
**Carbonaceous materials for the
production of aluminium — Pitch for
electrodes —**

**Part 1:
Determination of softening point by
the ring-and-ball method**

*Produits carbonés utilisés pour la production de l'aluminium — Brai
pour électrodes —*

*Partie 1: Détermination du point de ramollissement par la méthode
bille et anneau*

[ISO 5940-1:2019](https://standards.iteh.ai/catalog/standards/iso/bf101476-4790-4e97-8f03-405b185148c4/iso-5940-1-2019)

<https://standards.iteh.ai/catalog/standards/iso/bf101476-4790-4e97-8f03-405b185148c4/iso-5940-1-2019>



iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO 5940-1:2019](https://standards.iteh.ai/catalog/standards/iso/bf101476-4790-4e97-8f03-405b185148c4/iso-5940-1-2019)

<https://standards.iteh.ai/catalog/standards/iso/bf101476-4790-4e97-8f03-405b185148c4/iso-5940-1-2019>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	1
5 Reagents	1
6 Apparatus	2
7 Procedure	3
7.1 Preparation of test portion.....	3
7.2 Preparation of the apparatus.....	3
7.3 Determination.....	3
8 Expression of results	3
8.1 Method of calculation.....	3
8.2 Precision.....	4
9 Test report	4
Annex A (normative) Thermionic devices for temperature sensing and output	5
Annex B (normative) Melting of pitch samples	6

iteh Standards
 (<https://standards.iteh.ai>)
 Document Preview

[ISO 5940-1:2019](#)

<https://standards.iteh.ai/catalog/standards/iso/bf101476-4790-4e97-8f03-405b185148c4/iso-5940-1-2019>

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 documents 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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 226, *Materials for the production of primary aluminium*.

This first edition of ISO 5940-1 cancels and replaces ISO 5940:1981, which has been technically revised.

The main changes compared to the previous edition are as follows:

- 5.1.6 has changed to [6.1.2](#) which has been modified so that mercury thermometers are no longer required.
- [Annex A](#) has been modified.

A list of all parts in the ISO 5940 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.

Carbonaceous materials for the production of aluminium — Pitch for electrodes —

Part 1: Determination of softening point by the ring-and-ball method

1 Scope

This document specifies the ring-and-ball method, a method of using the ring-and-ball apparatus for the determination of the softening point (softening temperature) of pitch used in the production of aluminium.

The method is applicable to pitches having softening points equal to or greater than 30 °C.

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 6257, *Carbonaceous materials used in the production of aluminium — Pitch for electrodes — Sampling*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

4 Principle

Prepare a disc-shaped test piece by moulding a test portion in a ring, fitting the prepared ring into a heated bath and placing a steel ball on the upper surface of the test piece.

Determine the temperature at which the test piece, on heating at a prescribed rate, softens sufficiently to sag to a specified depth under the mass of the ball.

This temperature corresponds to the softening point (softening temperature).

5 Reagents

During the analysis, use only reagents of recognized analytical grade and distilled water, or water of equivalent purity, freshly boiled and cooled.

5.1 Glycerol, for use with pitches having softening points greater than 85 °C.

5.2 **Water**, for use with pitches having softening points in the range 30 °C to 85 °C.

6 Apparatus

Ordinary laboratory apparatus and

6.1 **Ring-and-ball apparatus** (see [Figure B.1](#) for assembled apparatus), comprising:

6.1.1 **Rings**, brass, tapered (see [Figure B.2](#)), having the dimensions:

- depth: 6,4 mm ± 0,1 mm;
- internal diameter at bottom: 15,9 mm ± 0,1 mm;
- internal diameter at top: 17,5 mm ± 0,1 mm;
- external diameter above shoulder: 20,6 mm ± 0,1 mm;
- external diameter below shoulder: 18,5 mm ± 0,5 mm.

6.1.1.1 **Steel balls**, of diameter 9,53 mm, each weighing 3,50 g ± 0,05 g.

6.1.1.2 **Ball centering guides**. A suitable form of guide is shown in [Figure B.3](#).

6.1.1.3 **Bath beaker**, a heat-resistant glass squat form beaker of capacity 800 ml.

6.1.1.4 **Ring support**, having the shape and dimensions shown in [Figures B.1](#) and [B.4](#).

The support consists essentially of two parallel brass plates, one above the other, and 25 mm ± 0,5 mm apart. The upper plate is designed to support the two rings ([6.1.1](#)) and its thickness is equal to the distance between the lower surface of one ring and its shoulder.

The two plates are supported by a circular or rectangular holder which rests on the top of the bath and which has a central hole intended for the thermometric device ([6.1.2](#)).

6.1.2 **Thermometric device**, a thermometric device as described in [Table A.1](#). The thermometric device shall have equal or higher accuracy than the thermometers described in [Table A.2](#).

- a) For pitches with softening point from 30 °C to 120 °C, a device with a range of at least 0 °C to 120 °C. And shall be capable of indicating the temperature to 0,5 °C and stable to within 0,5 °C for the complete length of the test.
- b) For pitches with softening point from 30 °C to 180 °C, a device with a range of at least 0 °C to 210 °C, and also capable of indicating the temperature to 1,0 °C and stable to within 1,0 °C for the complete length of the test.

Thermometers may be used if mercury in glass thermometers are legislation compliant in the jurisdiction where the testing facility is located.

6.1.3 **Tripod and open mesh wire gauze**, supporting the bath.

6.1.4 **Bunsen burner**, fitted with a governor if the gas supply is liable to fluctuate.

6.1.5 **Moulding plate**, having the dimensions shown in [Figure B.5](#).

6.1.6 **Draught screen**, of suitable design to protect the assembled apparatus from draughts.