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General technical delivery conditions for steel products

Conditions générales techniques de livraison des produits en acier

Allgemeine technische Lieferbedingungen für Stahlerzeugnisse

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

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Contents

Foreword

This document (EN 10021:2006) has been prepared by Technical Committee ECISS/TC 9 “Technical conditions of delivery and quality control”, the secretariat of which is held by IBN/BIN.

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of an identical text or by endorsement, at the latest by June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007.

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

1 Scope

This European Standard specifies the general technical delivery conditions for all steel products covered by EN 10079 with the exception of steel castings and powder metallurgical products.

Where the delivery requirements agreed for the order or specified in the appropriate product specification differ from the general technical delivery conditions defined in this European Standard, then the requirements agreed for the order or specified in the appropriate product specification apply.

NOTE Inspection documents are covered by EN 10168 and EN 10204.

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.

CR 10261, *ECISS Information Circular 11 — Iron and steel — Review of available methods of chemical analysis*

EN 10020:2000, *Definition and classification of grades of steel*

EN 10052:1993, *Vocabulary of heat treatment terms for ferrous products*

EN 10079:1992, *Definition of steel products*

EN 10204:2004, *Metallic products — Types of inspection documents*

EN ISO 377, *Steel and steel products — Location and preparation of samples and test pieces for mechanical testing (ISO 377:1997)*

ISO 31-0:1992, *Quantities and units — Part 0: General principles*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 10020:2000, EN 10052:1993, EN 10079:1992, EN 10204:2004 and the following apply.

3.1
cast (heat) analysis
chemical analysis representative of the cast (heat) determined by the steelmaker at his discretion in a manner of his choice

3.2
inspection
conformity evaluation by observation and judgment accompanied as appropriate by measurement, testing or gauging

3.3
inspection representative(s)
one or more individual(s) who is/are either:

a) the inspector(s) designated in any official regulation;

b) the manufacturer's authorized inspection representative(s), independent from the manufacturing department;

c) the purchaser's authorized inspection representative(s)

NOTE 1 The inspection representatives mentioned in a) and c) are referred to in the text as external inspection representatives.

NOTE 2 The inspection representatives validate the inspection and test results. Inspection and testing can also be carried out by the manufacturing department.

3.4
non-specific inspection
inspection carried out by the manufacturer in accordance with his own procedures to assess whether products defined by the same product specification and made by the same manufacturing process are in compliance with the requirements of the order or not

NOTE The products inspected may not necessarily be the products actually supplied.

3.5
product analysis
chemical analysis carried out on a sample of the product

3.6
rough specimen
part of the sample having undergone forming and/or machining, followed by heat treatment where appropriate, for the purpose of producing test pieces (see Figure 1)

3.7
sample
sufficient quantity of material taken from the sample product for the purposes of producing one or more test pieces (see Figure 1)

NOTE In certain cases, the sample can be the sample product itself or the rough specimen.

3.8
sample product
item (a sheet, for example) selected from a test unit for the purpose of obtaining test pieces (see Figure 1)

NOTE In certain cases the sample product can be the sample itself.

3.9
sequential testing
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 specification have been satisfied

3.10
specific inspection
inspection carried out, before delivery, according to the product specification on the products to be supplied or on test units of which the products supplied are part, in order to verify that these products are in compliance with the requirements of the order

3.11
testing
determination of one or more characteristics according to a procedure

3.12
test piece
part of the sample, with specified dimensions, machined or un-machined, brought to a required condition for submission to a given test (see Figure 1)

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

3.13
test unit
number of pieces or mass 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 specification or order (see Figure 1)

4 Information to be supplied by the purchaser

4.1 The purchaser shall select the steel grade, 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 required product and its characteristics and details concerning delivery, e.g.:

a) mass, length, area, number of pieces;

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

c) the nominal/specified dimensions;

d) the tolerances on the characteristics in a), b) and c);

e) the steel designation;

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

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

h) the type of inspection document (see EN 10204) if required;

i) the inspection requirements when not specified in the product specification (see Clause 8);

j) the requirements for marking, packing and loading;

k) any optional (supplementary) requirements provided for by the specification to apply.

4.2 The information in 4.1 shall be specified either by reference to one or more standards or, in the absence of a standard, by stipulation of the required characteristics and conditions.

If, in an order, reference is made to a given standard without specifying its edition date, this reference shall be interpreted as being the latest edition at the date of the order acknowledgment.

5 Manufacturing process

The manufacturing process shall be left to the discretion of the manufacturer unless otherwise agreed at the time of enquiry and order or otherwise specified in the product specification.

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

6 Supply by an intermediary

When a product is supplied by an intermediary, he shall submit to the purchaser, without any changes to it, the manufacturer's documentation.

This documentation from the manufacturer shall be accompanied by suitable means of identification of the product, in order to ensure the traceability between the product and the documentation (see Clause 10).

If the intermediary has changed the dimensions of the product, he shall supply an additional document of compliance for these particular new conditions. This also applies to all special requirements given in the order and not defined in the manufacturer's documentation.

NOTE Any organization which during processing changes the metallurgical state of the product is considered as a product or material manufacturer.

7 Requirements

7.1 General

The products shall comply with the requirements of the order. Consequently, the manufacturer shall carry out appropriate process control and inspection to ensure that the delivery complies with the requirements of the order, irrespective of the type of inspection document required (see Clause 8).

NOTE Examples for quality management systems can be found in appropriate documents, e.g. EN ISO 9001.

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 Where, in the product specification, the mechanical properties are specified by dimensional categories e.g. based on thickness or diameter, the dimension to be considered is the nominal/specified dimension of the product at the prescribed location for taking samples for mechanical tests.

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

7.3.3 Where an impact energy value is specified, without any further information, it shall be interpreted as representing 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 finish appropriate to the manufacturing route. Minor surface and internal discontinuities which may occur under normal manufacturing conditions shall not be a basis for rejection.

Detailed requirements referring to the surface and internal quality shall, where appropriate, be agreed at the time of enquiry and order, by reference to the appropriate European Standard or other relevant standard if no European Standard exists.

7.4.2 Detection of discontinuities

When special techniques (radiography, ultrasonics, magnetic detection etc.) are required to detect discontinuities, they shall, as well as the test frequency and the acceptance criteria, be as specified in the product specification or as agreed at the time of enquiry and order.

7.4.3 Removal of discontinuities

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

7.4.4 Repairs by welding

When there is no provision to the contrary in the product specification or order, the inspection representative may permit local repairs by welding. This permission may apply either to the whole or only to a part of the consignment and may imply a specific welding procedure specification.

8 Inspection

8.1 Type of inspection documents and type of inspection

When ordering, the purchaser shall state which type of document (see 4.1 h), if any, is required.

8.2 Non-specific inspection

When the purchaser requires a test report according to type 2.2 according to EN 10204:2004 he shall, if the product specification does not cover such detail, indicate for which product characteristics values shall be given in this document.

8.3 Specific inspection

8.3.1 General

8.3.1.1 Information to be supplied

Where the purchaser specifies that compliance with the requirements of the order shall be verified by specific inspection, the order shall cover the type of document required, i.e. the inspection certificate 3.1 or 3.2 (see EN 10204:2004), and the following items if they are not specified in the product specification:

— 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 test methods (see 8.3.4);

— the identification of test units if any.

In the case of inspection document type 3.2 (see EN 10204:2004), appropriate contact details of the person appointed to act as the external inspection representative shall be given in the order.

8.3.1.2 Place of specific inspection

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

8.3.1.3 Submission for inspection by an external inspection representative

In case of type 3.2 inspection documents, the external 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. Reference shall be made to the order.

The manufacturer and the external inspection representative shall agree the time and date of the inspection in order to avoid interference with the normal operation of the works. If the purchaser or his representative does not attend the inspection on the agreed date without justification, the manufacturer shall be considered as authorized to proceed with the inspection and to issue a 3.1 document.

A submission note referring to the consignment, or to the available parts of the consignment, shall be delivered to the external inspection representative not later than at the beginning of the inspection procedure.

8.3.1.4 Rights and duties of the external inspection representative

In order to carry out the agreed inspection, the external inspection representative shall have free access, at the agreed time, to the places where the products to be inspected are manufactured and stored. He shall have the right to be present during the selection and sampling of the products and to witness the tests. He shall observe all the relevant instructions in force in the manufacturer's works and particularly the safety rules. The works shall have the right to have him accompanied by a representative of the works.

The 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 ensure traceability between the sample products, samples, rough specimens if applicable, 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 specification or the order. Such specifications are normally based on the indication of whether the test unit shall be composed only of products of either one of the following:

— same cast (heat),

— same casting sequence,

— same rolling unit,

— same heat treatment condition or heat treatment batch,

— same product form,

— same thickness range

or any combination of these and whether the maximum size of the test unit is restricted by mass 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

For each type of test, the number of sample products to be taken from each test unit, the number of samples to be taken from each sample product and the number of test pieces to be taken per sample shall be as specified in the product specification or order.

8.3.3 Sampling conditions and test pieces

The requirements of EN ISO 377 and the specifications of the product specification or order for the location, direction and preparation of samples and 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 European Standard; where no such European Standard exists the test method to be used shall be agreed at the time of enquiry or order (see 4.1 i)).

All inspection measuring and test equipment used by the manufacturer to verify characteristics for which specific requirements are included in the order or product specification shall be calibrated and adjusted against certified equipment having a known valid traceability to nationally or internationally recognized standards, where such standards exist, and be so maintained. Where such standards do not exist the calibration procedure shall be documented. The manufacturer 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 according to CR 10261. In cases of arbitration, the method to be used shall be agreed.

8.3.4.2 Assessment of results of sequential tests

The assessment of some results is carried out in a sequential manner (see 3.13 and 8.3.4.3.3). The following example refers to impact tests.

a) The average value of a set of three test pieces shall be equal to or greater than the specified value. One individual value may be below the specified value, provided that it is not less than 70 % of that value.

b) If the conditions under a) are not satisfied then an additional set of three test pieces may be taken at the discretion of the manufacturer from the same sample and tested. To consider the test unit as conforming, after testing the second set, the following conditions shall be satisfied simultaneously:

   i) the average value of six test pieces shall be equal to or greater than the specified value;

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

   iii) 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 may be carried out on the remainder of the test unit (see 8.3.4.3.3).

The assessment of some other tests e.g. through thickness tensile testing, is carried out in a similar manner.

8.3.4.3 Retest

8.3.4.3.1 General

Where one or more tests give non-conforming results, subject to the following exception, the manufacturer may either withdraw the test unit concerned or carry out 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 deviates 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 non-conforming result comes from tests for which no average, but only individual values are specified (e.g. tensile test or end quench hardenability), the following shall be carried out.

a) The test unit consists of a single piece (see Figure 2).

Two new tests of the same type as the one giving a non-conforming result shall be carried out. Both new tests shall give conforming results. If not, the product shall be rejected.

b) The test unit includes more than one piece e.g. by cast or heat treatment condition (see Figure 3).

The manufacturer may, at his discretion, retain in the test unit the sample product from which the non-conforming tests have been obtained.

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

ii) If the sample product is retained in the test unit, the procedure is as indicated in i) but one of the new test pieces shall be taken from the sample product retained in the test unit; both new tests shall give conforming results.

8.3.4.3.3 Sequential tests

Where the non-conforming result arises from the sequential method as defined in 8.3.4.2 (see Figure 4), the following shall be carried out.

As stated in 8.3.4.2 the sample product which has given non-conforming results shall be rejected. The procedure shall be as indicated in 8.3.4.3.2 b) but, instead of carrying out one new test, carrying out one new set of three tests on each of two different products from the remainder of the test unit, both of which shall give conforming results. In this case, 8.3.4.2 b) no longer applies.

8.4 Invalidation of test results

Tests 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, 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 ISO 31-0:1992, Annex B, rule B.

NOTE When using digital display measuring devices, the number of digits shown may be in excess of the accuracy 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) of non-conforming products, either before or after the re-tests, 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 at first inspection. The manufacturer shall state to the inspection representative the method of sorting used.

10 Marking

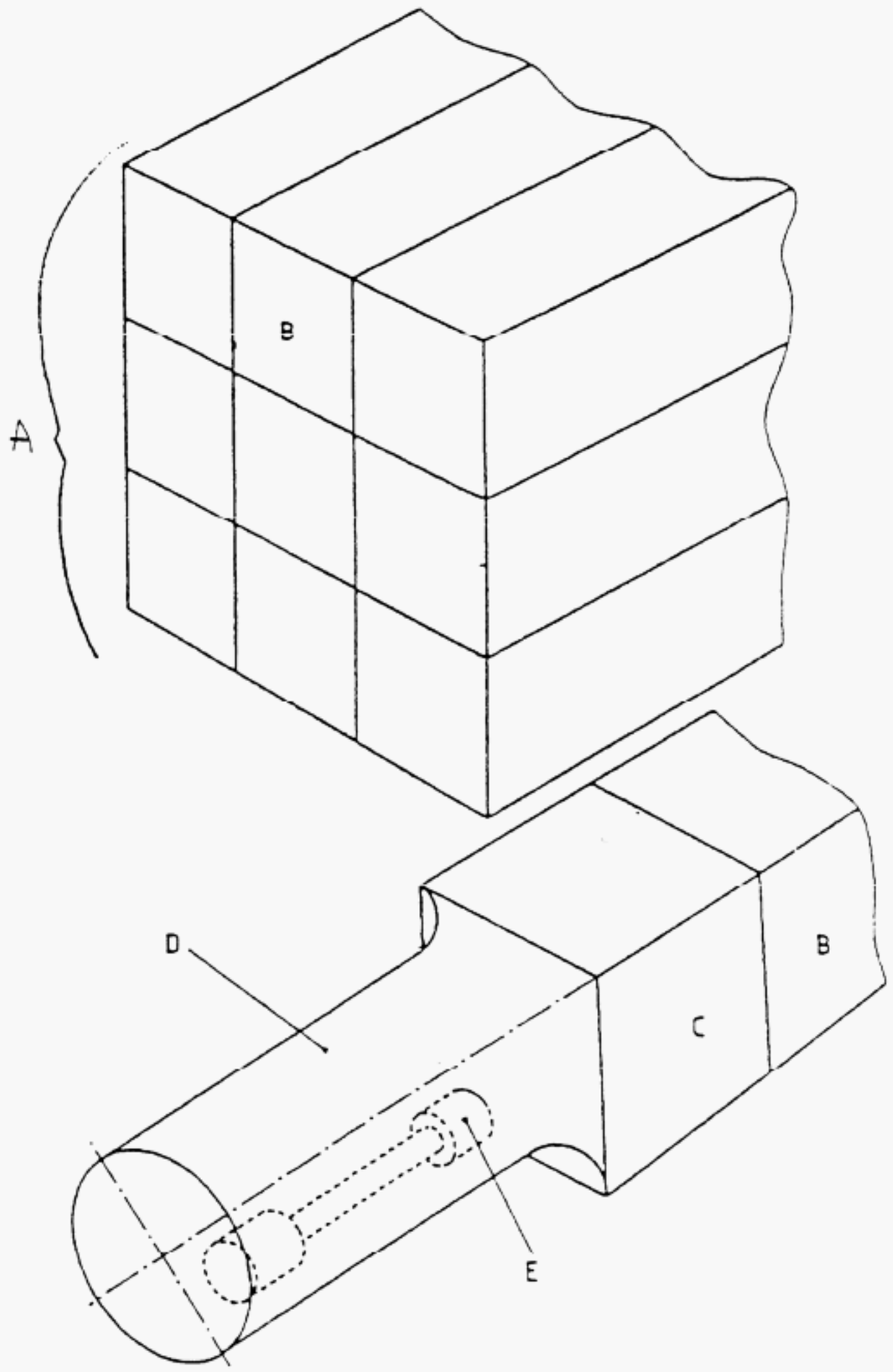
The manufacturer shall identify the delivery either by marking the product or the delivery unit in accordance with the product specification or the agreement at the time of enquiry and order. In the absence of such requirements the manufacturer shall use the type of identification of his choice taking into account the following:

a) when a specific inspection was ordered the delivery units or products shall be marked so that traceability between these and the inspection document type 3.1 or 3.2 is ensured;

b) in all other cases the delivery units or products shall be marked so that at least the manufacturer and the steel grade are traceable.

11 Disputes

In case of dispute the sampling conditions and the test methods used to evaluate the disputed characteristics shall be in accordance with the requirements of 8.3.3 and 8.3.4 of this European Standard.



Key

A Test unit
B Sample product
C Sample
D Rough specimen
E Test piece

Figure 1 — Terms defined in Clause 3

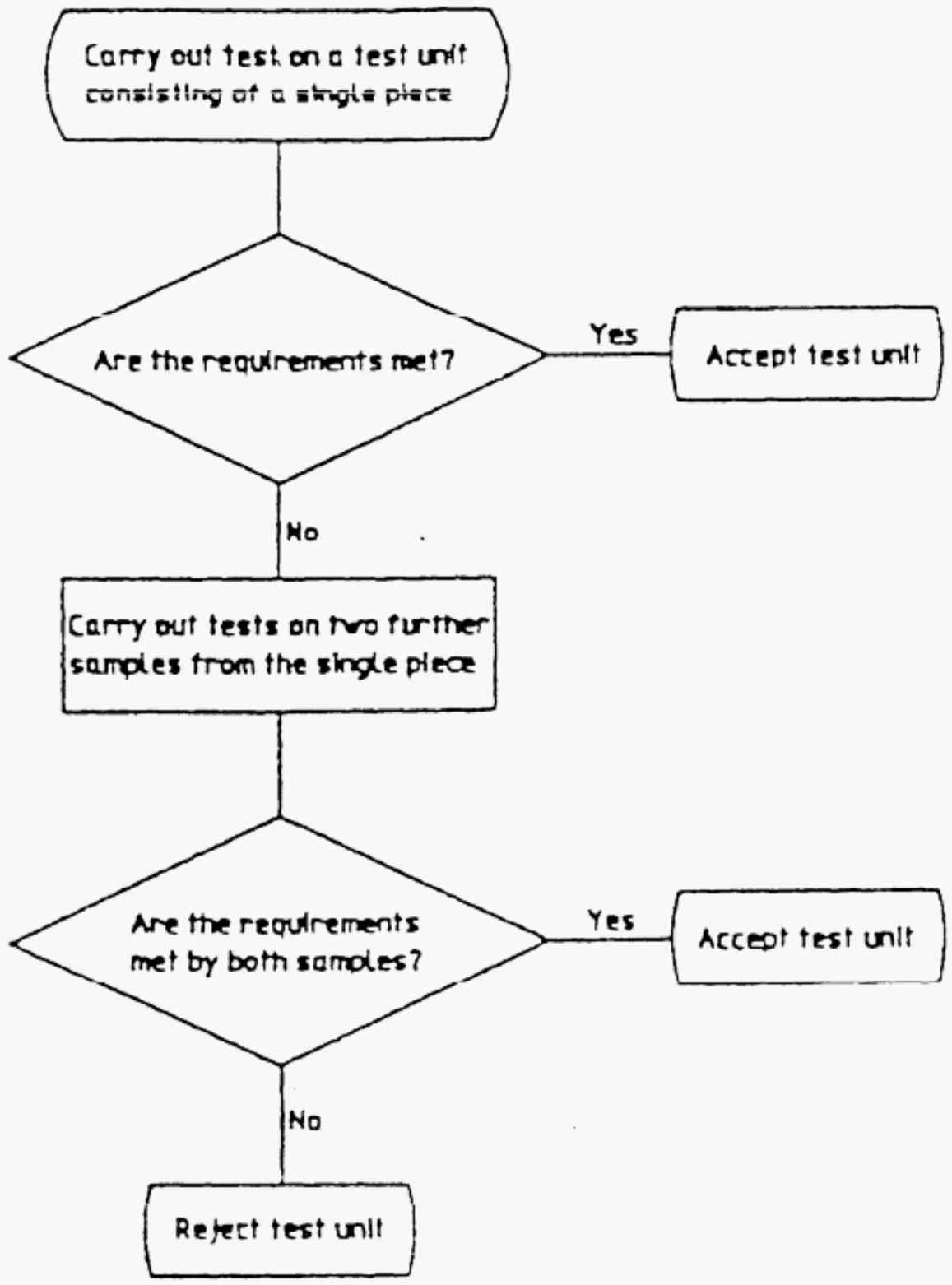


Figure 2 — Flow chart for tests and retests where the assessment of results of non-sequential tests is based on individual values only (e.g. for tensile test) for cases where the test unit consists of a single piece

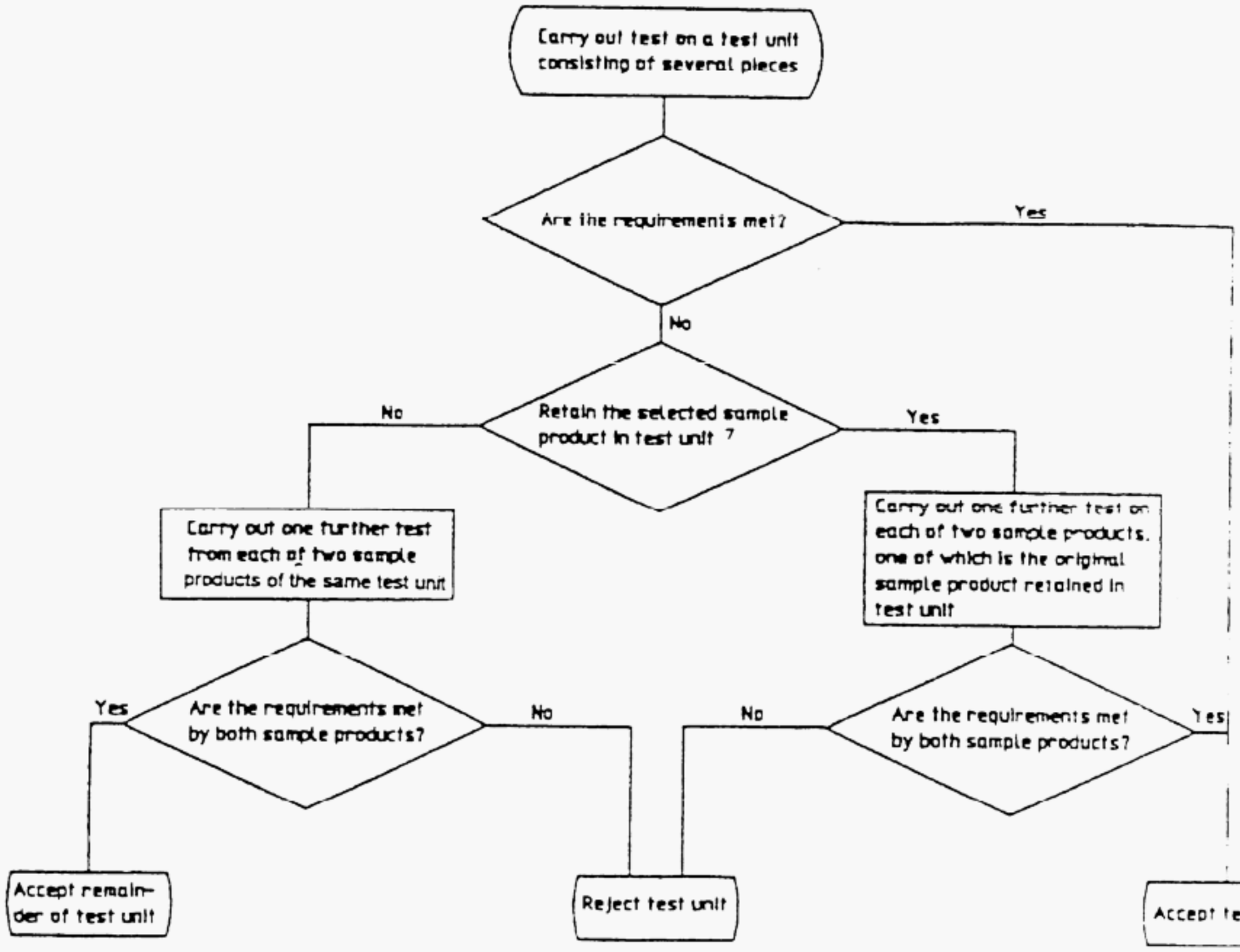
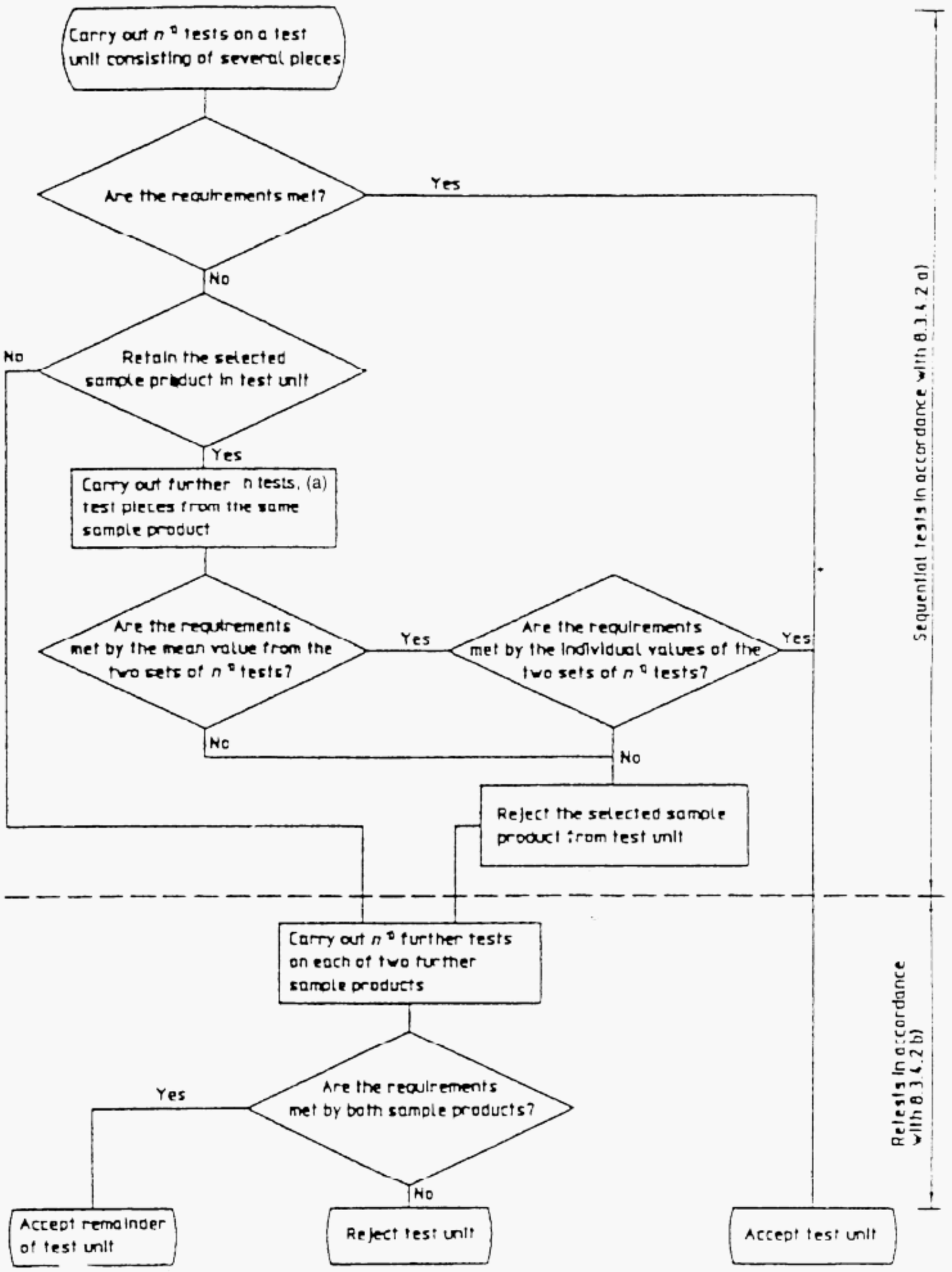


Figure 3 — Flow chart for test and retests where the assessment of results of non-sequential tests is based on individual values only (e.g. for tensile tests) for cases where the test unit consists of several pieces



[a] For impact tests and through thickness tensile tests n = 3.

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

Bibliography

[1] EN ISO 9001, *Quality management systems — Requirements (ISO 9001:2000)*

[2] EN 10168, *Steel products — Inspection documents — List of information and description*