BS EN 14508:2016

BSI Standards Publication

Postal services — Quality of service — Measurement of the transit time of end-to-end services for single piece non-priority mail and second class mail

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 14508:2016. It supersedes BS EN 14508:2003 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee SVS/4, Postal services.

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.

ISBN 978 0 580 62470 4

ICS 03.240

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 29 February 2016.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 14508

February 2016

ICS 03.240

Supersedes EN 14508:2003+A1:2007

English Version

Postal services - Quality of service - Measurement of the transit time of end-to-end services for single piece non-priority mail and second class mail

Services postaux - Qualité de service - Mesure de la qualité de service de bout en bout pour le courrier égrené non prioritaire et de seconde classe

Postalische Dienstleistungen - Dienstqualität - Laufzeitmessung end-to-end für Einzelsendungen ohne Vorrang und Sendungen zweiter Klasse

This European Standard was approved by CEN on 18 December 2015.

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 14508:2016 E

Contents

Page

European foreword

This document (EN 14508:2016) has been prepared by Technical Committee CEN/TC 331 “Postal services”, the secretariat of which is held by NEN.

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 August 2016, and conflicting national standards shall be withdrawn at the latest by August 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 14508:2003+A1:2007.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

The two annexes in this standard have been retained to highlight the differences between the original standard from 2002 and then the amendment in 2007. The highly revised EN 13850:2012, from which this standard has been developed, contains a number of annexes that bring together the planning required to create a sample survey to measure on-time performance, the validation and analysis steps and then the means of calculating the statistical accuracy of the performance estimates produced.

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.

Introduction

In the Green paper on postal services in 1992 the European Commission emphasized the need to establish common rules for the development of community postal services and the improvement of quality of service.

The Commission identified requirements for quality of service measurement that include:

— independent end-to-end measurement capabilities;

— a focus on cross-border delivery service performance;

— a single, uniform and reliable system for monitoring delivery service performance within the European Union.

The European Commission acknowledged that the different postal traditions and cultures in Europe would not allow for the establishment of one common unified European measurement system and that national systems should have sufficient degrees of freedom to reflect national needs and peculiarities. On the other hand, they should fulfil a defined set of minimum requirements to satisfy the information interests of the national regulatory authority, postal customers and postal operators themselves.

The objective of the measurement is to estimate the transit time quality of service given to the customer in each European country domestically and cross-border between the European countries.

This European Standard refers to a number of principles and minimum requirements to be applied for the measurement of the transit time of single piece non-priority mail.

This European Standard for single piece non-priority mail has been developed from EN 13850:2012 Postal Services - Quality of Service - Measurement of the transit time of end-to-end services for single piece priority mail and first class mail. Both standards consider methods using a representative end-to-end sample of addressed letter mail. The additional specifications in this European Standard are required to define the minimum confidence levels for the measurement of non-priority mail.

When EN 14508 was first developed it was decided to base it on existing measuring systems already in use among the European Union member states. The expansion of the European Union increased the number of cross-border mail flows and the standard was adapted in 2007 to make it possible to economically measure a larger number of mail flows from a wider range of countries. This was achieved by categorizing mail flows for measuring purposes and extending the measurement over a consecutive number of years.

In the earlier versions of EN 13850 and EN 14508 the requirements for the Minimum Sample Size (MSS) were given in terms of accuracy requirements for domestic and cross-border measurement systems. The basis of this was an accuracy calculation method which linked any accuracy requirement directly to a corresponding MSS.

The improved accuracy calculation method in EN 13850:2012 introduced a number of consequences which made it difficult to hold up this link. Annex B explains these consequences and how they have been overcome.

1 Scope

In addition to EN 13850:2012 Postal Services - Quality of Service - Measurement of the transit time of end-to-end services for single piece priority mail and first class mail, this European Standard specifies methods for measuring the end-to-end transit time of domestic and cross-border non-priority single piece mail, collected, processed and delivered by postal service operators. It considers methods using a representative end-to-end sample of all types of single piece addressed letter mail with defined transit-time service levels offered to the customer. This standard is applicable to the measurement of End-to-End single piece non-priority mail services.

This European Standard has been developed from and is compatible with the requirements of EN 13850:2012. As such, surveys for both priority and non-priority single piece mail may be undertaken concurrently while reporting separate estimates of priority and non-priority transit times.

The overall transit time quality-of-service result is to be expressed as the percentage of mail delivered within (*J + n)* days end-to-end according to the EU Postal directive[1].

This European Standard relates to the measurement of so-called “normal” services given to private persons / households and smaller businesses that post mail at street letter boxes, over the counter at post offices, have bring services from their offices or give their mail directly at postal service operators’ sorting centres.

For technical reasons this European Standard may not in all parts be suitable for the measurement of very small volumes of mail and for operators with limited coverage.

This European Standard is not applicable for measuring the end-to-end transit time distribution of large bulk mailers’ services or hybrid mail, which require different measurement systems and methodologies; (see, for example, EN 14534 Measurement of the transit time of end-to-end services of bulk mail).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13850:2012, *Postal Services - Quality of Services - Measurement of the transit time of end-to-end services for single piece priority mail and first class mail*

NOTE As the measurement method in this standard is based on the principles described in EN 13850:2012 it is needed to follow in parallel the rules of that standard. For convenience, the references made in EN 13850:2012 are contained in the bibliography of this European Standard.

[1] Directive 97/67/EC of the European Parliament and of the Council of 15 December 1997 on common rules for the development of the internal market of Community postal services and the improvement of quality of service (OJ L 15, 21.1.98, p. 14).

3 Terms and definitions

For the purposes of this document, the following term and definition applies.

3.1
non-priority item
letter post item sent without priority, typically by surface, and receiving slower processing compared to items classified as priority as defined nationally

EXAMPLE second class item, B class item.

4 Methodology

4.1 General

The system for measuring the distribution of the end-to-end transit time of non-priority single piece mail items shall be robust and shall give statistical measurements at a defined level of accuracy.

The methodology shall comply with the requirements of EN 13850:2012. In particular the following requirements of EN 13850:2012 shall apply, but shall refer to non-priority instead of priority:

— The sample design shall be representative of real non-priority single piece mail flows.

— The measurement system shall provide one annual figure for each relevant field of study using a test period of 1 year, 2 years or 3 years according to Annex A.

NOTE For cross border mail flows in categories 2 or 3 according to Annex A it will take 2 or 3 years, respectively to reach the required accuracy for the particular size of mail flow.

— The field of study shall be defined and used consistently throughout the measurement. A field of study shall not be modified during a yearly test period or over the full period of the years needed for full accuracy.

— The measuring methodology shall be objective and shall be audited.

— All measurements of transit time shall refer to end-to-end transit time.

— The measurement system shall be continuous.

— Panels of senders and receivers shall be independent of postal service operators and regulatory authority and shall be managed according to the International Chamber of Commerce / ESOMAR International Code of Marketing and Social Research Practice including its attachment. In addition, all requirements regarding integrity of the measurement shall follow EN 13850:2012, 6.6.

4.2 Calculation and presentation of transit time

The transit time of a postal item shall be measured in units of days and expressed as ($J + n$) days. J is the date of deposit provided posting takes place before the published last collection time at the point of induction of the mail.

For the purpose of this European Standard, transit times for domestic and cross-border mail shall be calculated according to a five-day working week calculation rule; whereby Saturdays, Sundays, and national holidays in the country of delivery are subtracted, in accordance with EN 13850:2012, B.1.

For domestic mail, the transit times may, in addition, be calculated according to the weekend collection and delivery pattern provided, in accordance with one of the other calculation rules of EN 13850:2012, Annex B, subject to the requirements of the national regulatory authority.

In the cross-border case it shall be continuous for a field of study over the full period of the years needed for full accuracy. This does not necessarily mean that for cross-border mail flows all dates in a year need to be covered. For example, it may be sufficient to select three out of five possible induction days randomly or according to a systematic rotation plan in each week of the year.

4.3 Service performance indicators

4.3.1 General

The following indicators shall be used in the presentation of the service performance result.

4.3.2 On-time performance

The percentage of postal items delivered within the defined service standard. The result shall be presented as the percentage of postal items arriving by ($J + n$), whereby J represents the day of deposit and n the number of qualifying days for the service standard.

All reports shall state the level of on-time performance accuracy achieved in the test period.

4.3.3 Cumulative distribution of delivery days

The cumulative percentage of mail delivered within a given period, from ($J + k$) to (J + 10) where k is the number of qualifying days defined by the service standard. All postal items delivered up to (J + 30) shall be considered in the calculations. Postal items not delivered by (J + 30) can be excluded.

5 Real mail studies

Real mail studies for domestic and cross-border mail measurement shall be implemented prior to the set-up of the test mail measurement system in order to obtain the information needed for the sample design. Real mail studies implemented to obtain information for priority single piece sample designs may be extended to obtain equivalent information for non-priority single piece sample designs. Real mail studies shall follow EN 13850:2012, 6.3.2.1.

6 Geographical stratification

Geographical stratification shall be the basis of the sampling design and shall follow EN 13850:2012, 6.4.3. For cross-border mail flows in categories 2 or 3 according to Annex A, the representative stratification does not have to be achieved annually but it should be tried to come as close as possible in order to be able to reach a representative stratification for each full multi-year result.

For cross-border mail flows in categories 2 or 3 according to Annex A the annual sample sizes that compose a multi-year result shall be spread evenly over the test period and not differ relatively by more or less than 20 % in any one year.

If the survey design is changed during the test period then checks shall be made that the results of the survey before and after the design change shall be combined in a way which is representative of real mail.

7 Estimators of transit time

7.1 General

Probabilities for attaining the specifications set with respect to the end-to-end transit times of an item shall be estimated based on a sample and an estimator. According to the two different types of measurement results, two different estimators are necessary. Let:

— $\hat{p}_1$ be the estimator for *p1* the true probability for attaining the specification with respect to the transit time for domestic mail;

— $\hat{p}_2$ be the estimator for *p*2 the true probability for attaining the specification with respect to the transit time for cross-border mail.

7.2 Accuracy

For the calculated estimators $\hat{p}_i, i = 1,2$ the accuracy per measurement period is given by the maximum length $2 \in_i$ of the confidence interval for $\hat{p}_i$ for a given confidence level $(1-\alpha) = 95\%$.

The end-to-end transit time target has been met if the target value falls within or below the 95 % confidence interval.

NOTE The assumption that the End to End transit time target has been met can only be rejected if the target falls above the 95 % confidence interval of the estimator.

The accuracy of the transit time QoS-level shall be assessed by calculating the variance of the estimator $\hat{p}_i$ and the corresponding design factor. This calculation shall take into account in accordance with Annex A of EN 13850:2012 for each test letter as a minimum:

— the induction / delivery point and date;

— all discriminant mail characteristics;

— an indication if the transit time target has been attained or not.

A possible weighting of results shall be done according to EN 13850:2012, 7.3.

7.3 Minimum Sample Size

7.3.1 Domestic measurement systems

Without calculation, 1070 items shall be taken as the Minimum Sample Size (MSS) for a domestic measurement system. With this MSS reliable results can be achieved for all possible performance levels.

The MSS may be reduced, if a performance level $\hat{p}$ better than 50 % can be expected. The MSS then shall be determined using Table 1:

Table 1 — Minimum Sample Sizes for selected performance levels (Domestic)

97,5 %	95 %	92,5 %	90 %	87,5 %	85 %	82,5 %	80 %	75 %	70 %	65 %	60 %	55 %	50 %
220	310	390	470	540	610	670	720	820	900	980	1030	1060	1070

For any performance level $\hat{p}$ the MSS is the value tabled below the highest performance level still lower than $\hat{p}$.

EXAMPLE Let $\hat{p}$ be expected to be 91 %. Then the 90 % is the highest tabled performance still lower than 91 %. The MSS then is 470.

This determination of the MSS can be applied for all performance levels from 50 % up to 97,50 % (see also EN 13850:2012, Annex D). For performance levels of 97,50 % and above at least 220 items have to be taken. For performance levels below 50 % at least 1070 items have to be taken.

A maximum of 12 letters per week shall be allocated to any domestic sender except business senders with a mode of payment other than 'stamped'. A maximum of 24 letters per week shall be allocated to them.

A maximum of 12 letters per week shall be allocated to any domestic receiver. On average no receiver shall get more than 6 letters per week during his time of participation in the measurement period.

The given weekly workloads are maximum values. In most cases the actual workloads should be well below the maximum.

7.3.2 Cross-border measurement systems

Without calculation 100 items shall be taken as the Minimum Sample Size (MSS) for a cross-border measurement system. With this MSS reliable results be achieved for all possible performance levels.

The MSS may be reduced, if a performance level $\hat{p}$ better than 50 % can be expected. The MSS then shall be determined using Table 2:

Table 2 — Minimum Sample Sizes for selected performance levels (Cross-Border)

97,5 %	95 %	92,5 %	90 %	87,5 %	85 %	82,5 %	80 %	75 %	70 %	65 %	60 %	55 %	50 %
43	51	58	65	71	76	81	86	93	98	100	100	100	100

For any performance level $\hat{p}$ the MSS is the value tabled below the highest performance level still lower than $\hat{p}$.

EXAMPLE Let $\hat{p}$ be expected to be 91 %. Then the 90 % is the highest tabled performance still lower than 91 %. The MSS then is 65.

This determination of the MSS can be applied for all performance levels from 50 % up to 97,5 %. For performance levels of 97,5 % and above at least 43 items have to be taken. For performance levels below 50 % at least 100 items have to be taken.

NOTE For fields of study with small mail flows these MSS-requirements are relaxed (see EN 13850:2012, Annex D).

A maximum of six letters per week shall be allocated to any cross-border sender, except business senders with a mode of payment other than 'stamped'. A maximum of 12 letters per week shall be allocated to them. A maximum of six letters per week shall be allocated to any cross-border receiver.

The given weekly workloads are maximum values. In most cases the actual workloads should be well below the maximum.

8 Test mail characteristics

The measurement systems shall represent a statistical sample of the real mail for all discriminant mail characteristics.

By agreement with the national regulatory authority, the list of all discriminant mail characteristics from one operator may be revised based on the results of empirical studies on the subject. These studies shall be audited in accordance with Annex C of EN 13850:2012 and it shall be guaranteed that the system always includes the up-to-date list of discriminant mail characteristics.

9 Report

The reporting requirements of EN 13850:2012 will apply for the reporting of non-priority single piece letter mail in accordance with EN 13850:2012, Clause 7.

Due to EN 13850:2012, 7.4, the specified information should be contained in the report of the independent measurement body

Due to reports on the yearly quality results provided by postal operators, reports shall include information specified in EN 13850:2012, 7.1, Measurement results

10 Quality control and auditing

Quality control procedures shall be applied through all phases and activities of the measurement system, including the real mail studies, according to Annex C of EN 13850:2012.

Validation of the test mail shall be applied through all phases and activities of the measurement system. Please see the rules provided as guidelines in Annex H of EN 13850:2012.

There shall be a detailed initial audit of the measurement system after the first measurement period. It shall be followed by independent re-audits at least every three years that keep track of any changes in the performance of the measurement system. More detailed independent audits are necessary after measurement periods when:

— the supplier changes,

— significant changes to the methodology of the measurement occur (for example any change in the set of mail characteristic that have been proved discriminant).

The audit cycle shall be agreed with the regulatory authority.

NOTE The regulatory authority might require a shorter audit cycle.

The auditor or auditors shall be fully independent from the tasks and parties (measurement body, postal operators and regulatory authority), which are the topic of their audit(s). The auditor(s) shall also have the proven skills and capacity to perform such an audit.

The measurement system shall be audited according to this Standard and to Annex C of EN 13850:2012.

Annex A
(normative)

Relaxation related to flows with small real mail volumes

A.1 General

This annex explains how to categorize mail flows for measuring purposes and explains how the required accuracy for small and medium-sized mail flows can be obtained by measuring under a consecutive number of years.

A.2 Introduction

Only for cross-border fields of study, it is allowed to relax the requirement of one annual figure.

When the real mail volume in a given cross-border field of study is smaller than a certain limit or small compared to other fields of study then the full accuracy may be reached after a longer period than one year.

The results for cross-border flows reaching full accuracy after 2 or 3 years should not be reported until before these years have been completed. After that, the results should continue to be reported annually on a year-rolling basis.

EXAMPLE A certain small country-to-country flow is measured annually with 1/3 of the test mail volume that is required for full accuracy. It will reach full accuracy after three years of measurement:

End of year 1: No reporting of results.

End of year 2: No reporting of results.

End of year 3: Reporting of results based on accumulated period from year 1 to year 3.

End of year 4: Reporting of results based on accumulated period from year 2 to year 4.

End of year 5: Reporting of results based on accumulated period from year 3 to year 5.

And so on …

A.3 Cross border mail flows

The MSS calculation requirement of 7.3.2 may not be reasonable for all cross border mail flows. An alternative way to reach this accuracy level is measuring over a number of consecutive years. It is recommended that in these circumstances the test period should be extended to 2 or 3 years. The accuracy requirements may be relaxed for flows with small volume and poor performance.

After all cross border mail flows have been sorted by real mail volume for each outbound country, each of them falls into one of the following four different categories:

Category 1: Large size flows

Definition:

— at least 5 largest (real mail volume) outbound flows per country,

— at least representing 65 % of total outbound EU volume plus, and

— at least the 3 largest inbound flows per country.

Measurement: Application of 7.3.2, i.e. the MSS requirement

Category 2: Medium size flows

Definition:

— at least representing 10 largest outbound flows together with category 1, and

— at least representing in total, with Cat.1 flows, 80 % of total outbound EU volume.

Measurement: Per 2-year period Application of 7.3.2.

Category 3: Small size flows

Definition:

— All remaining flows up to 100 % of total EU volume.

Measurement: Per 3-year period application of 7.3.2.

Category 4: Very small size flows

Definition:

— All flows with volumes of below 5 000 mail pieces per year.

Measurement: On each of these flows, the test mail would increase the real mail volume more significantly. Since the practical value and neutral position of such a measurement is rather questionable, these flows may be excluded from the measurement.

For all flows in categories 2 and 3, the MSS will only be reached after 2 or 3 years, respectively.

Annex B
(informative)

Changes to the 2007 version of EN 14508

B.1 Methodology

B.1.1 Accuracy and Minimum Sample Size (MSS)

In the 2002 version of EN 13850, referenced by EN 14508:2002 and its amended version in 2007, the requirements for the Minimum Sample Size (MSS) were given in terms of accuracy requirements for domestic and cross-border measurement systems. Basis of this layout was an accuracy calculation method which linked any accuracy requirements directly to a corresponding MSS.

The improved accuracy calculation method of EN 13850:2012, Annex D introduced a number of consequences which made it difficult to hold up this link in all cases. These consequences are:

— It is not possible to be sure if an MSS calculated before the start of the measurement will precisely satisfy the accuracy requirements after the end of the measurement period. This is due to the fact that one cannot be sure of the actual amount of correlation between test letter results in the measurement period. Securing the accuracy requirements would require an over-sizing of sample and panel or an on-going MSS calibration process without guarantee of ever fulfilling the accuracy requirements.

— The new MSS calculation rule is only applicable on moderate on-time service levels. For extreme results based on small test mail flows or on high on-time service levels no known MSS calculation rule exists.

— The reduced bias in accuracy calculation results in an MSS which would be considerably higher than the level accepted for years in existing transit-time measurement systems.

The link was therefore abandoned. The MSS requirements are now given directly as tabled values without any need for calculation. They are on the same level as in the previous version of this standard. Existing measurement systems which fulfil the former MSS requirements will also fulfil the MSS requirements of EN 13850:2012, 6.2.

The improved accuracy calculation is on the other hand still part of the reporting.

B.1.2 MSS for flows with small real mail volumes

EN 13850:2002+A1:2007, i.e. the consolidated version of EN 13850:2002 and EN 13850/prA1:2005, took into consideration real mail volumes for which the corresponding test mail volumes should not go beyond a certain level. The reasons are:

— EN 13850 should provide an acceptable entry level for users of this standard with a smaller mail base;

— the test mail volumes should not raise the size of existing mail flows significantly with possible consequences for the on-time performance;

— the costs of measurement should be in proportion to the importance of the mail flow.

The main body of EN 13850/prA1:2005 was implemented as a new Annex F in EN 13850:2002+A1:2007. This annex has now become Annex D of EN 13850:2012 Accuracy requirements were transformed into minimum sample size requirements according to the line of argument in B.1.1. The three existing mail-flow categories were redefined. For domestic mail flows, the boundaries between the categories moved from

— ["below 50 million" (very small), "50-100 million" (small), "100 and above million" (large and medium)] mail pieces per year in 2004 to

— ["1,5-200 million" (small), "200-500 million" (medium), "500 and above" million (large)] now.

— Category 4 was introduced for very small mail volumes below 1,5 million mail pieces per year.

— For cross-border mail flows only small changes were made

— 1,45 million instead of 1,5 million boundary in Category 1;

— J+1 performance boundary of 80 % instead of 75 % in Categories 2 and 3, see D.3).

— A new Category 4 was introduced for very small mail flows below 11 500 mail pieces.

B.2 Transit-time calculation rule

The transit-time calculation rule of EN 13850:2012, Annex B has been amended for special cases of national or regional holidays in the cross-border case. Holidays are now respected in the country of induction as well as in the country of delivery.

In cases of national or regional holidays the new transit-time calculation rule might lead to different results than the former calculation rule.

B.3 Accuracy calculation method

B.3.1 Improved applicability

Annex A of EN 13850:2012 includes a number of areas of improved applicability in comparison to the previous versions of EN 13850.

The accuracy calculation is applicable on stratified samples now. For measurement systems with a weighting system that is in line with 7.3 EN 13850:2012, Annex A EN 13850 provides an unbiased accuracy calculation method, even for samples that are not fully proportional. This closes a gap, since 7.3 EN 13850:2012 explicitly requires a weighting system based on a stratified sample.

Since the first instalment of EN 13850 and EN 14508 transit-time performances have improved considerably throughout Europe. The high transit-time performance results that are now common in many European countries may generate a considerable bias if the common Normal confidence interval is used in smaller samples. Adding to that, the interest in QoS sub-results for regional quality improvement has grown, too, and with it the requirement for an accuracy calculation for small sub-samples.

Annex A of EN 13850:2012 covers these cases with the introduction of two alternative types of confidence intervals, the Agresti-Coull interval and the Inverse Beta interval. Both intervals take care of small samples and/or high transit-time performance results. EN 13850:2012, A.5.2.2, assists with a decision rule when the alternative confidence intervals should be used.

B.3.2 Reduced bias in calculation

Annex A of EN 13850:2012 removes a bias in calculation that was reported by users of the previous versions of EN 13850.

Extensive tests with measurement data from different operators throughout Europe has shown, that the old accuracy calculation method leads to accuracy results that were not conservative enough. The accuracy of large European transit-time measurement systems tended to be approximately four times overestimated.

This bias in the accuracy calculation has been corrected.

Bibliography

[1] EN ISO 9000, *Quality management systems - Fundamentals and vocabulary (ISO 9000)*

[2] EN ISO 9001, *Quality management systems — Requirements (ISO 9001)*

[3] EN ISO 9004, *Managing for the sustained success of an organization - A quality management approach (ISO 9004)*

[4] EN ISO 19011, *Guidelines for auditing management systems (ISO 19011)*

[5] ISO 10005, *Quality management systems — Guidelines for quality plans*

[6] ISO 10007, *Quality management systems — Guidelines for configuration management*

[7] ISO/TR 10013:2001, *Guidelines for quality management system documentation*

[8] ISO 3534-1:1993, *Statistics — Vocabulary and symbols — Part 1: Probability and general statistical terms*

[9] ISO 3534-2:1993, *Statistics — Vocabulary and symbols — Part 2: Statistical quality control*

[10] ISO 3534-3:1999, *Statistics — Vocabulary and symbols — Part 3: Design of experiments*

[11] International Chamber of Commerce / ESOMAR International Code of Marketing and Social Research Practice, with attachment

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.

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 bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

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.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 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.