



**International
Standard**

ISO 20299-2

**Film for wrapping rubber bales —
Part 2:
Natural rubber and modified
natural rubber**

Emballage des balles en caoutchouc —

Partie 2: Caoutchouc naturel et caoutchouc naturel modifié

**Third edition
2024-12**

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document 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 third edition cancels and replaces the second edition (ISO 20299-2:2017), which has been technically revised.

The main changes are as follows:

- the title has been changed;
- the scope has been expanded to incorporate modified natural rubber bales, and the bale mass of 33,33 kg has been changed to 33,3 kg;
- the normative references have been updated;
- in [Clause 5](#), replacement of “specific gravity” by “density”; addition of the method A of ISO 1183-1:2019 to determine the density; addition of the requirement for test specimens to determine the Vicat softening temperature; addition of method A of ISO 3146:2022 as an alternative procedure to the DSC method for the determination of melting point of the low-density polyethylene (LDPE) film;
- in [Clause 6](#), deletion of paragraphs one and two;
- addition of [Annex A](#).

A list of all parts in the ISO 20299 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Block natural rubber is prepared by comminuting large lumps, washed with plenty of water. It is then dried, baled and packed. The bales are wrapped in clear polyethylene film and packed into metal or wooden crates.

Bale coating on natural rubber ribbed smoked sheet bundles is used to prevent stickiness between bales and fungus formation on the external sides, and also to allow for the stencilling of the grade mark and supplier code. The bale coating solution is a non-reinforcing filler which has no benefit in product manufacturing. Excess bale coating generates ash, which adversely affects the quality of end products and creates environmental issues.

Shifting to wrapping polyethylene film is an alternative option that is beneficial to all, as it is cost effective, environmentally friendly and pollution free. However, it is difficult and uneconomic to strip the film from each bale, and therefore an essential feature is that the film disperses into the rubber compound during mixing. This means that its melting point must be lower than the temperatures attained in internal mixing cycles, typically 120 °C to 160 °C.

Nowadays, modified natural rubbers, such as epoxidized natural rubber (ENR) and low-protein natural rubber (LPNR), are widely used due to their special properties. Therefore, it is important for the requirements of wrapping polyethylene film to cover the modified natural rubber bales.

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Film for wrapping rubber bales —

Part 2: Natural rubber and modified natural rubber

WARNING — Persons using this document should be familiar with normal laboratory practice. This document 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 determine the applicability of any other restrictions.

1 Scope

This document specifies the material and physical property requirements for non-strippable, low-density polyethylene (LDPE) film for the wrapping of:

- natural rubber bales comprised of block natural rubber of 33,3 kg or 35 kg;
- natural rubber ribbed smoked sheets, including bales of 33,3 kg, 35 kg, 50 kg and 111,11 kg;
- modified natural rubber (e.g. epoxidized natural rubber, low-protein natural rubber) bales of 33,3 kg or 35 kg;
- any other bale masses as mutually agreed between the parties, and intended to keep the bales separate during transportation and storage.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 306:2022, *Plastics — Thermoplastic materials — Determination of Vicat softening temperature (VST)*

ISO 1183-1:2019, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pycnometer method and titration method*

ISO 3146:2022, *Plastics — Determination of melting behaviour (melting temperature or melting range) of semi-crystalline polymers by capillary tube and polarizing-microscope methods*

ISO 11357-3, *Plastics — Differential scanning calorimetry (DSC) — Part 3: Determination of temperature and enthalpy of melting and crystallization*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Material

The film shall be manufactured from LDPE.

NOTE Slip agents, anti-oxidants and anti-blocking agents are normally not included.

5 Physical properties

5.1 Thickness

When measured using a micrometer screw gauge, the film shall have a thickness between 0,03 mm and 0,05 mm.

5.2 Density

When determined in accordance with method A of ISO 1183-1:2019, the density shall be $(0,92 \pm 0,01)$ g/cm³.

5.3 Thermal properties

5.3.1 General

It is sufficient to satisfy only one of the thermal property requirements.

5.3.2 Vicat softening temperature

The test specimens shall be taken from the same raw material as that of the LDPE film in accordance with the requirement in ISO 306:2022, 6.1. When tested in accordance with method A50 of ISO 306:2022, the Vicat softening temperature shall be equal to or less than 95 °C.

NOTE The Vicat softening temperature is generally 18 °C lower than the peak melting temperature as measured by DSC or the melting temperature as measured by capillary tube.

5.3.3 Differential scanning calorimeter — Peak melting temperature

When determined in accordance with ISO 11357-3, the differential scanning calorimeter – peak melting temperature shall be equal to or less than 113 °C.

5.3.4 Capillary tube — Melting temperature

When determined in accordance with method A of ISO 3146:2022, the melting temperature shall be equal to or less than 113 °C.

NOTE [Annex A](#) gives the result of a comparative study on melting point determination.

6 Marking

The inclusion of the marking specification, including location on the bale, colour and size of the lettering, shall be as agreed upon between the interested parties.

7 Test report

The test report shall include the following:

- a) a reference to this document, i.e. ISO 20299-2:2024;
- b) all details necessary for the identification of the sample;

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- c) any unusual features noted during the determinations;
- d) the results obtained from the tests specified in [Clause 5](#);
- e) the date of the test.

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