

SRI LANKA STANDARD 484 PART 7: 2018
(ISO 4660: 2011)
UDC 678.4

METHODS OF
TESTING FOR RAW NATURAL RUBBER
PART 7: COLOUR INDEX TEST
(Second Revision)

SRI LANKA STANDARDS INSTITUTION

Sri Lanka Standard
METHODS OF TESTING FOR RAW NATURAL RUBBER
PART 7: COLOUR INDEX TEST
(Second Revision)

SLS 484 PART 7: 2018
(ISO 4660: 2011)

Gr. C

Copyright Reserved
SRI LANKA STANDARDS INSTITUTION
17, Victoria Place
Elvitigala Mawatha
Colombo 08
SRI LANKA.

Sri Lanka Standards are subject to periodical revision in order to accommodate the progress made by industry. Suggestions for improvement will be recorded and brought to the notice of the Committees to which the revisions are entrusted.

This Standard does not purport to include all the necessary provisions of a contract

© ISO 2011 - All right reserved.

© SLSI 2018

All right reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the SLSI.

Sri Lanka Standard
METHODS OF TESTING FOR RAW NATURAL RUBBER
PART 7: COLOUR INDEX TEST
(Second Revision)

FOREWORD

This Sri Lanka Standard was approved by the Sectoral Committee on Chemical and Polymer Technology and was authorized for adoption and publication as a Sri Lanka Standard by the Council of the Sri Lanka Standards Institution on 2018-11-16

This Sri Lanka Standard was first published in 1980 and First Revision which was an adoption of ISO 4660: 1999 was published in 2006. The International Standard ISO 4660: 1999 has been technically revised in 2011. ISO 4660: 2011 has been accepted to adopt as the second revision to **SLS 484: Part 7** to be referred for the determination of colour index of raw natural rubber.

This Standard is identical with ISO 4660: 2011, Rubber, raw natural — Colour index test, published by the International Organization for Standardization (ISO).

TERMINOLOGY AND CONVENTIONS:

The text of the International Standard has been accepted as suitable for publication, without deviation, as a Sri Lanka Standard. However, certain terminology and conventions are not identical with those used in Sri Lanka Standards. Attention is therefore drawn to the following:

- a) Wherever the words ‘International Standard’ appear referring to a particular standard they should be interpreted as “Sri Lanka Standard”.
- b) The comma has been used throughout as a decimal marker. In Sri Lanka Standards it is the current practice to use the full point at the base as the decimal marker.
- c) Wherever page numbers are quoted, they are ISO page numbers.

Cross References

International Standard

ISO 2393, Rubber test mixes — Preparation, mixing and vulcanization — Equipment and procedures

Corresponding Sri Lanka Standard

No corresponding Sri Lanka Standard

INTERNATIONAL
STANDARD

SLS 484 PART 7: 2018

ISO
4660

Fourth edition
2011-02-15

Rubber, raw natural — Colour index test

Caoutchouc naturel brut — Essai d'indice de couleur



Reference number
ISO 4660:2011(E)

© ISO 2011

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.



COPYRIGHT PROTECTED DOCUMENT

© ISO 2011

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Principle	1
4 Apparatus	1
5 Procedure	4
5.1 Test piece preparation	4
5.2 Colour matching	5
6 Expression of results	5
7 Precision and bias	5
8 Test report	5
Bibliography	6

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 4660 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 3, *Raw materials (including latex) for use in the rubber industry*.

This fourth edition cancels and replaces the third edition (ISO 4660:1999), which has been technically revised. The main change is the deletion of the subclause concerning sample preparation (old Subclause 5.1) together with the associated normative reference ISO 1795.

Rubber, raw natural — Colour index test

WARNING — Persons using this International Standard should be familiar with normal laboratory practice. This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

1 Scope

This International Standard specifies a method of determining the colour of raw natural rubber according to a standard colour scale.

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 2393, *Rubber test mixes — Preparation, mixing and vulcanization — Equipment and procedures*

3 Principle

The raw rubber is prepared in the form of a moulded disc of specified thickness, and the colour of this disc is compared and matched as closely as possible with that of standard glasses. Colour matching is carried out under diffuse daylight illumination against a matt white background, preferably by use of a comparator which suitably locates and shrouds the test piece and standard glass.

The standard glasses used are calibrated according to the intensity of their colour (amber) to provide a colour index scale in which the higher index values correspond to darker colours.

4 Apparatus

4.1 Laboratory mill, conforming to the requirements of ISO 2393.

4.2 Mould, of stainless steel or aluminium, 1,6 mm ± 0,05 mm thick, having cavities approximately 14 mm in diameter with two mould covers of similar material, 1 mm to 2 mm thick. A suitable mould is illustrated in Figure 1.

4.3 Platen press, capable of applying a pressure of not less than 3,5 MPa over the platen surfaces and maintaining platen temperatures of 150 °C ± 3 °C. Platens with lateral dimensions of 200 mm × 200 mm are suitable.

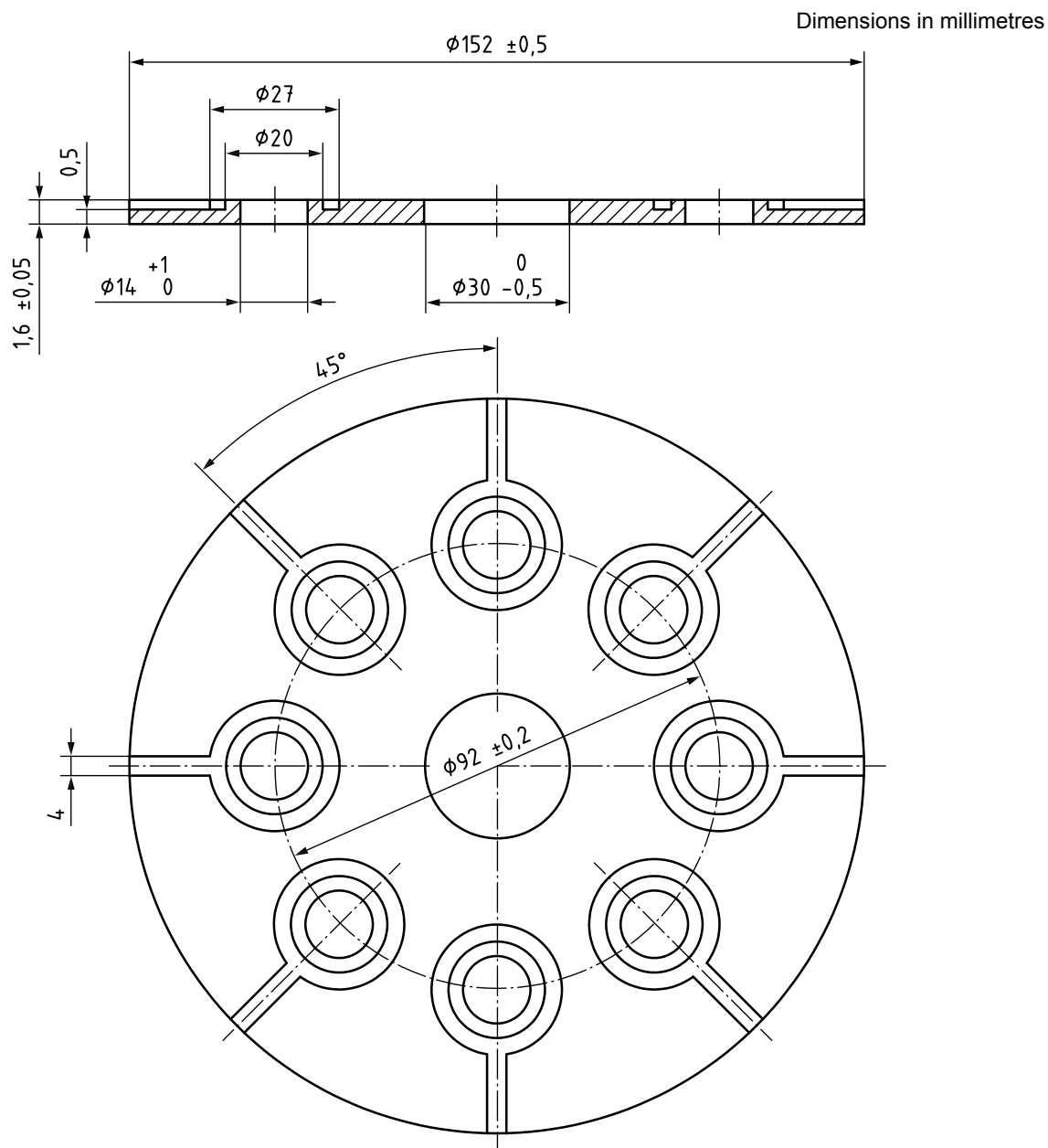


Figure 1 — Mould for colour index test

4.4 Punch, for preparation of the test pieces.

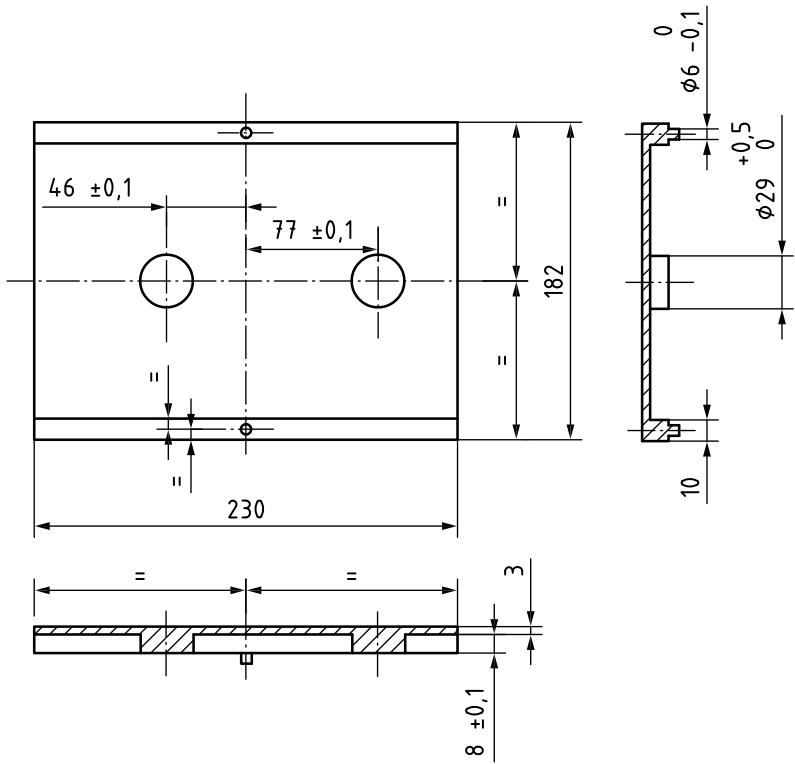
The purpose of the punch is to produce test pieces of approximately constant volume quickly and without difficulty. The punch shall consist of a flat-ended cylindrical anvil and a coaxial tubular knife moving independently of one another; a single action of the handle shall compress a portion of the material to a thickness of approximately 3 mm and shall cut a disc of approximately 13 mm diameter. The test piece need only be approximately constant in volume because the final shaping to exact dimensions is carried out in the mould during the pre-heating period.

NOTE This is identical with the test piece punch described in ISO 2007:2007.

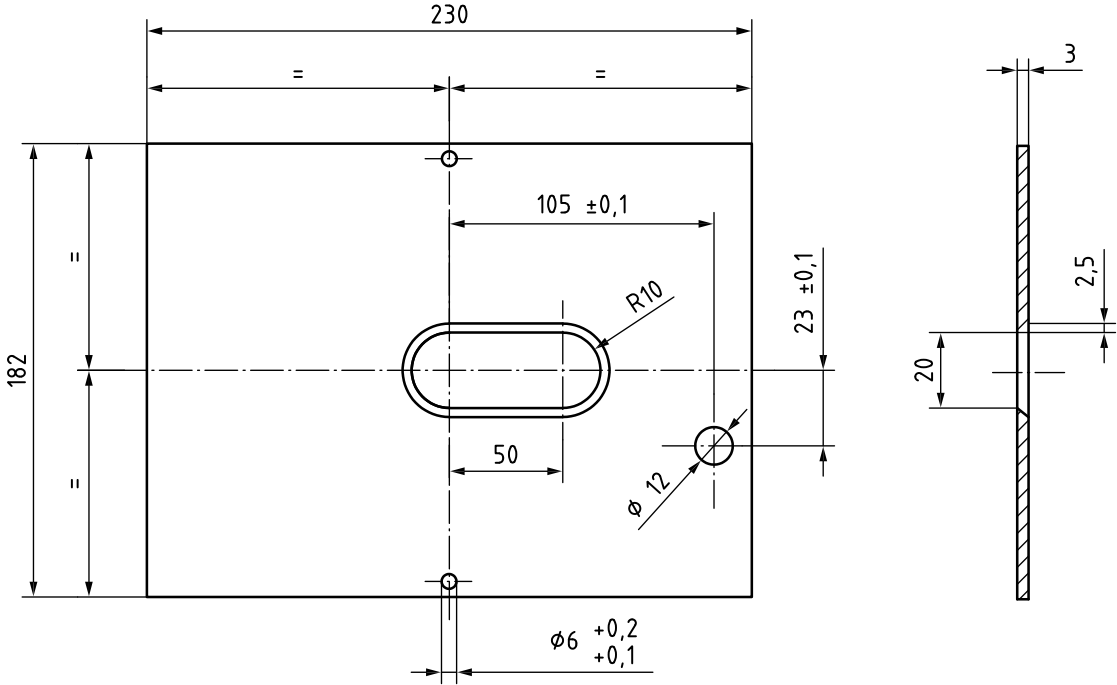
4.5 Transparent polyester or cellulose film, approximately 0,025 mm thick.

4.6 Comparator, as illustrated in Figure 2 or as available commercially.

Dimensions in millimetres



a) Base plate



b) Cover plate

Figure 2 — Comparator for use with commercial Lovibond Comparator discs

4.7 Standard coloured glasses, conforming to the requirements of Table 1 (colour index scale: 1 to 5 units in half-unit steps and 5 to 16 units in unit steps).¹⁾

Table 1 — Calibration table for standard glasses

Colour index	CIE ^a chromaticity coordinates using standard illuminant B ^b		
	<i>x</i>	<i>y</i>	<i>z</i>
1	0,357 7	0,368 6	0,275 2
1,5	0,362 9	0,372 8	0,265 5
2	0,367 2	0,377 0	0,255 8
2,5	0,373 8	0,380 4	0,245 8
3	0,377 6	0,385 5	0,236 9
3,5	0,384 2	0,389 6	0,226 2
4	0,388 0	0,393 5	0,218 5
4,5	0,392 5	0,397 9	0,211 0
5	0,396 5	0,400 3	0,203 2
6	0,405 0	0,408 9	0,186 1
7	0,414 1	0,412 4	0,173 6
8	0,412 6	0,418 6	0,159 8
9	0,430 2	0,423 0	0,146 9
10	0,437 1	0,425 9	0,137 0
11	0,443 9	0,427 0	0,129 0
12	0,449 1	0,430 8	0,120 0
13	0,454 2	0,432 9	0,113 0
14	0,461 0	0,435 0	0,104 0
15	0,466 2	0,436 1	0,097 7
16	0,471 0	0,438 9	0,090 0

^a Commission Internationale de l'Éclairage (International Commission on Illumination).
^b Standard illuminant B corresponds to the yellowish phases of daylight (colour temperature 4 870 K).

5 Procedure

5.1 Test piece preparation

Clean the mill (4.1) thoroughly and then proceed as follows:

Take a test portion of about 30 g from the homogenized piece and pass three times (doubling the sheet between passes) between the mill rolls, at room temperature and with the distance between the rolls adjusted so that the final sheet thickness is about 1,7 mm. Immediately double the sheet, which shall be uniform in texture and free from holes, and lightly press the two halves together by hand, avoiding the formation of air bubbles. From the doubled sheet (3,2 mm to 3,6 mm thick) cut two pellets with the test piece punch (4.4) and press them lightly together.

¹⁾ These glasses are also referred to as Lovibond Comparator discs, 4/19A in 1 to 5 units and 4/19B in 5 to 16 units, and are commercially available from Tintometer Limited, Waterloo Road, Salisbury SP1 2JY, England. Tel: (01722) 327242, Fax: (01722) 412322. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named.

Press this test piece in the mould (4.2) between two sheets of polyester or cellulose film (4.5), with mould covers superimposed, at a pressure of not less than 3,5 MPa for 5 min \pm 0,2 min at 150 °C \pm 3 °C. Retain the test piece in the mould, with the transparent cover films attached, for testing. The moulded test piece shall be 1,6 mm \pm 0,1 mm thick, excluding cover films, and shall be free from extraneous contaminants.

5.2 Colour matching

Compare the test piece with standard glasses (4.7). Carry out the colour matching under diffuse daylight illumination against a matt white background, viewing in a direction normal to the major surface of the test piece. Take the colour index of the test piece as that of the glass giving the closest colour match.

If the comparator shown in Figure 2 is used, first place a sheet of white paper (with holes to accommodate the projections) on the base plate. Then fit the disc of standard glasses and the filled mould (with transparent cover films attached) over the projections and place the cover plate in position. Carry out the colour matching.

6 Expression of results

Report the colour index of the rubber to the nearest half-unit for index values 1 to 5 and to the nearest unit for higher values.

Very occasionally, the colour of the rubber cannot be matched owing to the presence of strong yellow, green or grey tints. In this case, report that the colour index cannot be determined, stating the reason, e.g. "green tint too strong".

7 Precision and bias

No statement is made about the precision and bias of this test method for measuring colour of raw natural rubber, since the results merely state whether there is conformance to the criteria for the parameter in terms of an index using a comparative standard.

8 Test report

The test report shall include the following particulars:

- a) a reference to this International Standard;
- b) all details necessary for the identification of the sample;
- c) the results and the units in which they have been expressed;
- d) any unusual features noted during the determination;
- e) any operation not included in this International Standard or in the International Standard to which reference is made, plus any operation regarded as optional;
- f) the date of the test.

Bibliography

- [1] ISO 2007:2007, *Rubber, unvulcanized — Determination of plasticity — Rapid-plastimeter method*

SLS CERTIFICATION MARK

The Sri Lanka Standards Institution is the owner of the registered certification mark shown below. Beneath the mark, the number of the Sri Lanka Standard relevant to the product is indicated. This mark may be used only by those who have obtained permits under the SLS certification marks scheme. The presence of this mark on or in relation to a product conveys the assurance that they have been produced to comply with the requirements of the relevant Sri Lanka Standard under a well designed system of quality control inspection and testing operated by the manufacturer and supervised by the SLSI which includes surveillance inspection of the factory, testing of both factory and market samples.

Further particulars of the terms and conditions of the permit may be obtained from the Sri Lanka Standards Institution, 17, Victoria Place, Elvitigala Mawatha, Colombo 08.



SRI LANKA STANDARDS INSTITUTION

The Sri Lanka Standards Institution (SLSI) is the National Standards Organization of Sri Lanka established under the Sri Lanka Standards Institution Act No. 6 of 1984 which repealed and replaced the Bureau of Ceylon Standards Act No. 38 of 1964. The Institution functions under the Ministry of Science & Technology.

The principal objects of the Institution as set out in the Act are to prepare standards and promote their adoption, to provide facilities for examination and testing of products, to operate a Certification Marks Scheme, to certify the quality of products meant for local consumption or exports and to promote standardization and quality control by educational, consultancy and research activity.

The Institution is financed by Government grants, and by the income from the sale of its publications and other services offered for Industry and Business Sector. Financial and administrative control is vested in a Council appointed in accordance with the provisions of the Act.

The development and formulation of National Standards is carried out by Technical Experts and representatives of other interest groups, assisted by the permanent officers of the Institution. These Technical Committees are appointed under the purview of the Sectoral Committees which in turn are appointed by the Council. The Sectoral Committees give the final Technical approval for the Draft National Standards prior to the approval by the Council of the SLSI.

All members of the Technical and Sectoral Committees render their services in an honorary capacity. In this process the Institution endeavours to ensure adequate representation of all view points.

In the International field the Institution represents Sri Lanka in the International Organization for Standardization (ISO), and participates in such fields of standardization as are of special interest to Sri Lanka.