SLOVENSKI STANDARD
SIST-TP CEN/TR 14547:2006

01-februar-2006

Sheme vzorļenja za potrjevanje skladnosti ļistine izdelkov iz plemenitih kovin pri tretji stranki

Sampling schemes for third party conformity assessment of fineness in precious metal articles

Probenahmeverfahren für die Konformitätsbewertung des Feingehaltes von Gegenständen aus Edelmetall durch Dritte

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Programmes d'échantillonnage pour une évaluation de la conformité du titre des ouvrages en métaux précieux par une tierce partie

SIST-TP CEN/TR 14547:2006
https://standards.iteh.ai/catalog/standards/sist/a0a747d2-d020-4d17-a6ee-9e5cc853f614/sist-tp-cen-tr-14547-2006

Ta slovenski standard je istoveten z: **CEN/TR 14547:2005**

ICS:

39.060 Nakit Jewellery

SIST-TP CEN/TR 14547:2006 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

SIST-TP CEN/TR 14547:2006

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST-TP CEN/TR 14547:2006
https://standards.iteh.ai/catalog/standards/sist/a0a747d2-d020-4d17-a6ee-9c5cc853f614/sist-tp-cen-tr-14547-2006

SIST-TP CEN/TR 14547:2006

TECHNICAL REPORT

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

CEN/TR 14547

November 2005

ICS 39.060

English Version

Sampling schemes for third party conformity assessment of fineness in precious metal articles

Méthodes d'échantillonnage pour une évaluation de conformité du titre des articles en métaux précieux par une tierce personne

Probenahmeverfahren für die Konformitätsbewertung des Feingehaltes von Gegenständen aus Edelmetall durch Dritte

This Technical Report was approved by CEN on 8 August 2005. It has been drawn up by the Technical Committee CEN/TC 283.

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST-TP CEN/TR 14547:2006
https://standards.iteh.ai/catalog/standards/sist/a0a747d2-d020-4d17-a6ee-9c5cc853f614/sist-tp-cen-tr-14547-2006

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

© 2005 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. CEN/TR 14547:2005: E

SIST-TP CEN/TR 14547:2006

Contents

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST-TP CEN/TR 14547:2006
https://standards.iteh.ai/catalog/standards/sist/a0a747d2-d020-4d17-a6ee-9e3e6e55b614/sist-tp-cen-tr-14547-2006

SIST-TP CEN/TR 14547:2006

Foreword

This Technical Report (CEN/TR 14547:2005) has been prepared by Technical Committee CEN /TC 283, "Precious metals - Applications in jewellery and associated products", the secretariat of which is held by UNI.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST-TP CEN/TR 14547:2006
https://standards.iteh.ai/catalog/standards/sist/a0a747d2-d020-4d17-a6ee-9c5cc853f614/sist-tp-cen-tr-14547-2006

SIST-TP CEN/TR 14547:2006

Section one: General

1 Scope

This Technical Report specifies an acceptance sampling system of single sampling plans both for inspection by attributes and for inspection by variables. The attributes plans are of the accept-zero form, i.e. no lot is accepted if the sample from it contains one or more nonconforming articles. (For the purposes of this Technical Report, a nonconforming article is a precious metal article containing less than the nominal proportion by weight of the precious metal). The variables plans generally require smaller sample sizes than the attributes plans, but require the precious metal content of all the sampled articles to exceed the nominal content by at least a specified amount.

The objective of this Technical Report is to provide accept-zero schemes and procedures for assuring an upper limit to the long-term percentage of nonconforming precious metal articles in the market place (i.e. the percentage of articles reaching the market place that contain less than the nominal proportion of precious metal) by means of the lowest practicable sample sizes. The upper limit provided by this Technical Report is 1,47% nonconforming. The objective is achieved in three ways:

a) the sample size reduces as the total number of articles accepted in all the lots since the last non-acceptance increases;

b) if quality is consistently high, then subject to certain conditions it will be possible to switch from sampling by attributes to sampling by variables;

c) under sampling by variables, further reductions in sample size may be achieved by switching from the unknown standard deviation method (the "s" method) to the known standard deviation method (the "**σ**" method) if there is sufficient evidence that the process standard deviation is constant.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

This Technical Report is designed for use under conditions where:

d) articles are of a similar type, weight and nominal precious metal content, all supplied by the same supplier;

SIST-TP CEN/TR 14547:2006
https://standards.iteh.ai/catalog/standards/sist/a0a747d2-b920-4d17-a0ee-9c5cc8551614/sist-tp-cen-tr-14547-2006

NOTE Where any of these factors differ, this Technical Report should be applied to each combination of type, weight range, nominal precious metal content and supplier separately.

e) the cost to the supplier for marking for fineness increases with the number of articles inspected and the cost of inspection of each article;

f) for sampling by attributes, it is possible to accurately determine whether the sampled articles are conforming or nonconforming with regard to precious metal content;

g) for sampling by variables, the precious metal content by weight for each sampled article is measurable on a continuous scale (usually in parts per thousand, expressed as a real number), and the precious metal content from article to article is distributed according to a normal distribution, at least to a close approximation;

h) for sampling by variables under the "**σ**" method, the process standard deviation is stable.

2 Normative references

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

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

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

ISO 5479, *Statistical interpretation of data - Tests for departure from the normal distribution*

ISO 5725-6, *Accuracy (trueness and precision) of measurement methods and results - Part 6: Use in practice of accuracy values*

SIST-TP CEN/TR 14547:2006

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3534-1:1993 and ISO 3534-2:1993 and the following apply. For ease of reference, the definitions of some of these terms are quoted from these standards while others are re-defined or newly defined.

3.1
inspection
activity such as measuring or gauging the precious metal content of an article, and comparing the results with specified requirements in order to establish whether conformity is achieved

3.2
lot
definite collection of precious metal articles of the same type, the same approximate weight, the same nominal precious metal content and from the same supplier

3.3
sample
a set of one or more articles taken from a lot and intended to provide information on the lot

3.4
sample size
number of articles in the sample

3.5
sampling plan
combination of sample size to be used and associated lot acceptability criteria

NOTE 1 A sampling plan does not contain the rules on how to draw the sample.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

NOTE 2 There is a distinction between the terms "sampling plan" (3.5), "sampling scheme" (3.6) and "sampling system" (3.7).

SIST-TP CEN/TR 14547:2006
https://standards.iteh.ai/catalog/standards/sist/a0a747d2-d020-4d17-a6ee-

3.6
sampling scheme
combination of sampling plans with rules for changing from one plan to another

3.7
sampling system
collection of sampling plans, or of sampling schemes, each with its own rules for changing plans, together with sampling procedures including criteria by which appropriate plans or schemes may be chosen

NOTE This Technical Report is a sampling system indexed by lot size and credit.

3.8
test portion
a quantity of material taken from an article or articles for analysis

3.9
lower specification limit, L
the nominal minimum precious metal content of an article

NOTE L will normally be expressed in terms of parts per thousand by weight.

3.10
inspection by attributes
inspection by means of which each article is classified simply as conforming or nonconforming with respect to the lower specification limit

3.11
(acceptance) sampling by attributes
lot acceptance procedure based on the number of nonconforming articles in a sample

NOTE In this Technical Report a lot is automatically non-accepted if one or more articles in the sample are classified as nonconforming.

SIST-TP CEN/TR 14547:2006

3.12
inspection by variables
inspection by means of which a single measurement is obtained for the precious metal content of each article in a sample

3.13
(acceptance) sampling by variables
lot acceptance procedure based on the measurements of the precious metal content of the articles in the sample

3.14
process average
process level averaged over a defined time period or quantity of production

NOTE In this Technical Report the process average is the quality level in percent nonconforming during a period when the process is in a state of statistical control (see ISO 3534-2:1993, 3.9)

3.15
credit K
total number of articles accepted in a sub-sequence of lots since a lot in the sequence was non-accepted

3.16
average outgoing quality (AOQ)
expected average quality level of outgoing product for a given value of incoming product quality

NOTE Different definitions of AOQ are used depending on whether or not nonconforming articles removed in the 100% inspection of non-accepted lots are replaced by conforming articles. This Technical Report is based on the assumptions that every lot that fails to satisfy the acceptance criterion when the credit is zero is 100% inspected and that every article found to be nonconforming is scrapped and not replaced.

iTeh STANDARD PREVIEW

3.17
average outgoing quality limit (AOQL)
(standards.iteh.ai)
maximum AOQ over all possible values of incoming product quality level for a given acceptance sampling scheme

SIST-TP CEN/TR 14547:2006
https://standards.iteh.ai/catalog/standards/sist/a0a747d2-d020-4d17-a6ee-9c5cc853f614/sist-tp-cen-tr-14547-2006

NOTE For the sampling schemes in this Technical Report the AOQL is 1,47%.

3.18
quality
the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs

NOTE In this Technical Report, quality will be interpreted in the narrow sense of whether or not the precious metal content of an article exceeds the lower specification limit. Quality is high if it does and low if it does not.

4 Symbols and abbreviations

The symbols and abbreviations used in this Technical Report are as follows:

AOQ average outgoing quality, in percent nonconforming articles

AOQL average outgoing quality limit, in percent nonconforming articles

b constant used in the development of the likelihood ratio tests of Annex B

c constant used in the acceptance criteria for sampling by variables

NOTE In this Technical Report, c takes the values ¼, ½, ¾, 1 and 1¼

K credit (an integer)

L lower specification limit for the precious metal content, expressed in parts per thousand by weight

n sample size

SIST-TP CEN/TR 14547:2006

N lot size

p process average, expressed as the proportion of articles that are nonconforming

p_a process average at which the probability of acceptance of a lot is a

s standard deviation of the precious metal content of the articles in the sample, expressed in terms of parts per thousand (see Annex A)

X_{min} the smallest of the measured precious metal contents for the articles in a sample, expressed in terms of parts per thousand

σ standard deviation of the precious metal content of the articles generated by the production process, expressed in terms of parts per thousand (see Annex A)

5 Average outgoing quality limit

When submitted quality is very high, almost all the lots will be accepted for marking for fineness and enter the market place unchanged. The average outgoing quality (AOQ) of articles to the market place will therefore be a low percent nonconforming.

When submitted quality is very low, most of the lots will be non-accepted and 100% inspected. In this case, most of the articles will be subjected to inspection and only the conforming articles marked for fineness, so the AOQ of articles to the market place will again be a low percent nonconforming, albeit at a relatively high average inspection cost per article marked for fineness.

As quality moves from one of these extremes to the other, the AOQ will increase, reach a limit, and thereafter decrease. The upper limit to the average outgoing percent nonconforming is called the average outgoing quality limit (AOQL). The plans in this Technical Report have been devised in such a way that no sampling scheme constructed from the plans will give an AOQL of more than 1,47% nonconforming, subject to the normality assumption in the case of sampling by variables.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST-TP CEN/TR 14547:2006
https://standards.iteh.ai/catalog/standards/sist/a0a747d2-d020-4d17-a6ee-9c5ce853f614/sist-tp-cen-tr-14547-2006

As sample sizes by their nature are constrained to be integers, the sampling plans have invariably been chosen to err on the conservative side, i.e. to provide an AOQL of no more than 1,47% nonconforming. As a consequence, some schemes constructed from plans in this Technical Report will provide an AOQL that is substantially less than 1,47% nonconforming.

The average outgoing quality after a sequence of lot submissions will only approach the AOQL under the most adverse sequence of lot qualities. In practice this is unlikely to occur, so the AOQ will generally be very much better than the nominal AOQL of 1,47% nonconforming. In particular, if submitted lot quality in percent nonconforming is consistently better than the AOQL, then the AOQ will tend to be even better than the AOQL; this is because the sampling procedure can only result in the lot either being unchanged or in the removal of its nonconforming articles.

6 Switching between attributes and variables inspection

The attributes schemes in this Technical Report provide a firm guarantee that the long-term percentage of nonconforming articles entering the market place will not exceed 1,47%, whatever the quality of submitted lots. Attributes inspection is therefore an integral and obligatory procedure of this Technical Report if the consumer protection implied by the AOQL is to be maintained.

This Technical Report also provides the possibility of switching to variables inspection when inspection results indicate that the process average is stable and reliable at a level well below 1,47%, and that the precious metal content is distributed from article to article in accordance with a normal distribution. However, under variables inspection the AOQL of 1,47% is only guaranteed if the assumption of normality is valid, at least approximately. The use of sampling by variables is, therefore, optional (at the request of the supplier and at the discretion of the Assay Office).

If measurements have been made of the precious metal content of the articles in at least 10 previous samples and there is sufficient evidence from a statistical test on these data that the within-lot article-to-article variability in the precious metal content is stable, consideration should be given to using the "**σ**" method. If inspection is switched to the "**σ**" method, the square root of the weighted average value of s^2 over the previous 10 lots shall be taken as **σ**

SIST-TP CEN/TR 14547:2006

(see Annex A). The value of **σ** shall be continually updated on the basis of the previous 10 lots as long as the "**σ**" method is in effect.

If measurements have not been made under sampling by attributes, or the tests given in Annex B strongly indicate that there is a lack of homogeneity of the sample standard deviations or a lack of conformity of the most recent standard deviation with the supposedly known value **σ**, then there is no choice under sampling by variables except to use the "s" method.

Both the "s" method and the "**σ**" method tend to progress more rapidly to very small sample sizes, thus saving on inspection effort. For each of these methods there are five options, distinguished by a parameter c that takes values from 3 to 13 by intervals of 3. Larger values of c require smaller sample sizes, but are only appropriate when quality is an order of magnitude better than the AOQL.

7 The credit principle

The unifying idea for the sampling plans in this Technical Report is the credit principle. It is assumed that a supplier will submit for marking for fineness a continuing sequence of lots of articles of a similar precious metal content. Each lot may be of any size.

NOTE The AOQL protection for short sequences or for an isolated lot will still be valid, but the supplier will not benefit to the same extent from an accumulation of credit and the resulting reduction in inspection costs.

At the start of inspection, credit is set to zero. The appropriate sample size for each lot is determined from the relevant table by entering the table with the lot size and the credit. A sample of this size is randomly selected from the lot and inspected. If the first lot fails to meet the acceptance criterion, credit remains at zero. Otherwise credit is increased by the lot size. The process is repeated with successive lots, with credit increasing by the size of accepted lots until a lot is non-accepted, at which point the credit is reset to zero and a new sequence is started.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

By this means, a supplier who submits lots of consistently high quality is rewarded by smaller sample sizes and therefore lower inspection costs, while the required AOQL is still guaranteed.

SIST-TP CEN/TR 14547:2006
https://standards.iteh.ai/catalog/standards/sist/a0a747d2-d020-4d17-a6ee-9c5cc853f614/sist-tp-cen-tr-14547-2006

8 Classification by weight range

It was assumed in Clause 7 that the supplier was submitting for marking for fineness a continuing sequence of lots of articles of a similar precious metal content. Indeed, the methods in this Technical Report were essentially developed for articles of identical value submitted in lots of possibly varying size. In practice, of course, the supplier may submit lots of different types of article with a widely varying nominal weight of precious metal per article. In order to ensure that credit accumulated on articles of low value is not misused to provide artificially small sample sizes when sampling from articles of high value, lots are classified according to which weight range the average nominal weight of precious metal per article in the lot belongs. See Table 4 for the preferred weight ranges for gold, silver, platinum and palladium. A sequence of lots for the purposes of this Technical Report is then considered to be a sequence of lots from the same supplier of articles of a similar type and the same precious metal, with the nominal precious metal content within the same weight range. Suppliers may have a number of sequences of lots running concurrently.

9 Role and use of 100% inspection of non-accepted lots

If a supplier continually submits lots with in excess of 1,47% articles nonconforming, then eventually a sample could be selected that satisfies the acceptance criterion. If the previous non-accepted lots had all been scrapped without any further inspection, then this would be the first lot to enter the market place and the required AOQL of 1,47% nonconforming would at once be exceeded. Clearly such a procedure does not provide the required level of consumer protection.

If, instead, the first lot in a sub-sequence (i.e. when the credit is zero) is always 100% inspected if it is non-accepted, and the conforming articles found in the lot are allowed to enter the market place, then these conforming articles dilute the effect of erroneously accepted lots and it becomes possible to devise plans, such as those in this Technical Report, that provide the required consumer protection.

100% inspection may be relatively expensive if the articles are of low value with little workmanship and the lot is large. For such articles the supplier may be advised to submit a small lot at zero credit in order to avoid the

SIST-TP CEN/TR 14547:2006

possibility of an expensive 100% inspection of a large lot. Consultation of the relevant table from among Tables 1, 2 and 3 will help in determining an appropriate lot submission strategy.

On the other hand, articles may have had a considerable investment of workmanship that the supplier does not wish to be destroyed, or the re-refining costs of scrapped articles may be relatively high. In this case, the supplier may prefer all non-accepted lots to be 100% inspected, even when the credit exceeds zero, so that all the conforming articles in the lot can be placed in the market. The supplier may demand this option, as the AOQL consumer protection is not thereby compromised.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST-TP CEN/TR 14547:2006
https://standards.iteh.ai/catalog/standards/sist/a0a747d2-d020-4d17-a6ee-9c5cc853f614/sist-tp-cen-tr-14547-2006

SIST-TP CEN/TR 14547:2006

Section two : Choice of sampling plan

10 Choice between attributes and variables

At the start of inspection operations, when there is no evidence on which to judge the normality or otherwise of the distribution from article to article of the precious metal content, there is no option but to use sampling by attributes. Sampling by attributes does have certain advantages over sampling by variables:

a) The AOQL is guaranteed under sampling by attributes, regardless of the distribution from article to article of the precious metal content.

a) No tests for outliers or for heterogeneity or inconsistency of the standard deviations are necessary, so attributes inspection is administratively easier.

b) Inspection by attributes is generally cheaper and quicker, as it is only necessary to determine whether or not the precious metal content of each sampled article exceeds the level specified, not the precise content for each article.

c) An attributes scheme can be more readily understood and accepted; for example, it may at first be difficult to accept that, when inspecting by variables, a lot can be non-accepted on measurements taken of a sample that does not contain any nonconforming articles.

iTeh STANDARD PREVIEW

d) If quality is consistently excellent so that lots are continually accepted, eventually a point will be reached under sampling by attributes where the required sample size is only 1. For sampling by variables, it is necessary to take a sample of at least two articles from each lot in order to be able to determine the standard deviation, either for use under the "s" method or for monitoring the variability under the "**σ**" method.

(standards.iteh.ai)
SIST-TP CEN/TR 14547:2006

The advantage of sampling by variables is that sample sizes are generally smaller and the lower sample sizes (with the exception of sample size 1) are reached more quickly. This is an important consideration if inspection is time-consuming or expensive.

11 Choice between the "s" method and the "σ" method

If it has been decided to switch to sampling by variables and the conditions for switching are satisfied (see Clause 21), the next question is which method should be used, the "s" method or the "σ" method. The "σ" method is generally the most economical in sample size but, before that method may be employed, the value of σ has to be established.

If there is evidence that the within-lot variability in the parts per thousand of precious metal is inhomogeneous between lots, then it will be necessary to begin sampling by variables with the "s" method. Once variability becomes homogeneous from lot to lot, and lots continue to be accepted, the question becomes whether or not it will be economical to switch to the "σ" method. This will depend on the choice of value for c in the acceptance criterion (see Clause 12).

Under the "σ" method it will still be necessary to calculate the sample standard deviation s and to carry out heterogeneity and inconsistency tests (see Annex B). Methods of calculating s and for determining **σ** are given in Annex A.

12 Choice of constant, c, for sampling by variables

Both the "s" method and the "σ" method allow a choice from among five preferred values of a parameter c, namely the values ¼, ½, ¾, 1 and 1¼. Larger values of c provide smaller sample sizes and therefore lower inspection costs, but impose more stringent acceptance criteria. It is therefore only advantageous to choose one of the larger values of c if the process average is expected to be so good that the probability of lot acceptance will be high

SIST-TP CEN/TR 14547:2006

despite the severity of the acceptance criterion. Choice of the best value of c for a particular application may be aided by reference to Tables 2, 3 and 5.

The value of c shall always be determined before the sample is drawn. Normally the same value of c will be used throughout a sub-sequence of lots. Exceptionally, at the request of the supplier, the value of c may be changed to one of the other preferred values part-way through a sub-sequence. If this occurs, the credit already accrued shall be carried forward to the remainder of the sub-sequence.

13 Choice of sampling plan

Once the sampling method has been established, i.e. attributes, "s" method or "**σ**" method, together with the value of c in the case of sampling by variables, the sampling plan for the next lot is automatically determined by the size of the lot, N, and by the current value of the credit, K. Table 1 is used for sampling by attributes, Table 2 for the "s" method or Table 3 for the "**σ**" method. The appropriate table is entered with N and that row is scanned to find the smallest sample size, n, that requires a credit less than or equal to K. If the precise value of N is not tabulated, the next largest tabulated value of N shall be used. The required sampling plan is then a sample of size n with lot acceptance criterion

$$X_{min} \geq L$$

for sampling by attributes,

$$X_{min} \geq L+c.s$$

for the "s" method, and

$$X_{min} \geq L+c.\sigma$$

iTeh STANDARD PREVIEW
(standards.iteh.ai)

for the "σ" method, where X_{min} is the smallest of the n sample values and L is the lower specification limit for the precious metal content, and where X_{min}, L, s and σ are all expressed in the same units.

SIST-TP CEN/TR 14547:2006
https://standards.iteh.ai/catalog/standards/sist/a0a747d2-d020-4d17-a6ee-9c5cc853f614/sist-tp-cen-tr-14547-2006

SIST-TP CEN/TR 14547:2006

Section three : Operation of a sampling scheme

14 Preliminary operations

Inspection operations shall begin with sampling by attributes. The supplier may decide at the outset, on the grounds of administrative simplicity and ease of inspection, to remain indefinitely on attributes inspection. However, if a switch to sampling by variables may be desired at a later date, the supplier should consider having measurements made of the precious metal content of the individual test portions, rather than a simple screening to see whether or not the test portions conform to specification. Measurements are more time-consuming and expensive to obtain, but they are necessary to provide assurance that the conditions are right for switching to variables inspection.

Before the inspection of each lot, the assayer shall determine from Table 4 within which weight range the average nominal precious metal content per article for that lot lies. This average is easily calculated as the total weight of the articles in the lot divided by the number of articles in the lot and multiplied by the nominal precious metal content, L. This Technical Report shall be separately applied to sequences consisting of lots of similar articles within the same weight range from the same supplier. For each sequence, credit shall begin at zero.

15 Standard procedure for sampling by attributes

a) Find the row of Table 1 corresponding to the lot size N. If there is no row for this precise value of N, refer instead to the row corresponding to the next higher tabulated lot size.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

b) Find the entry in this row with the largest value that is less than or equal to the credit.

c) The required sample size is given at the top of the column containing this entry. Take a random sample of this size, and determine if any of the articles have a precious metal content below the lower specification limit, L. If none of the articles in the sample are below specification, the lot is accepted and the credit is increased by N; otherwise, the lot is non-accepted and the credit is reset to zero.

SIST-TP CEN/TR 14547:2006
https://standards.iteh.ai/catalog/standards/sist/e0a747d2-d020-4d47-a6ee-
0e5ac852f614/sist-tp-cen-tr-14547-2006

d) In the case of lot non-acceptance, if the current credit is zero the lot shall be subjected to 100% inspection; if the current credit is not zero, then it is at the discretion of the supplier whether the lot is 100% inspected or returned to the supplier as scrap. Conforming articles found in the sample shall always be marked for fineness.

e) When non-accepted lots are subjected to 100% inspection, the conforming articles shall be marked for fineness and the nonconforming articles returned to the supplier as scrap.

f) For subsequent lots of similar articles of the same precious metal in the same weight range from the same supplier, repeat from (a).

EXAMPLE 1

Suppose that the first lot submitted in a sequence is of size 200. Credit is zero, so the appropriate sample size is found from the last row of Table 1-4 to be 51. Fifty-one articles are selected at random from the lot and inspected. None are found to be nonconforming, so credit is increased to 200.

Suppose that the second lot in the sequence is of size 192. Lot size 192 does not appear in Table 1, so we refer instead to lot size 195, which is the next higher tabulated lot size. From the penultimate row of Table 1-3 it is found that a sample size of 29 requires a credit of 195, whereas a sample size of 28 requires a credit of 211. Our credit of 200 is therefore sufficient to reduce the sample size to 29, but insufficient to reduce it to 28. A random sample of 29 articles is accordingly selected from the second lot and inspected. One nonconforming article is found in the sample. The lot is therefore considered to be non-acceptable, and the credit is reset to zero. As the credit was greater than zero when the sample size for this lot was determined, it is not necessary for the purpose of guaranteeing the AOQL to subject the lot to 100% inspection. It is at the discretion of the supplier whether the lot is simply scrapped or 100% inspected. If the lot is scrapped, all conforming articles found in the sample shall be marked for fineness.

SIST-TP CEN/TR 14547:2006

16 Standard procedure for the "*s*" method

Every "*s*" method sampling plan in this Technical Report consists of a sample size together with an acceptance criterion of the form $X_{min} \geq L+c.s$, where c is one of five preferred values that is chosen by the supplier. The procedures are as follows:

a) Before the start of inspection under the "s" method, the supplier shall inform the Assay Office of his choice of value of c from among the five preferred values ¼, ½, ¾, 1 and 1¼. In general a phase of "s" method inspection will follow a qualifying phase of attributes inspection or a switch from "σ" method inspection, in both of which cases the credit shall be carried forward to the "s" method.

b) Find the row of Table 2 corresponding to the lot size N. If there is no row for this precise value of N, refer instead to the row corresponding to the next higher tabulated lot size.

c) In this row, find the entry with the largest value that is less than or equal to the credit.

NOTE For the larger lot sizes in Tables 2 and 3, the sample size required for credit 0 is smaller than for small values of the credit. For example, for lot size 125 with c = ¾, it is seen in Table 2-C-1 that a credit of zero requires a sample of 9, whereas a credit of between 1 and 6 inclusive requires a sample of size 11, and a credit of between 7 and 30 inclusive requires a sample of 10. The reason for this apparent anomaly is the requirement that lots non-accepted on credit zero are treated differently by being mandatory subjected to 100% inspection.

d) The sample size is given at the top of the column containing this entry. Take a random sample of this size, and measure the precious metal content of a test portion from each article. Determine the smallest, X_{min}, and the standard deviation, s, of these measurements. If $X_{min} \geq L+c.s$ then the lot shall be accepted and the credit, K, increased by N; otherwise, the lot shall be non-accepted and the credit reset to zero.

e) In the case of lot non-acceptance, if the current credit is zero the lot shall be subjected to 100% inspection; if the current credit is not zero, then it is at the discretion of the supplier whether the lot is 100% inspected or returned to the supplier as scrap. Conforming articles found in the sample shall always be marked for fineness.

f) In the case of lot non-acceptance where this is the second lot to be non-accepted within any sub-sequence of five or fewer consecutive lots, inspection shall revert to sampling by attributes.

g) When non-accepted lots are subjected to 100% inspection, the conforming articles shall be marked for fineness and the nonconforming articles returned to the supplier as scrap.

h) Carry out Grubbs' test for a single low outlier, i.e. a sample value significantly smaller than the other sample values (See ISO 5725-6). If, at the 1% significance level, a significantly low outlier is detected, sampling shall revert to sampling by attributes and the database of sample standard deviations shall be reset to zero. Credit, if any, shall be carried over to sampling by attributes.

i) If no significantly low outlier is detected, the Epps-Pulley test for departure from the normal distribution shall also be carried out if the sample is of size 8 or more (See ISO 5479). If non-normality is detected at the 1% significance level, the database of sample standard deviations shall be reset to zero and inspection shall be switched to sampling by attributes with a carryover of credit, if any.

j) If neither the outlier test nor the test for departure from normality produce significant results, update the database of sample standard deviations, and test for heterogeneity (See Annex B for details). If a result is obtained that is not significant at the 1% significance level, and the database of sample standard deviations contains at least 10 values, consider switching to the "σ" method (See 21.1.). If the result is significant at the 1% level, all but the most recent sample standard deviation shall be removed from the standard deviation database, and inspection shall continue under the "s" method.

k) If inspection remains under the "s" method then, for subsequent lots of similar articles of the same precious metal in the same weight range from the same supplier, repeat from (b).

EXAMPLE 2

A supplier has submitted 10 consecutive lots of 18 carat gold rings for marking for fineness under sampling by attributes. The average nominal gold content of the rings in each lot fell in the same weight range given in Table 4, so these lots were considered to form a single sequence. All lots were accepted for marking for fineness, with a resulting credit of 2215. Anticipating a possible later switch to variables inspection, the supplier had opted to have the parts per thousand of gold in the test portion from each of the sampled rings measured and recorded, rather than simply verifying that they conformed to the lower limit of 750 parts per thousand. Records and analyses of the

iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST-TP CEN/TR 14547:2006
https://standards.iteh.ai/catalog/standards/sist/a9a747d2-d020-4d17-a6ee-9c5ce858f614/sist-tp-cen-tr-14547-2006