centrality parameter $\lambda = u_{1-p} \cdot \sqrt{n}$.

whereby $u_{1\text{-}p}$ is the $(1 - p)$-percentile of the standardised normal distribution function.

The following simplified expression may be used to evaluate $k_s(n)$

$$k_s(n) = \frac{6{,}5n + 6}{3{,}7n - 3} \tag{10}$$

Some values of $k_s(n)$ calculated according to Formula (9) are given in Table 1.

Table 1 — $k_s(n)$ values for strength properties for p = 5 % and α = 75 %

Number of test specimens	**Factor**
n	$k_s(n)$
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	1,69
∞	1,64

For other numbers of test specimens, one should take the value corresponding to the next smallest value of n listed in this table.

3.2.3 Non parametric calculation

a) Non parametric calculation shall not be applied if the sample size is less than $n = 40$;

b) The 5-percentile of the test data shall be evaluated by ranking the test data and determining the 5-percentile of the ranked data;

To rank the data, any *p*-percentile value f_p shall be linearly interpolated from the empirical cumulative frequency distribution of the test data ranked in ascending order.

The *i*-th data point in the empirical cumulative frequency distribution of the test data (ranked in ascending order) shall be taken to be the percentile (p) given by the following equation:

$$p = \frac{i}{n} \qquad (11)$$

where

n sample size

i *i*-th data point ranked in ascending order

c) The 5-percent lower tolerance limit with 75 % confidence shall be evaluated from Formula (12):

$$m_k = y_{0.5}\left(1 - \frac{k_{0.5,0.75}V}{\sqrt{n}}\right) \qquad (12)$$

where

n is the number of test values

m_k is the 5-percent lower tolerance limit with 75 % confidence

$y_{0.5}$ is the 5-percentile from the test data

V is the coefficient of variation of the test data found by dividing the standard deviation of the test data by the average of the test data

$k_{0.5,0.75}$ is a multiplier to give the 5-percent lower tolerance limit with 75 % confidence:

$$k_{0.5,0.75} = \frac{0{,}49n + 17}{0{,}28n + 7{,}1} \qquad (13)$$

3.3 Calculation of characteristic mean values

a) The characteristic value m_{mean} for a material stiffness m modelled as a stochastic variable is defined as the mean value in the distribution function for m, corresponding to an assumed infinitely large test series;

b) 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 normally distributed and independent, are denoted $m_1, m_2, \ldots, m_n$. The n test values constitute the sample;

c) The sample mean value $\overline{y}$ and the sample standard deviation s_y for the stochastic variable $y = m$ shall be determined as:

$$\overline{y} = \frac{1}{n}\sum_{i=1}^{n} m_{\mathrm{i}} \tag{14}$$

$$s_{\mathrm{y}} = \max\begin{cases}\sqrt{\dfrac{1}{n-1}\displaystyle\sum_{i=1}^{n}(m_{\mathrm{i}}-\overline{y})^2}\\ 0{,}05\overline{y}\end{cases} \tag{15}$$

d) For stiffness properties, the characteristic mean value shall be taken as the sample mean value $\overline{y}$ as given in Formula (14);

e) When it is required to make use of confidence intervals, the characteristic mean value m_{mean} shall be determined as.

$$m_{\mathrm{mean}} = \overline{y} - k_{\mathrm{s}}(n)s_{\mathrm{y}} \tag{16}$$

where

$$k_{\mathrm{s}}(n) = \frac{t_{\alpha,\mathrm{n}-1}}{\sqrt{n}} \tag{17}$$

$t_{\alpha,\mathrm{n}-1}$ is the α percentile in a central t-distribution with n-1 degrees of freedom.

Some values of $k_{\mathrm{s}}(n)$ are given in Table 2. For other numbers of test specimens, one should either interpolate or take the safer value for $k_{\mathrm{s}}(n)$, i.e. the one which is larger.

The following simplified equation may also be used to evaluate.

$$k_{\mathrm{s}}(n) = \frac{0{,}78}{n^{0{,}53}} \tag{18}$$

Table 2 — $k_s(n)$ values for stiffness properties

Number of test specimens	Factor
n	$k_s(n)$
3	0,471
5	0,331
10	0,222
15	0,179
20	0,154
30	0,125
50	0,096
100	0,068
500	0,030
∞	0,000

4 Calculation of characteristic properties from test results in the frame of internal factory production control

4.1 General

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

NOTE The significance level α = 75 % corresponds to the value required in Clause 3.

4.2 Calculation of characteristic strength, density or resistance properties (5-percentile)

a) 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 or normally distributed, are denoted $m_1, m_2, \ldots, m_n$. The *n* test values constitute the sample;

b) Strength parameters shall be assumed as logarithmically normally distributed. Density shall be assumed as normally distributed;

c) The mean value $\overline{y}$ and the standard deviation s_y shall be determined as:

logarithmically normally distributed	normally distributed
$\overline{y} = \frac{1}{n}\sum_{i=1}^{n} \ln m_i$ (19)	$\overline{y} = \frac{1}{n}\sum_{i=1}^{n} m_i$ (20)

$s_y = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(\ln m_i - \bar{y})^2}$ (21)	$s_y = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(m_i - \bar{y})^2}$ (22)

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

logarithmically normally distributed	normally distributed
$\exp\left(\bar{y} - k(n)s_y\right) > m_k$ (23)	$\bar{y} - k(n)s_y > m_k$ (24)

where m_k is the assumed (declared) characteristic value

e) If the standard deviation is unknown from prior knowledge, the coefficient $k(n)$ shall be taken as $k_s(n)$ (see 3.2);

f) If the standard deviation is known from production control of 30 working shifts or more, the coefficient $k(n)$ shall be taken as:

$$k(n) = u_{1-p} + \frac{u_\alpha}{\sqrt{n}} \qquad (25)$$

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 (α = 75 % shall be assumed).

The following simplified expression may be used to evaluate $k(n)$.

$$k(n) = \frac{2{,}7n + 16}{1{,}6n + 7} \qquad (26)$$

NOTE Some values of $k(n)$ for known standard deviation are given in Table 3.

Table 3 — $k(n)$ values for strength properties

Number of test specimens	**Factor**
n	$k(n)$
3	2,03
5	1,95
10	1,86
15	1,82
20	1,80
30	1,77
50	1,74
100	1,71
500	1,68
∞	1,64

4.3 Calculation of characteristic stiffness properties (mean values)

a) 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 normally distributed and independent, are denoted $m_1, m_2, \ldots, m_n$. The n test values constitute the sample;

b) The sample mean value $\overline{y}$ and the sample standard deviation s_y for the stochastic variable $y = m$ shall be determined as:

$$\overline{y} = \frac{1}{n}\sum_{i=1}^{n} m_i \tag{27}$$

$$s_y = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(m_i - \overline{y})^2} \tag{28}$$

c) For stiffness properties, the characteristic mean value shall be taken as the sample mean value $\overline{y}$ as given in Formula (14).

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

$$\overline{y} - k(n)s_y > m_{mean} \tag{29}$$

where m_{mean} is the assumed (declared) characteristic value

and $$k(n) = \frac{u_\alpha}{\sqrt{n}} \tag{30}$$

where u_α is the α-percentile of the standardised normal distribution function (α = 75 %).

The following simplified expression may be used to evaluate $k(n)$

$$k(n)=\frac{0{,}25n+12}{5n+18} \tag{31}$$

NOTE Some values of $k(n)$ for known coefficients of variation are given in Table 4.

Table 4 — $k(n)$ values for stiffness properties

Number of test specimens	Factor
n	$k(n)$
3	0,389
5	0,302
10	0,213
15	0,174
20	0,151
30	0,123
50	0,095
100	0,067
500	0,030
∞	0,000

5 Acceptance procedure for verification of a lot

5.1 General

To check a stated characteristic value for a given lot, a sample of that lot shall be tested in accordance with Clause 4. The sample size and the check requirements are given in the following clauses for mean values and 5-percentile values.

NOTE These clauses have been derived according to the theory of quality control, assuming a manufacturer's risk α = 5 % and a consumer's risk β = 10 %. The purpose of quality control is to compare the quality of the lot with the originally tested population. The manufacturer's risk corresponds to the probability that an acceptable quality lot is not accepted. The consumer's risk corresponds to the probability that an unacceptable quality lot is accepted.

This acceptance procedure is also intended to be used for a machine installation check.

5.2 Verification of mean values (e.g. mean modulus of elasticity)

5.2.1 Method keeping the consumer's risk at 10 %

The sample size, which depends on the coefficient of variation (*COV*) of the sample, shall be taken from Table 5.

Table 5 — Sample size for verification of mean values

COV	*COV* ≤ 20 %	20 % < *COV* ≤ 25 %	25 % < *COV* ≤ 30 %	30 % < *COV* ≤ 35 %	*COV* > 35 %
n	*34*	54	77	105	*140*

Since the coefficient of variation is derived from the tests and therefore unknown prior to testing, an initial guess for the *COV* of 20 % can be assumed.

Once the testing with the initial sample is finished, the actual *COV* shall be calculated. If it is larger than the initial guess, the sample size shall be increased according to Table 5, and the subsequent testing shall be carried out.

The mean value of the sample shall not be less than the required mean value multiplied by k_q = 0,944. Otherwise, the lot is defined as unacceptable.

NOTE In the case of mean values verification, if an acceptable quality lot is defined by a required mean $E_{mean,acc}$, an unacceptable quality lot is defined as having a mean value $E_{mean,unacc}$ = 90 % $E_{mean,acc}$.

If the *COV* is larger than 35 %, the additional testing may be too extensive. In such cases, the alternative method given below may be used.

5.2.2 Alternative method limiting the sample size for large *COV*s

If the *COV* is larger than 35 %, the sample size may be limited to 105. In that case, k_q = 0,934.

NOTE This option raises the consumer's risk to 20 %.

5.3 Verification of 5-percentile values (e.g. characteristic strength)

5.3.1 Method with consumer's risk equal to 10 %

The required sample size, which depends on the coefficient of variation of the sample, shall be taken from Table 6.

Table 6 — Sample size for verification of 5-percentile values

COV	*COV* ≤ 25 %	25 % < *COV* ≤ 30 %	30 % < *COV* ≤ 35 %	35 % < *COV* ≤ 40 %	*COV* > 40 %
n	40	48	93	187	411

Since the coefficient of variation is derived from the tests and therefore unknown prior to testing, an initial guess for the *COV* of 25 % may be assumed.

Once the testing with the initial sample is completed, the actual *COV* shall be calculated. If it is larger than the initial guess, the sample size shall be increased according to Table 6, and the subsequent testing shall be carried out.

From the tested sample, the percentile corresponding to the required characteristic value shall be evaluated by ranking according to method given in 3.2.3 b). It shall not be higher than the limit p_{lim}, given in Table 7. If it is higher, the lot is defined as unacceptable.

NOTE In the case of strength verification, if an acceptable quality lot is defined by a required 5-percentile value $f_{05,acc}$, an unacceptable quality lot is defined as having a 5-percentile value $f_{05,unacc}$ = 80 % $f_{05,acc}$.

Table 7 — p_{lim} values for verification of 5-percentile values

COV	*COV* ≤ 25 %	25 % < *COV* ≤ 30 %	30 % < *COV* ≤ 35 %	35 % < *COV* ≤ 40 %	*COV* > 40 %
p_{lim}	9,44 %	7,96 %	7,02 %	6,37 %	5,89 %

If the *COV* is larger than 35 %, an alternative option that limits the sample size can be used, see below.

5.3.2 Alternative method limiting the sample size for large *COV*s

For large *COV*'s, the additional testing may be too extensive. In such cases, the sample size shall be limited to 93 pieces and p_{lim} values shall be taken from Table 8.

NOTE Limiting the sample size increases the consumer's risk according to Table 6.

Table 8 — p_{lim} values for high COVs

COV	35 % < *COV* ≤ 40 %	*COV* > 40 %
p_{lim}	7,43 %	6,9 %
Consumer's risk	20 %	30 %

Bibliography

[1] EN 384, *Structural timber — Determination of characteristic values of mechanical properties and density*

[2] EN 1990:2002, *Eurocode — Basis of structural design*

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Storing and using standards

Standards purchased in soft copy format:

- A British Standard purchased in soft copy format is licensed to a sole named user for personal or internal company use only.
- The standard may be stored on more than 1 device provided that it is accessible by the sole named user only and that only 1 copy is accessed at any one time.
- A single paper copy may be printed for personal or internal company use only.

Standards purchased in hard copy format:

- A British Standard purchased in hard copy format is for personal or internal company use only.
- It may not be further reproduced – in any format – to create an additional copy. This includes scanning of the document.

If you need more than 1 copy of the document, or if you wish to share the document on an internal network, you can save money by choosing a subscription product (see 'Subscriptions').

Reproducing extracts

For permission to reproduce content from BSI publications contact the BSI Copyright & Licensing team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email subscriptions@bsigroup.com.

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Useful Contacts

Customer Services
Tel: +44 345 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 345 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK