इंटरनेट मानक

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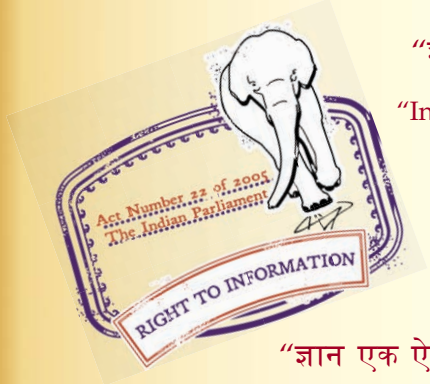
IS 8910 (2010): General technical delivery requirements for steel and steel products [MTD 4: Wrought Steel Products]



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"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS 8910 : 2010
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भारतीय मानक

इस्पात एवं इस्पात उत्पाद की सामान्य तकनीकी डिलीवरी अपेक्षाएँ

(पहला पुनरीक्षण)

Indian Standard

GENERAL TECHNICAL DELIVERY REQUIREMENTS FOR STEEL AND STEEL PRODUCTS

(First Revision)

ICS 77.080.20:77.140.01

B U R E A U OF I N D I A N STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELH1110002

February 2010

Price Group 6

NATIONAL FOREWORD

This Indian Standard {First Revision) which is identical with ISO 404 :1992 'Steel and steel products — Genera! technical delivery requirements' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Wrought Steel Products Sectional Committee and approval of the Metallurgical Engineering Division Council.

This standard was first published in 1978. This revision has been taken up to align it with ISO 404 :1992 by adoption under dual numbering system.

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain terminology and conventions are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'.

b) Comma (,) has been used as a decimal marker in the International Standard while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their respective places are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 31-0 : 1981 General principles concerning quantities, units and symbols	IS 1890 (Part 0): 1995 Quantities and units: Part 0 General principles *(first revision)*	Identical
ISO 377-1 : 1989 Selection and preparation of samples and test pieces of wrought steels — Part 1: Samples and test pieces for mechanical test	IS 3711 : 1990 Wrought steel — Selection and preparation of samples and test pieces for mechanical test *(first revision)*	Technically Equivalent
ISO 377-2 : 1989[1)] Selection and preparation of samples and test pieces of wrought steels — Part 2: Samples for the determination of the chemical composition	IS/ISO 14284 : 1996 Steel and iron-sampling and preparation of samples for the determination of chemical composition	do
ISO 4948-1 : 1982 Steels — Classification — Part 1: Classification of steels into unalloyed and alloyed steels based on chemical composition	IS 7598 : 1990 Classification of steels *(first revision)*	do
ISO 4948-2 : 1981 Steels — Classification — Part 2: Classification of unalloyed and alloyed steels according to the main quality classes and main property or application characteristics		

1) Since revised in 1996.

(Continued on third cover)

Indian Standard

GENERAL TECHNICAL DELIVERY REQUIREMENTS FOR STEEL AND STEEL PRODUCTS

(First Revision)

1 Scope

This International Standard specifies the general technical delivery requirements for all steel products covered by ISO 6929, with the exception of steel castings and powder metallurgical products.

ISO 10474 describes the inspection documents to be used.

Annex A gives details of related standards.

Where the delivery requirements agreed upon for the order or specified in the appropriate product or material standard differ from the general technical delivery requirements defined in this International Standard, then it is the requirements agreed for ordering or specified in the appropriate product or material standard which shall apply.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid international Standards.

ISO 31-0:1981, *Genera! principles concerning quantities, units and symbols.*

ISO 377-1:1989. *Selection and preparation of samples and test pieces of wrought steels — Part 1: Samples and test pieces for mechanical test.*

ISO 377-2:1989, *Selection and preparation of samples and test pieces of wrought steels — Part 2: Samples for the determination of the chemical composition.*

ISO 4948-1:1982, *Steels — Classification — Part 1: Classification of steels into unalloyed and alloy steels based on chemical composition.*

ISO 4948-2:1981, *Steels — Classification — Part 2: Classification of unalloyed and alloy steels according to main quality classes and main property or application characteristics.*

ISO 6929:1987. *Steel products - Definitions and classification.*

ISO/TR 9769:1991, *Steel and iron — Review of available methods of analysis.*

ISO 10474:1991, *Steel and steel products — Inspection documents.*

3 Definitions

For the purposes of this International Standard the following definitions, in addition to those in ISO 4948-1, ISO 4948-2 and ISO 6929, apply.

3.1 inspection: Activities such as measuring, examining, testing, gauging one or more characteristics of a product or service and comparing these with specified requirements to determine conformity. (Definition taken from ISO 8402 C[5]1)

3.2 testing: Any operation or action to determine one or more properties or characteristics of a material or product.

3.3 continuous inspection: Regular inspection and testing of the characteristics and/or manufacturing parameters of a product manufactured over a long period, normally in large quantities and always to the same specification. The tests and inspection are carried out according to a procedure agreed between the manufacturer and purchaser. This agreement may cover, for example, specifications on:

— the characteristics or manufacturing parameters to be tested or inspected;

— the condition of the products at the time of testing and inspection;

— the assessment of the test results (frequently statistical assessments);

— the right of the purchaser to verify the proper carrying out of the test inspections.

3.4 non-specific inspection and testing: Inspection and testing carried out by the manufacturer in ac cordance with his own procedures, to assess whether products made by the same manufacturing process meet the requirements of the order. The products inspected and tested may not necessarily be the products actually supplied.

NOTE 1 Current discussion indicate that the term "inspection and testing" will be replaced by "inspection".

3.5 specific inspection and testing: inspection and testing carried out, before delivery, according to the technical requirements of the order, on the products to be supplied or on test units of which the product supplied is part, in order to verify whether these products comply with the requirements of the order. (See 3.4, note 1.)

3.6 inspection representative: One or mote individuals who is/are either:

a) the Inspector(s) designated in the official regulations;

b) the manufacturer's authorized representative(s), who is/are independent of the production process, acting on behalf of the purchaser(s);

c) the purchaser's authorized representative.

3.7 test unit: The number of pieces or the tonnage of products to be accepted or rejected together, on the basis of the tests to be carried out on sample products in accordance with the requirements of the product standard or order. (See figure 1.)

NOTE 2 This term is sometimes referred to in other in ternational Standards as "inspection lot" or "batch".

3.8 sample product: Stem (a sheet, for example) selected from a test unit for inspection and/or testing. (See figure 1.)

3.9 sample; A sufficient quantity of material taken from the sample product for the purpose of producing one or more test pieces. (See figure 1.)

NOTE 3 In certain cases, the sample may be the sample product itself.

3.10 rough specimen: Part of the sample having undergone mechanical treatment, followed by heat treatment where appropriate, for the purpose of producing test pieces. (See figure 1.)

3.10 test piece: Part of the sample, with specified dimensions, machined or unmachined, brought to a required condition for submission to a given test. (See figure 1.)

NOTE 4 In certain cases, the test piece may be the sample itself or the rough specimen.

3.12 cast (heat) analysis: A chemical analysis representative of the cast (heat) determined by the steelmaker in accordance with his own procedures.

3.13 product analysis: A chemical analysis carried out on the product.

3.14 sequential testing: A group or series of tests from which the average and individual results are used to demonstrate that the requirements of the order and/or product standard have been satisfied.

4 Information to be supplied by the purchaser

4.1 The purchaser shall select the steel type, the shape of the product and the dimensions, taking the intended processing and use into account. He may take the manufacturer's advice in making his choice.

The order shall provide all the information necessary for describing the product and its characteristics, and also details concerning delivery such as:

a) mass, length, area, number of pieces to be delivered;

b) the product form (it may be a number referring to a drawing, for example);

c) the nominal dimensions;

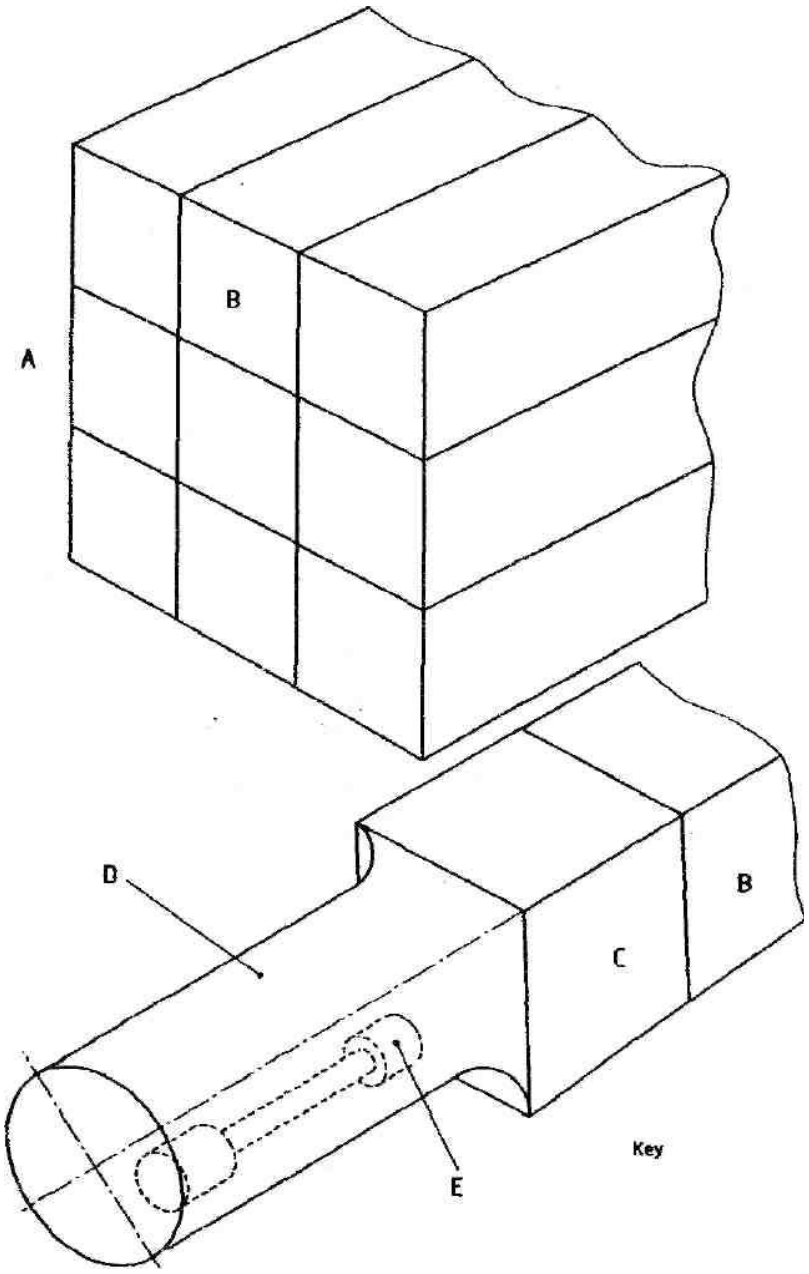
d) the tolerances on the characteristics in items a) and c);

e) the designation of the steel;

f) delivery condition (type of heat treatment, surface treatment etc.);

g) specific requirements for surface and/or internal quality (see 7.4);

h) the type of inspection document required and, where not specified in the product standard, the inspection and testing requirements (see clause 8);



A Test unit
B Safnple product
C Sample
0 Rough specimen
E Test piece

Figure 1 — Examples of terms defined in clause 3

i) where applicable, the application of one of the quality assurance systems given in ISO 9001 [6], ISO 9002 [7] or ISO 9003 [8];

j) requirements for marking, packing and loading;

k) any optional (supplementary) requirements provided for by the product standard.

4.2 The information in 4.1 shall be specified either:

a) by reference to one or more International Standards or;

b) in the absence of an International Standard, by stipulation of the characteristics and conditions required.

If, in an order, reference is made to a given International Standard without specifying its edition date, this reference shall be interpreted as being the edition current at the date of placing the order.

NOTE 5 if there is any doubt concerning the current edition of the International Standard, the edition to be used shall be agreed between the manufacturer and the purchaser.

5 Manufacturing process

The manufacturing process shall be left to the discretion of the manufacturer, unless otherwise agreed at the time of ordering or otherwise specified in the product standard.

NOTE 6 The manufacturing process covers all operations up to the delivery of the product.

6 Supply by a processor or merchant

When a product is supplied by a processor or an intermediary, they shall submit to the purchaser, without any changes to it, the manufacturer's documentation, as described in ISO 10474.

This documentation from the manufacturer shall include suitable means of identification of the product. in order to ensure the traceability between the product and the documentation.

If the processor or intermediary has changed the state or dimensions of the product in any way whatever, he shall supply an additional document of compliance for these particular new conditions. This shall apply to all special requirements not included in the manufacturer's documentation.

7 Requirements

7.1 General

The product shall comply with the requirements of the order.

The manufacturer shall carry out appropriate process control, inspection and testing to satisfy him self that the delivery complies with the quality and dimensional requirements of the order, irrespective of the type of inspection document required (see clause 8).

7.2 Chemical composition

Requirements concerning the chemical composition shall be considered to refer to the cast (heat) analysis unless they refer expressly to the product analysis.

7.3 Mechanical properties

7.3.1 Effect of dimensions

Where, in the product standard, the mechanical properties are specified by dimensional categories such as thickness, diameter etc.. the dimension to be considered is the nominal dimension of the product at the prescribed location for taking samples for mechanical tests.

7.3.2 Applicable material condition

In the absence of any specification in the order or the product standard, the mechanical properties relate to the as-delivered condition of the products.

7.3.3 Assessment of impact energy value

Where an impact-energy value is specified, without any further information, it shall be taken to represent the average value of those individual tests which shall be assessed as described in 8.3.4.2.

7.4 Surface and internal quality

7.4.1 General

All products shall have a workmanlike finish. Minor surface and internal Imperfections, which may occur under normal manufacturing conditions, shall not be grounds for rejection.

Detailed requirements referring to these characteristics shall, where appropriate, be agreed upon at the time of enquiry and order, by reference to the appropriate International Standard (or another relevant standard if no International Standard exists).

NOTE 7 The following International Standards on surface qualities exist: ISO 7788 [4], ISO 9443 [9] (and any others which are relevant).

7.4.2 Detection of defects

The use of special techniques {radiography, ultrasonic, magnetic detection, etc.) to detect defects, as well as the number of products to be tested per test unit and the procedures for interpreting the results, when required, shall be as specified in the product standard or as agreed at the time of ordering.

7.4.3 Removal of discontinuities

Surface discontinuities may be removed by mechanical or thermal means, provided that the dimensions and properties of the product remain within the limit specified in either the order, product standard, dimensional standard or surface quality standard.

7.4.4 Repairs by welding

Where there is no provision in the product standard or order, the purchaser or the inspector may permit local repairs by welding. This agreement may apply either to the whole or only to a part of the consignment.

8 Inspection and testing

8.1 Types of inspection documents and inspection and testing

8.1.1 When ordering, the purchaser shall state which type of inspection document [see 4.1 h)], if any, is required (see ISO 10474), thereby indicating the required type of inspection and testing: nonspecific or specific. If non-specific inspection and testing is required, see 8.2. If specific inspection and testing is required, see 8.3.

8.1.2 in special cases, specific inspection and testing may be replaced by continuous inspection (see 3.3) carried out by the manufacturer.

8.2 Non-specific inspection and testing

The purchaser may require that, on the basis of non-specific inspection and testing, a certificate of compliance with the order or a test report {see 2.1 and 2.2 of ISO 10474:1991) is to be furnished by the manufacturer. When the purchaser requires a test report, he shall indicate for which product characteristics the test results shall be given in this document, if the product standard does not cover such detail.

8.3 Specific inspection and testing

8.3.1 General

8.3.1.1 Information to be supplied

When the purchaser specifies that compliance with the requirements of the order is to be verified by specific inspection and testing, the enquiry and order shall cover:

— the type of document required, for example an inspection certificate of type 3.1. A or 3.1. B or 3.1. C, or an inspection report of type 3.2 {see ISO 10474);

and, if not specified in the product standard,

— the testing frequency (see 8.3.2);

— the requirements for sampling and for the preparation of the samples and test pieces (see 8.3.3);

— the identification of test units, if any;

— the test methods (see 8.3.4);

and, in the case of inspection certificates and inspection reports to be signed by external inspectors, the address of the inspection body.

8.3.1.2 Place of specific inspection and testing

If the necessary facilities are not available at the manufacturer's works, the inspection and testing shall be carried out at another place agreed between the two parties, or at an establishment accredited by a recognized organization, preferably in the country of manufacture. In the latter case, the products shall not be delivered before receipt of the test results by the manufacturer.

8.3.1.3 Submission for specific inspection and testing

Where appropriate, the inspection representative shall be informed, by the manufacturer or his authorized representative, of the date of availability of part or all of the consignment for specific inspection and testing. Reference shall be made to the order. The manufacturer and the inspection representative shall agree upon the time and date of the inspection and lesting, in order to avoid interference with the normal operation of the works. If the external inspection representalive does not attend on the agreed date, the manufacturer's authorized representative may carry out the acceptance operations himself and provide the purchaser, or his representative, with the inspection document, unless this was expressly forbidden.

A submission note referring to the order, or to the available parts of the order, shall be delivered to the inspection representative not later than the beginning of the inspection/testing procedure.

8.3.1.4 Rights and duties of the inspection representative

In order to carry out the agreed inspection and Jesting, the inspection representative shall have free access, at the agreed time, to the places where the products to be tested/inspected are manufactured and stored. He may select the sample products from the test unit from which the samples are to be taken in conformity with the specifications. He shall have the right to be present during the selection of the samples, preparation (machining and treatment) of test pieces and during the tests. He shall observe all the relevant instructions in force in the manufacturer's works and especially the safety rules. The works shall have the right to have him accompanied by one of their representatives. The testing/inspection procedures shall be carried out so that disturbance of the normal run of production is minimized.

8.3.1.5 Traceability during testing

During the test operations, the manufacturer shall be able to provide traceability between the sample products, samples and test pieces and the test units to which they belong.

8.3.2 Testing frequency

8.3.2.1 Formation of test units

For each type of test, the test unit shall be specified in the product standard or the order. Such specifications are normally based on the indication of whether the test unit shall be composed only of products of

— the same cast (heat), and/or

— the same casting sequence, and/or

— the same heat treatment condition or heat treatment batch, and/or

— the same product form, and/or

— the same thickness;

and whether the maximum size of the test unit is restricted by weight or number of pieces

In certain cases, the test unit may consist of an individual product.

8.3.2.2 Number of sample products, samples and test pieces

From each test unit, a certain number of sample products shall be selected for sampling. This number is specified in the product standard or the order. For each type of test, the following shall be as specified in the product standard or order:

— the number of sample products to be taken for each test unit;

— the number of samples to be taken for each sample product;

— the number of test pieces to be taken per sample.

8.3.3 Sampling conditions and test pieces

ISO 377-1 *and* ISO 377-2 give details of sample preparation for mechanical tests and chemical analysis. The general conditions of ISO 377-1 and ISO 377-2 and the specifications of the product standard or order for the location, direction and preparation of test pieces shall apply.

8.3.4 Test procedures

8.3.4.1 Test method and equipment

Tests shall be carried out, and the results presented, in accordance with the corresponding International Standard. Where no such International Standard exists, other test methods shall be used which shall be agreed upon at the time of ordering [see 4.1 h)].

All inspection, measuring and test equipment used by the supplier to verify characteristics for which specific requirements are included in the order or product standard, shall be calibrated and adjusted against certified equipment having a known valid relationship to nationally recognized standards, where such standards exist, and be so maintained. Where such standards do not exist, the basis for calibration shall be documented. The supplier or his authorized representative shall maintain calibration records for inspection, measuring and test equipment. The accuracy of the measuring or testing equipment shall be sufficient in relation to the specified values and tolerances.

The chemical composition may be determined by chemical, physical or spectrochemical methods of analysis (see ISO/TR 9769). In cases of arbitration, the method to be used shall be agreed upon.

Annex B contains a list of some of the major Inters national Standards used for testing and analysis.

8.3.4.2 Assessment of results of sequential tests

The assessment of some results is carried out in a sequential manner (see 3.14). The following example refers to impact tests.

a) The averaged value of a set of three test pieces shall meet the specified requirement. One individual value may be below the specified value, provided that it is not less than 70 % of that value.

b) If the conditions described in item a) are not satisfied and not more than two of the three individual values are lower than the specified minimum value, and not more than one of the three individual values is lower than 70 % of the specified value, then the manufacturer may take an additional set of three test pieces from the same samples. To consider the test unit as conforming, after testing the second set, the following conditions shall be satisfied simultaneously:

   1) the average value of the six tests shall be equal to or greater than the specified minimum value;

   2) not more than two of the six individual values may be lower than the specified minimum value;

   3) not more than one of the six individual values may be lower than 70% of the specified value.

c) If these conditions are not satisfied, the sample product is rejected and retests are carried out on the remainder of the test unit {see 8.3.4.3.3).

The assessment of some other tests, for example tensile testing in the thickness direction, is carried out in a similar manner.

8.3.4.3 Retests

8.3.4.3.1 General

Where one or more tests give unsatisfactory results, subject to the following exception, the manufacturer may either withdraw the test unit concerned or require retests in accordance with the procedures described in 8.3.4.3.2 and 8.3.4.3.3.

If the result of a test should deviate significantly from the specified requirements for the steel type to be supplied, so that there is a suspicion that products have become mixed, then the procedure described in clause 9 shall be used.

8.3.4.3.2 Non-sequential tests

Where the unsatisfactory result comes from tests for which no average, but only individual values are specified (e.g. tensile test, bend test or end quench hardenabtlity, the following procedures shall be carried out.

a) The test unit is a single piece {see figure2).

   Two new tests of the same type as the one giving an unsatisfactory result shall be carried out. Both new tests shall gfve satisfactory results. If not, the product shall be rejected.

b) The test unit is more than one piece, for example a roiling unit, cast or heat treatment condition (see figure3).

   The manufacturer may, at his discretion, retain in the test unit the sample product from which the unsatisfactory test results have been obtained, unless otherwise agreed.

   1) if the sample product is withdrawn from the test unit, the inspection representative shall designate two other sample products of his choice within the same test unit. One more test of the same type shall then be carried out on test pieces from each of the two sample products, under the same conditions as for the first tests. Both new tests shall give satisfactory results.

   2) If the sample product is retained in the test unit, the procedure is as indicated in item 1), but one or the new test pieces shall be taken from the sample product retained in the test unit. Both new tests shall give satisfactory results.

8.3.4.3.3 Sequential tests

Where the unsatisfactory result arises from the sequential method as defined in 8.3.4.2 for impact tests (see figure *4)*$_t$ the following shali be carried out.

As stated in 8.3.4.2, the sample product which has not given satisfactory results shall be rejected. The procedure shall be as indicated in 8.3.4.3.2 b) 1}, carrying out one new set of three tests on each of two different sample products from the remainder of the test unit, both of which shall give satisfactory results. In this case, 8.3.4.2 b) no longer applies.

8.4 Invalidation of test results

Test results which are due to improper sampling and/or preparation of test pieces and/or to tests carried out improperly shall be considered Invalid.

8.5 Rounding of results of mechanical and chemical tests

Unless otherwise specified in the order or product specification, for the purpose of deciding whether a test result meets a specified value, the results of mechanical and chemical tests shall be expressed by or, if needed, be rounded to the same number of significant figures as in the specified value, using either the rules specified in the testing standards or the rules according to annex B, Rule A of ISO 31-0:1981.

NOTE 8 When using digital display measuring devices, the number of digits shown may be in excess of the precision of the testing device and/or the test method.

9 Sorting and reprocessing

The manufacturer has the right to carry out sorting or reprocessing (e.g. heat treatment, machining, rolling, drawing, etc.) of non-conforming products, either before or after the retests, and to submit these products as a new test unit In accordance with 8.3.2. Where no reprocessing, only sorting, has been applied, the new inspection procedure shall only apply to the requirements which were not complied with during the first inspection and testing. The manufacturer shall inform the inspection representative which method of sorting or reprocessing was used.

10 Marking

The manufacturer shall identify the delivery by marking the product or the consignment either in accordance with the product standard or with the agreement at the time of order. In the absence of such requirements, the manufacturer shall use the identification of his choice.

When an inspection document is to be provided, the products and delivery units shall be marked so that traceability between these and the document is possible.

11 Disputes

In case of dispute, the sampling conditions and test methods used to evaluate the disputed characteristics shall be those described in the relevant International Standard, or in 8.3.3 and 8.3.4 of this International Standard.

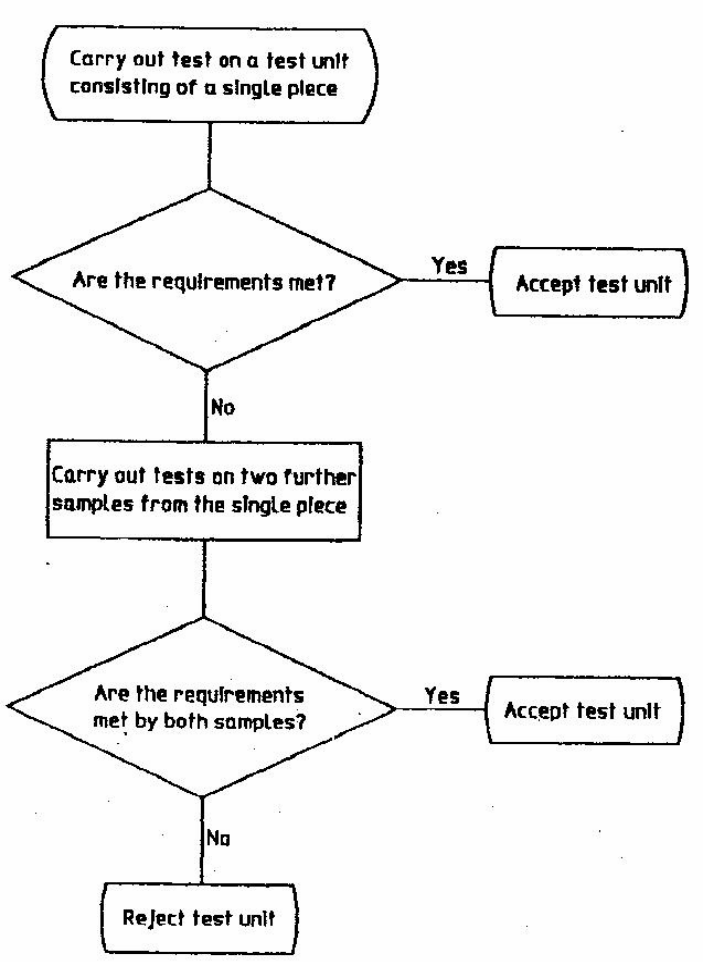


Figure 2 — Flow chart for tests where the interpretation of results of non-sequential tests is based on Individual values only (e.g. for tensile tests) for cases where the test unit consists of a single piece

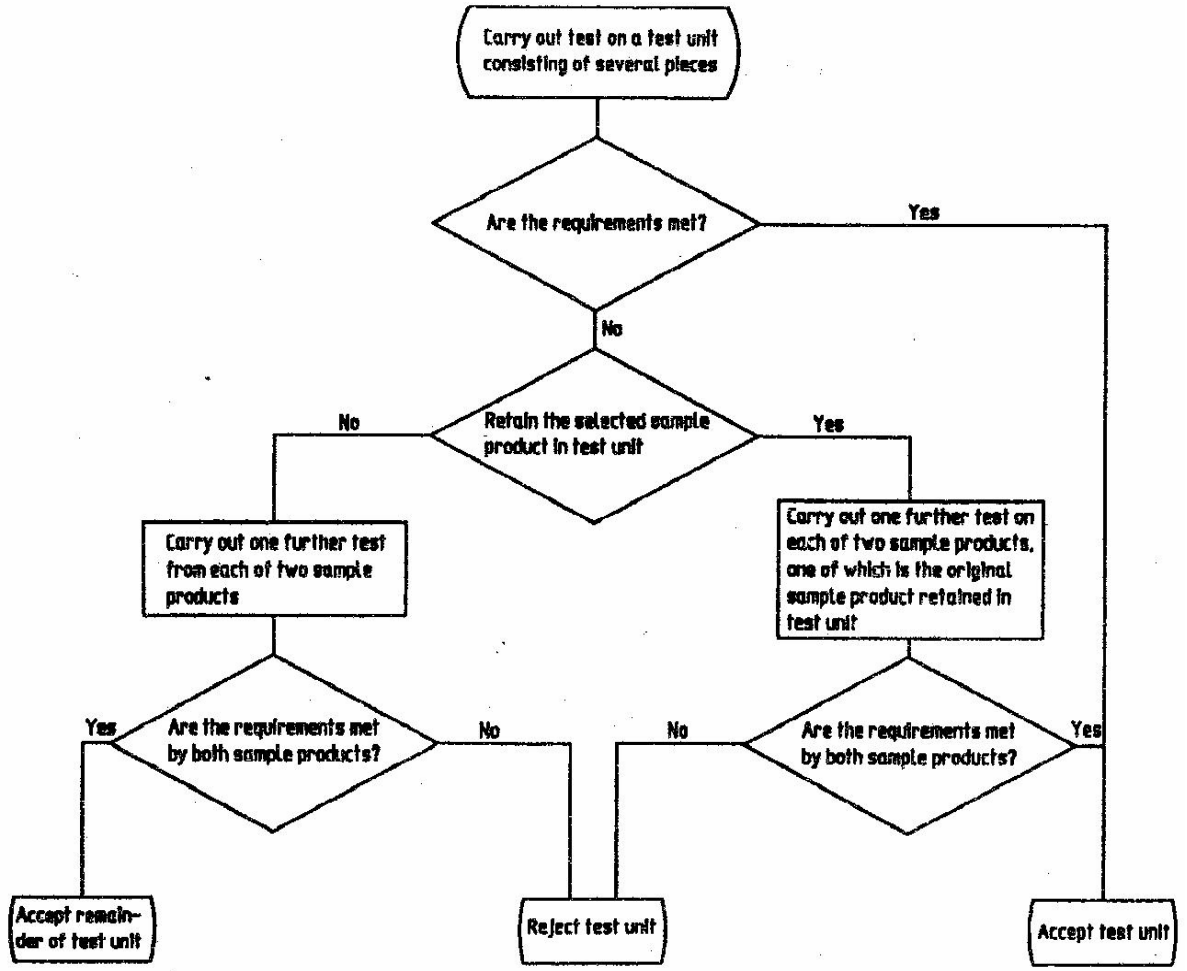


Figure 3 — Flow chart for tests where the Interpretation of results of non-sequential tests is biased on individual values only (e.g. for tensile tests) for cases where the test unit consists of several pieces

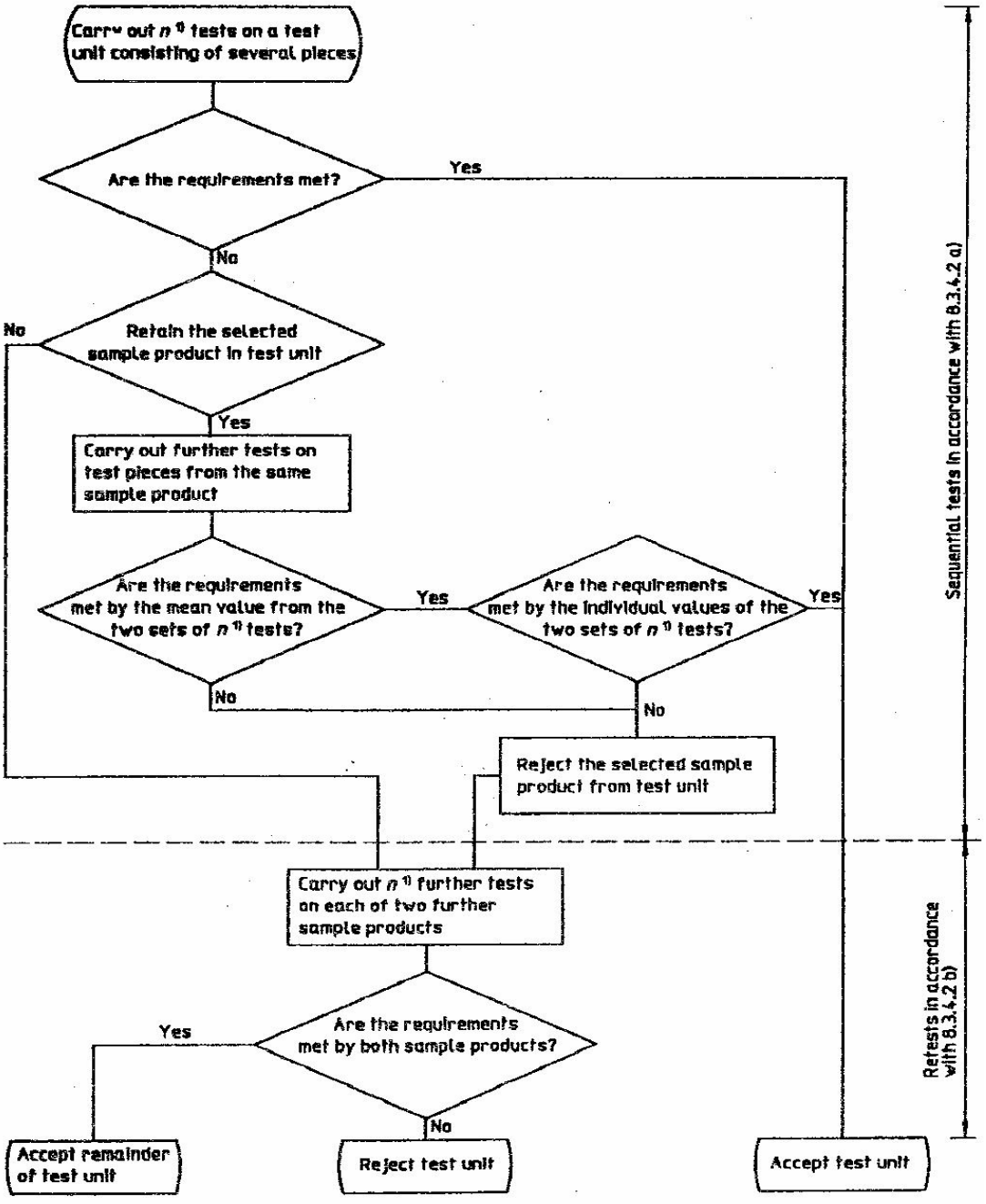


Figure 4 — Flow chart for sequential tests in conjunction with retests

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International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 6929 : 1987 Steel products — Definitions and classification	IS 1990:2009 Steel rivet and stay bars for boilers *(second revision)*	Technically Equivalent
ISO/TR 9769 :1991 Steel and iron — Review of available methods of analysis	SP 71 :2010 Compendium of method of chemical analysis of steels	do
ISO 10474 : 1991 Steel and steel products — inspection documents	IS/ISO 10474 : 1991 Steel and steel products — Inspection documents	Identical

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values *(revised)'-*

Bureau of Indian Standards

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Review of Indian Standards

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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