BRITISH STANDARD

BS EN ISO
28199-3:2009

Paints and varnishes — Evaluation of properties of coating systems related to the application process

Part 3: Visual assessment of sagging, formation of bubbles, pinholing and hiding power (ISO 28199-3:2009)

ICS 87.040

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN ISO 28199-3:2009.

The UK participation in its preparation was entrusted to Technical Committee STI/10, Test methods for paints.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

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ICS 87.040

English Version

Paints and varnishes - Evaluation of properties of coating systems related to the application process - Part 3: Visual assessment of sagging, formation of bubbles, pinholing and hiding power (ISO 28199-3:2009)

Peintures et vernis - Évaluation des propriétés des systèmes de revêtement liées au mode d'application - Partie 3: Évaluation visuelle du festonnage, de la formation de bulles, des piqûres et du pouvoir masquant (ISO 28199-3:2009)

Beschichtungsstoffe - Beurteilung von applikationsbedingter Eigenschaften von Beschichtungssystemen - Teil 3: Visuelle Beurteilung von Ablaufneigung, Kocherbildung, Nadelstichbildung und Deckvermögen (ISO 28199-3:2009)

This European Standard was approved by CEN on 21 May 2009.

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Ref. No. EN ISO 28199-3:2009: E

Foreword

This document (EN ISO 28199-3:2009) has been prepared by Technical Committee ISO/TC 35 "Paints and varnishes" in collaboration with Technical Committee CEN/TC 139 “Paints and varnishes” the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by March 2010, and conflicting national standards shall be withdrawn at the latest by March 2010.

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

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Endorsement notice

The text of ISO 28199-3:2009 has been approved by CEN as a EN ISO 28199-3:2009 without any modification.

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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.

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.

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ISO 28199-3 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

ISO 28199 consists of the following parts, under the general title *Paints and varnishes — Evaluation of properties of coating systems related to the application process*:

— *Part 1: Relevant vocabulary and preparation of test panels*

— *Part 2: Colour stability, process hiding power, re-dissolving, overspray absorption, wetting, surface texture and mottling*

— *Part 3: Visual assessment of sagging, formation of bubbles, pinholing and hiding power*

Introduction

In many areas (e.g. car manufacture, industrial coatings, coatings for plastics) the coating materials used are adapted to the specific application equipment and technologies of the particular user. A coating material is, therefore, to be understood as a semi-manufactured product that only receives its final form in combination with the specific application conditions. The adaptation to the application conditions is therefore decisive for the quality of the coated product.

The test methods specified in ISO 28199 are based on studies by a Working Group of the European Council for Automotive R&D (EUCAR).

They may be used for evaluation of coating materials in research, development and production with regard to their suitability and safety for industrial processes, and error analysis. The properties of coating materials and coatings to be evaluated depend on the film thickness, so a coating system of increasing thickness is applied to a test panel under defined conditions.

The following characteristics are measured (in ISO 28199-1):

— film thickness in accordance with ISO 2808;

— surface texture;

— colour in accordance with ISO 7724 (all parts).

In combination with visual assessment, the following properties are determined:

— colour stability, process hiding power, re-dissolving, overspray absorption, wetting, surface texture and mottling (ISO 28199-2);

— tendency toward sagging, formation of bubbles, pinholing and hiding power (this part of ISO 28199).

INTERNATIONAL STANDARD **ISO 28199-3:2009(E)**

Paints and varnishes — Evaluation of properties of coating systems related to the application process —

Part 3: Visual assessment of sagging, formation of bubbles, pinholing and hiding power

IMPORTANT — The electronic file of this document contains colours which are considered to be useful for the correct understanding of the document. Users should therefore consider printing this document using a colour printer.

1 Scope

This part of ISO 28199 specifies visual methods for the assessment of tendency toward sagging, formation of bubbles, pinholing and hiding power of coating materials applied to a test panel under defined conditions.

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 6504-3, *Paints and varnishes — Determination of hiding power — Part 3: Determination of contrast ratio of light-coloured paints at a fixed spreading rate*

ISO 28199-1:2009, *Paints and varnishes — Evaluation of properties of coating systems related to the application process — Part 1: Relevant vocabulary and preparation of test panels*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 28199-1 apply.

4 Tendency toward sagging

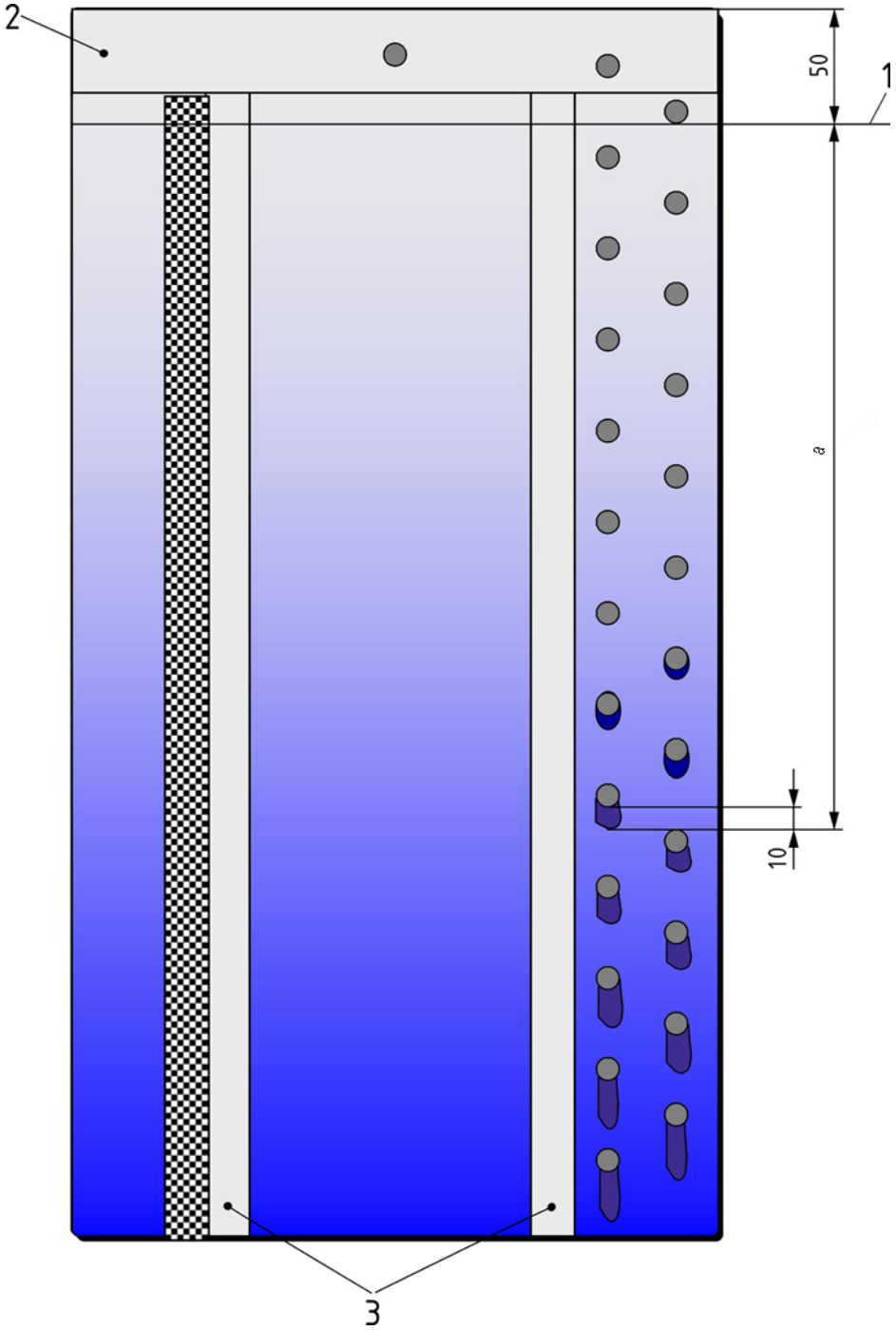
4.1 General

The tendency toward sagging is determined by visual assessment of the sag. This assessment is made after drying/curing of the coating, on a panel prepared in accordance with Version A in ISO 28199-1:2009.

If a tendency toward sagging is already visible in the liquid layer, this should be marked at the edge of the panel.

Film thickness is determined using the values measured in accordance with 9.4.2 of ISO 28199-1:2009.

Dimensions in millimetres



Key

1 measuring series 1
2 coil-coated reference strip
3 clear-coated reference strip
a distance from start of coating to 10-mm sag

Figure 1 — Assessment of sagging

4.2 Evaluation

After drying/curing of the coating, visually assess the perforated area of the test panel (see ISO 28199-1:2009, Figure 2) for the determination of the tendency to sagging. Determine the hole at which the sag exceeds a length of 10 mm from the lower edge of the hole (see Figure 1), and determine the film thickness corresponding to that hole in accordance with 9.4.2 of ISO 28199-1:2009. The greater the distance a for a given film thickness, the less the tendency of the coating to sag. A control chart of film thickness vs distance a can assist in this evaluation.

Other lengths of sag for measuring film thickness may be agreed by interested parties.

5 Bubbles

5.1 General

Assessment of the bubble formation limit is made visually after drying/curing of the coating. Examples of bubbles in a coating material are shown in Figures A.1 and A.2.

The film thickness values are determined in accordance with 9.4.2 of ISO 28199-1:2009.

5.2 Evaluation

After drying/curing of the coating, assess the bubble formation limit (see 3.2 of ISO 28199-1:2009) visually in the range of the film thickness pattern in the wedge area (see ISO 28199-1:2009, Figure 5 and Figure 6).

Determine the film thickness which corresponds to this bubble formation limit by using the film thickness measurement pattern.

6 Pinholing

6.1 General

Assessment of the pinholing limit is made visually after drying/curing of the coating. Examples of pinholes in a coating material are shown in Figures A.3 to A.6.

The film thickness values are determined in accordance with 9.4.2 of ISO 28199-1:2009.

6.2 Evaluation

After drying/curing of the coating, assess the pinholing limit (see 3.11 of ISO 28199-1:2009) visually in the range of the film thickness pattern in the wedge area (see ISO 28199-1:2009, Figure 5 and Figure 6).

Using the film thickness measurement pattern, determine the film thickness corresponding to this pinholing limit.

7 Process hiding power

7.1 General

Assessment of the process hiding power (see ISO 28199-1:2009, 3.12) is made visually after drying/curing of the coating.

The film thickness values are determined in accordance with 9.4.2 of ISO 28199-1:2009.

7.2 Evaluation

After drying/curing of the coating, assess the process hiding power visually in accordance with ISO 6504-3 in the range of the wedge-shaped layer applied to the contrast strip.

Determine the film thickness which corresponds to the process hiding power using the film thickness measurement pattern (see ISO 28199-1:2009, Figure 5 and Figure 6).

8 Test report

Prepare a test report in accordance with Clause 12 of ISO 28199-1:2009.

Annex A
(informative)

Examples of bubbles, pinholes and craters

Examples of bubbles, pinholes and craters are shown in Figures A.1 to A.9.

NOTE The photographs of craters have been included in view of the fact that pinholes (see ISO 28199-1:2009, 3.10) are often confused with craters (see ISO 28199-1:2009, 3.4).

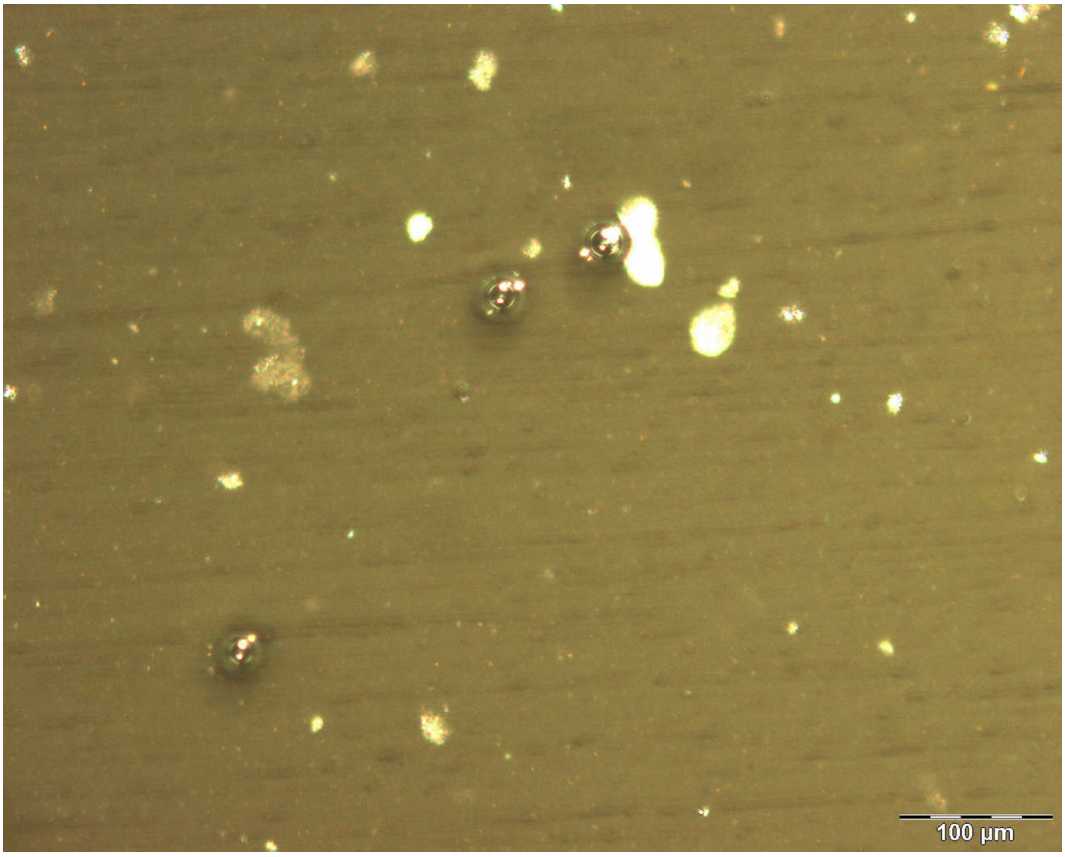


Figure A.1 — Bubbles — Top view

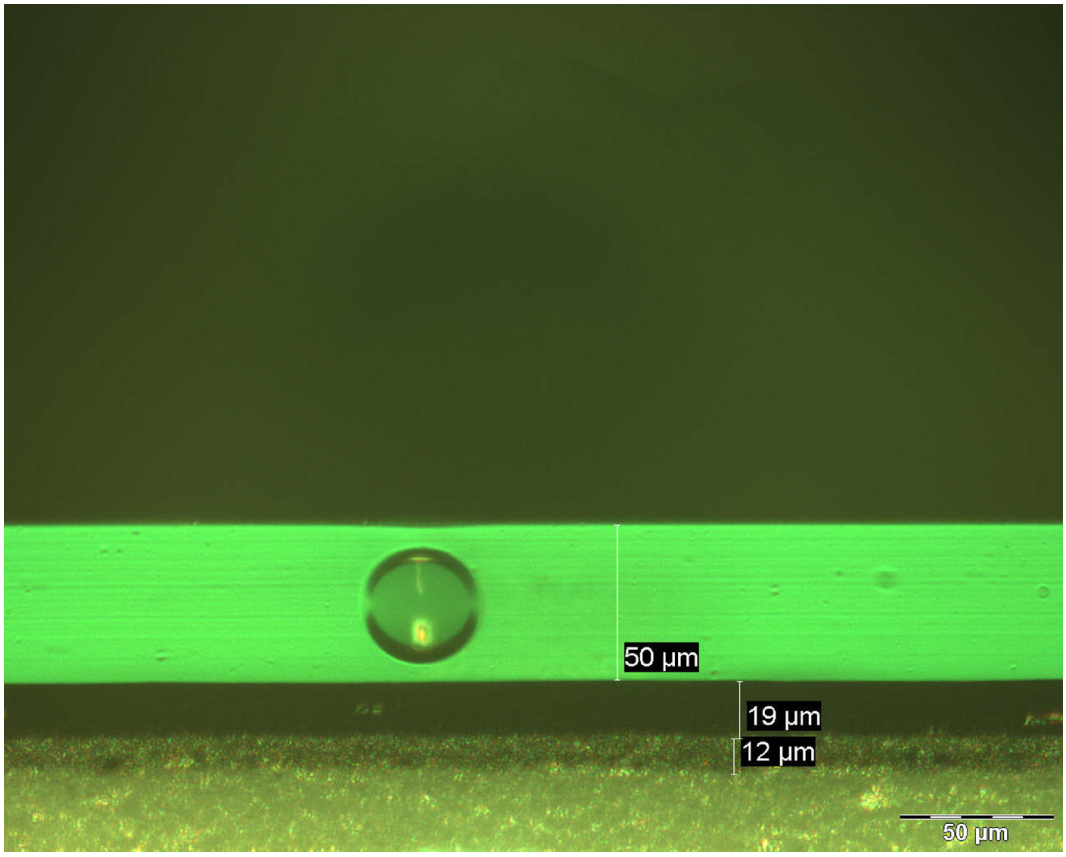


Figure A.2 — Bubble — Cross-section

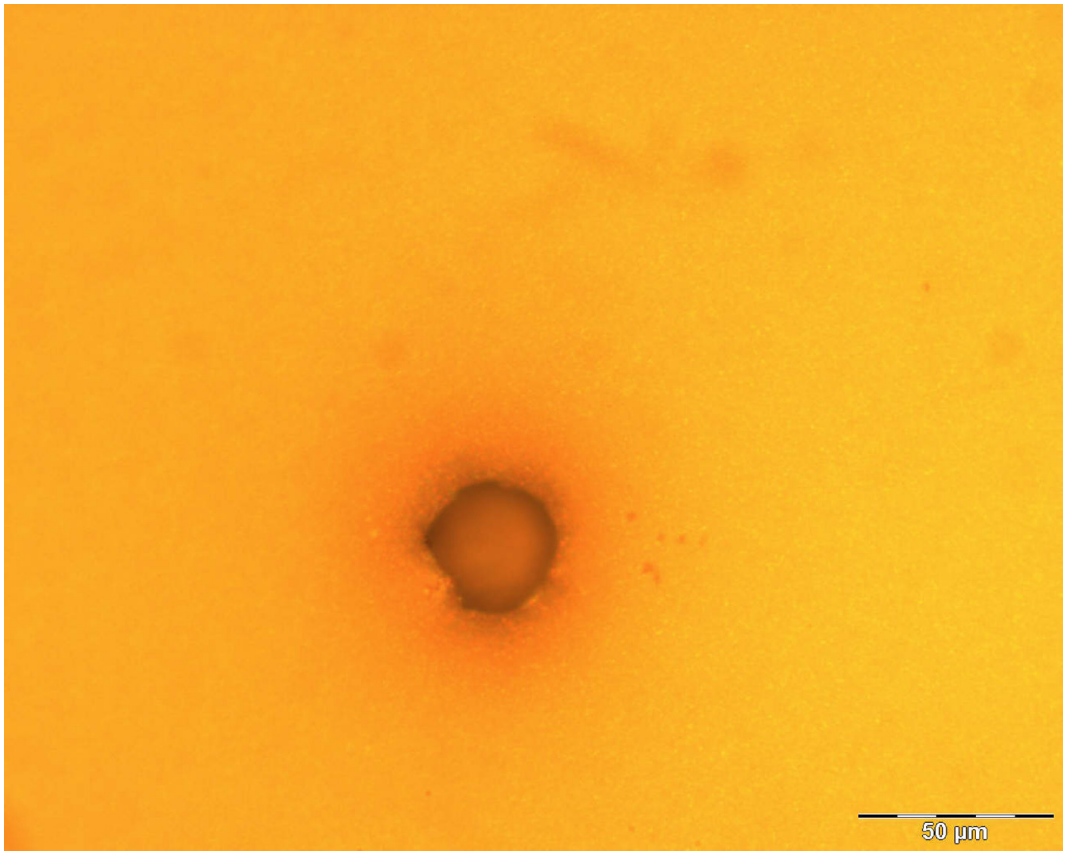


Figure A.3 — Pinhole — Top view

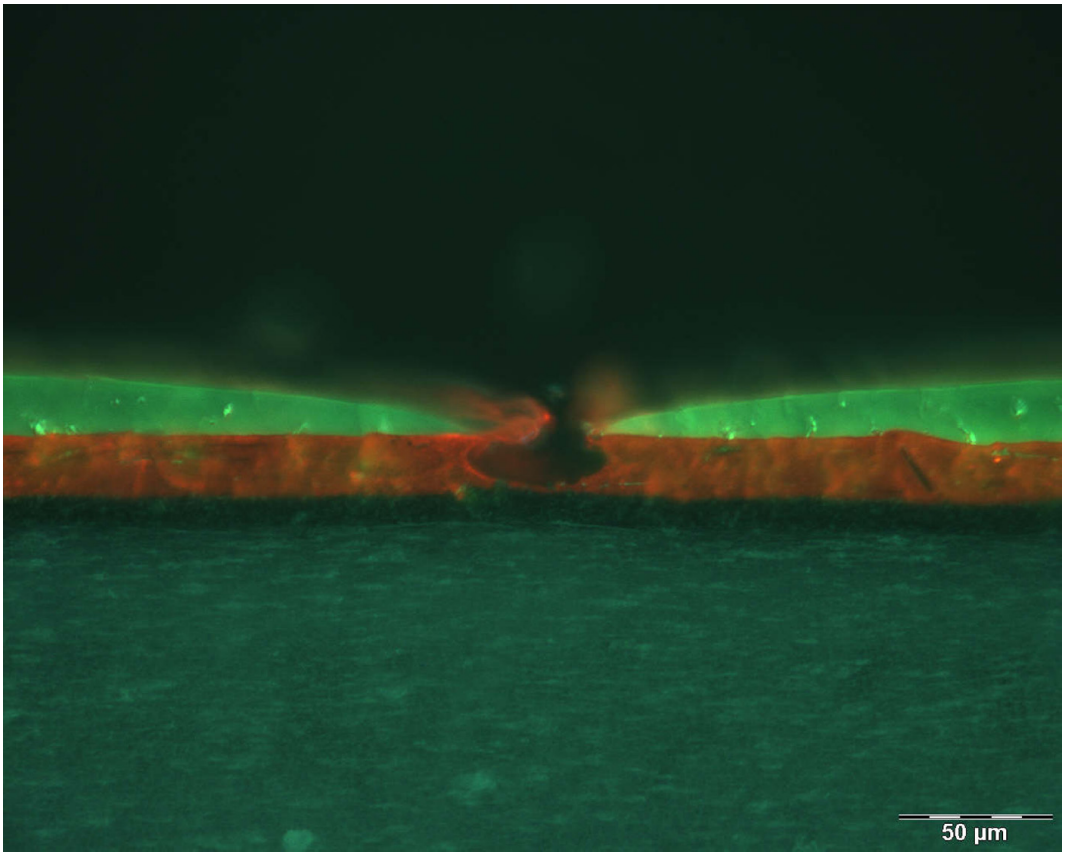


Figure A.4 — Pinhole 1 — Cross-section

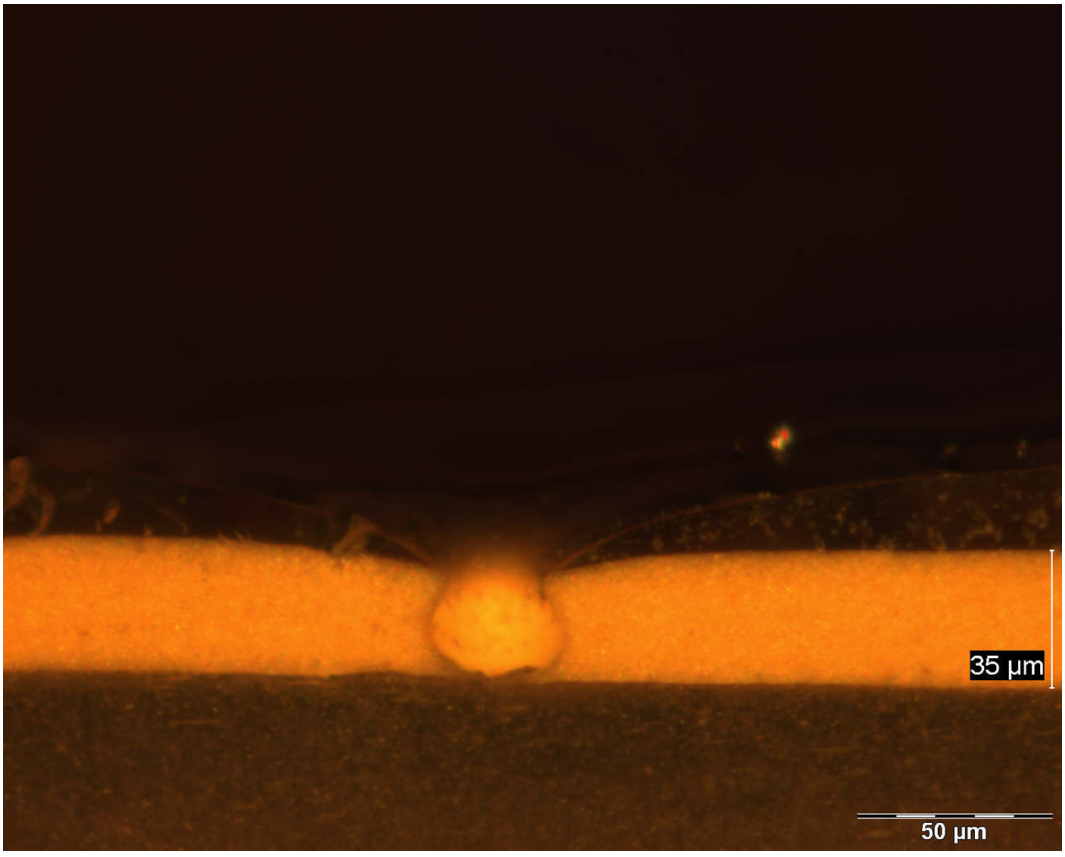


Figure A.5 — Pinhole 2 — Cross-section

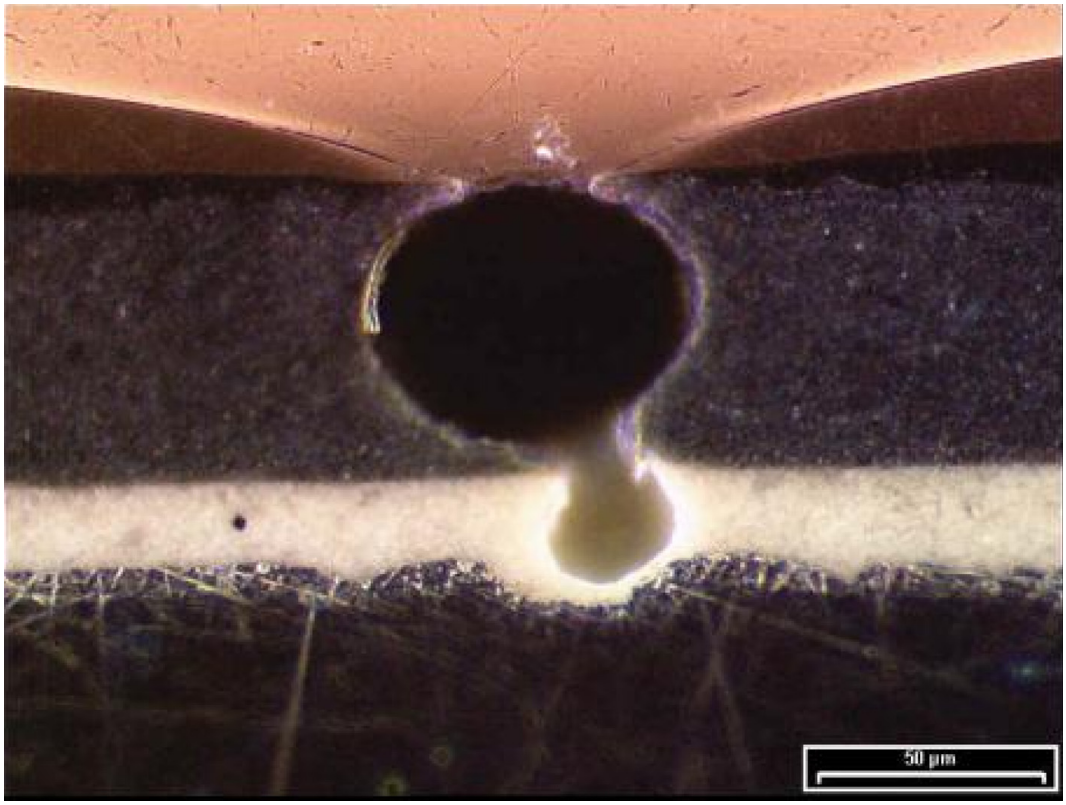


Figure A.6 — Pinhole 3 — Cross-section

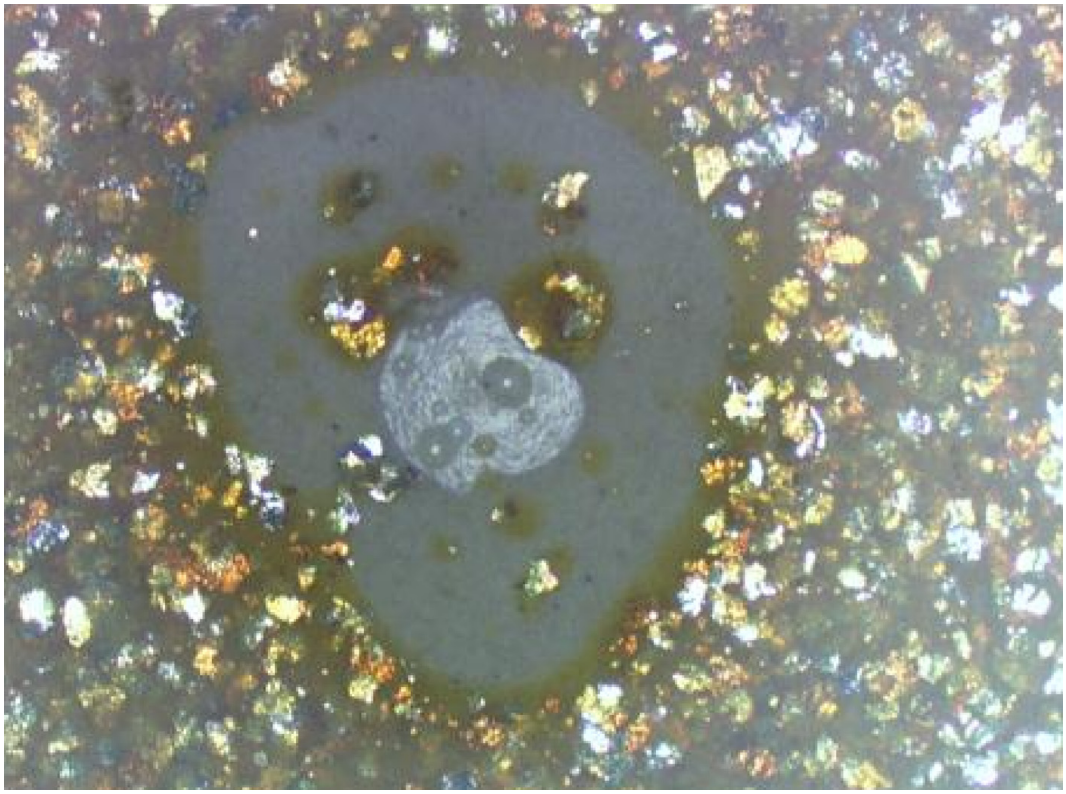


Figure A.7 — Crater — Top view

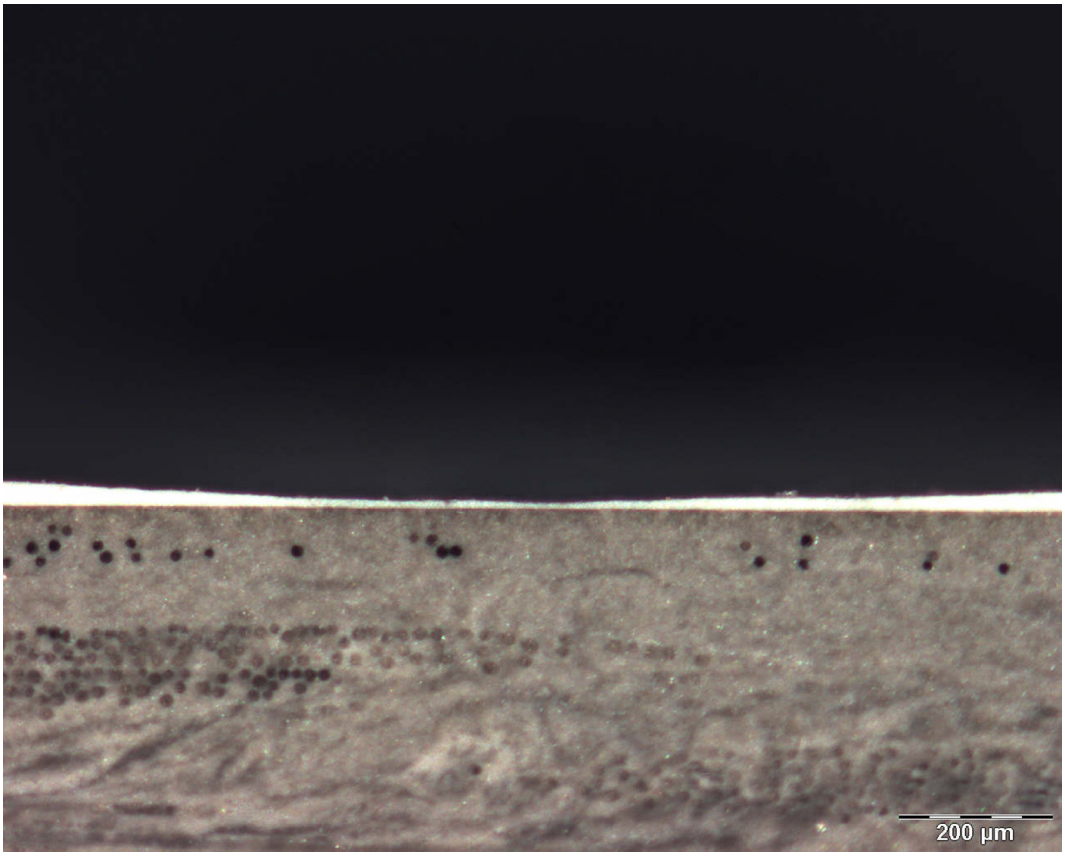


Figure A.8 — Crater 1 — Cross-section

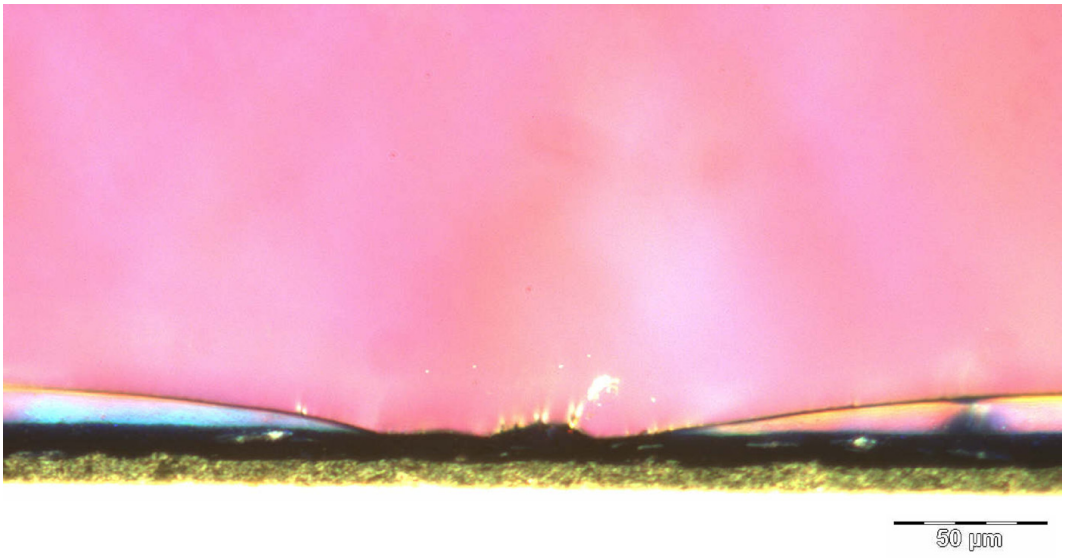


Figure A.9 — Crater 2 — Cross-section

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