International Standard

ISO 10427-1

Second edition
2024-08

Oil and gas industries including lower carbon energy — Equipment for well cementing —

Part 1: Casing bow-spring centralizers

Industries du pétrole et du gaz, y compris les énergies à faible teneur en carbone — Équipement de cimentation de puits —

Partie 1: Centreurs de tubes de cuvelage

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Foreword

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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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This document was prepared by Technical Committee ISO/TC 67, *Oil and gas industries including lower carbon energy*, Subcommittee SC 3, *Drilling and completion fluids, well cements and treatment fluids,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 12, *Oil and gas industries including lower carbon energy,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 10427-1:2001), which has been technically revised.

This document supplements API Spec 10D, 7th edition (2021).

The technical requirements of this document and API Spec 10D used to be identical. In the meantime, API Spec 10D has been technically revised as API Spec 10D, 7th edition (2021). The purpose of this edition of ISO 10427-1 is to bring it up to date, by referencing the current edition of API Spec 10D and including supplementary content.

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

— specification for the use of an unpainted centralizer in the running force test;

— specification for compensation of mass in the running force test;

— measurement of the centralizer maximum diameter after open hole test;

— definition of centralizer rigid OD;

— specification for the order of test.

A list of all parts in the ISO 10427 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.

Oil and gas industries including lower carbon energy — Equipment for well cementing —

Part 1: Casing bow-spring centralizers

1 Scope

This document specifies testing, performance, and marking requirements for casing bow-spring centralizers to be used in oil and natural gas well construction. The procedures give guidance on verification testing for the manufacturer's design, materials, and process specifications, and periodic testing to confirm the consistency of product performance. This specification is not applicable to other devices, such as rigid centralizers and cement baskets, or bow-spring centralizers used for other purposes (e.g., wireline tools, gravel pack, inner string).

This document is a supplement to API Spec 10D 7th edition (2021), the requirements of which are applicable with the exceptions specified in this document.

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.

API Spec 10D, *7th edition (2021), Casing Bow-spring Centralizers*

3 Terms, definitions and abbrevaited terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in API Spec 10D 7th edition (2021) and the following apply.

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/

3.1.1
centralizer rigid OD
maximum OD of the centralizer or end collars when the bows are flat

3.1.2
coating
application of a thin film of one material on the surface of another material for various purposes

Note 1 to entry: Paint is a form of coating.

3.2 Abbreviated terms

ID internal diameter

OD outer diameter

4 Supplements to API Spec 10D, 7th edition (2021)

4.1 General requirements

The requirements specified in API Spec 10D 7th edition (2021) shall be applicable, with the exceptions specified in 4.2 to 4.5.

4.2 Compensating for the mass of the traveling pipe and attachments

The requirements specified in API Spec 10D 7th edition (2021), 6.1.1 shall apply with the following additions:

When compensating for the mass of the traveling pipe and the attachments, the mass of the centralizer shall be excluded from the compensating values.

4.3 Coated centralizer

The requirements specified in API Spec 10D 7th edition (2021), 6.1.2 d) shall apply with the following addition to d).

The centralizer shall be tested uncoated. If the centralizer is coated with a friction reducing coating, the test shall be performed both with and without the friction reducing coating.

NOTE Paint on the centralizer bows provides erroneous measurement as the paint artificially lowers the friction coefficient. When running a centralizer in a well, the paint is removed very quickly in the run. Measuring running force on a painted centralizer is inadequate and non-representative of field conditions.

4.4 Centralizer maximum diameter reported after open hole test

The requirements specified in API Spec 10D 7th edition (2021), A.5.2 b) apply with the following additions.

NOTE When centralizers are plastically deformed after a test and they have a reduced OD compared to the untested centralizer, the plastic deformation is not typically uniform.

The centralizer maximum diameter after open hole test(s) shall be measured in accordance with the following procedure and with reference to Figure 1:

— Centralizer internal diameter measurement

  a) Measure the centralizer ID in a minimum of 3 different places. Record measurements as ID1, ID2, ID3.

  b) Average the centralizer ID measurements and record the value.

— Bow height measurement

  c) Place the measurement bar behind the bow. Ensure it is in contact with both end rings and in the centre of the bow.

  d) Hold the bar in position. Measure the bow height using a calliper. This is the distance from the OD of the measurement bar to the outside surface of the bow. Measurement shall be taken at the widest point of the bow.

  e) Compensate the measurement for the bar OD. Either subtract the bar OD from the measurement, or zero the calliper on the bar OD premeasurement.

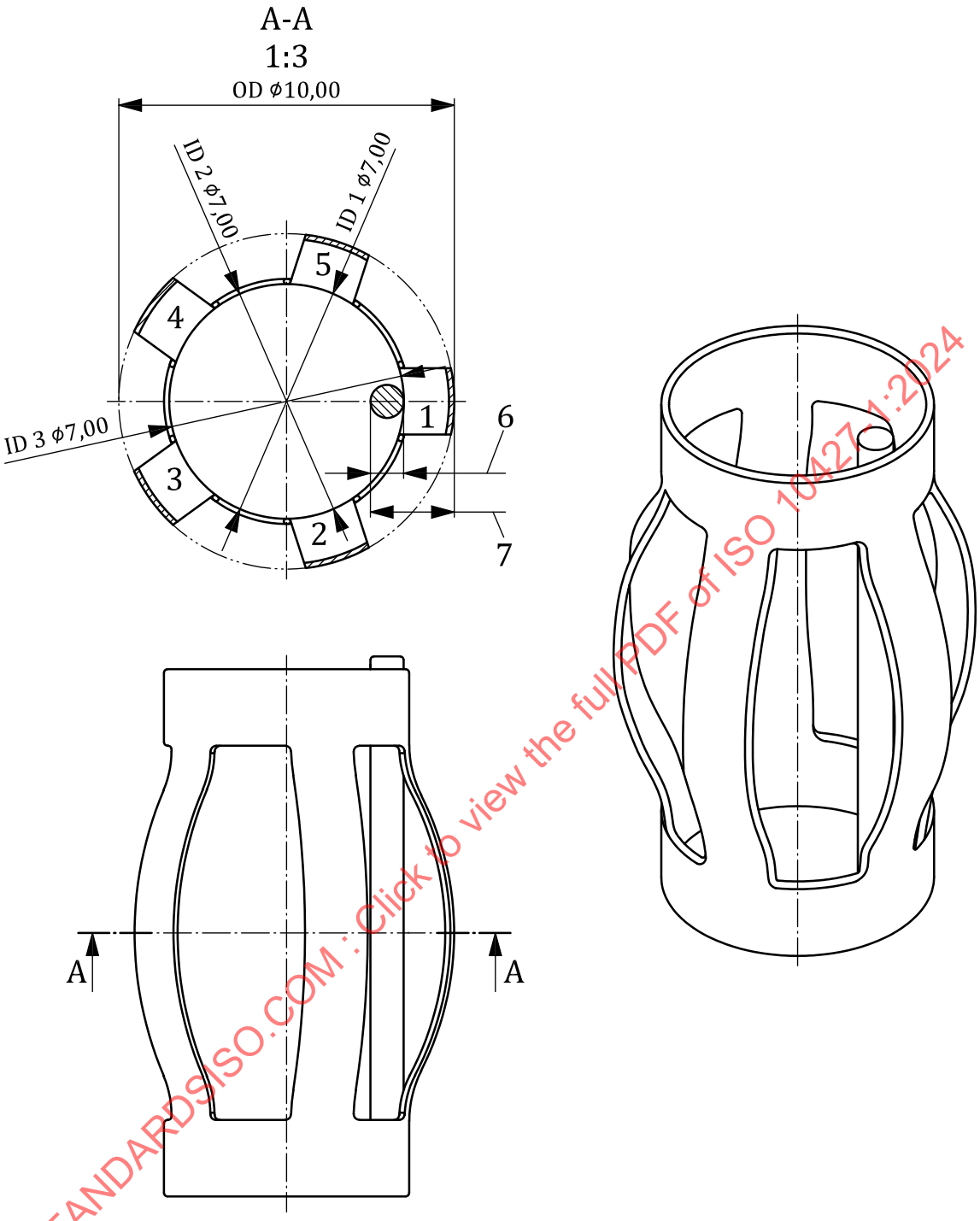
f) Record the compensated measurement as bow 1 height.

g) Take the same measurement on all bows.

— Calculation

h) Average all bow heights; multiply the value by 2 and add it to the average centralizer ID.

Dimensions in millimetres



Key

1 bow 1
2 bow 2
3 bow 3
4 bow 4
5 bow 5
6 measurement bar
7 bow 1 standoff

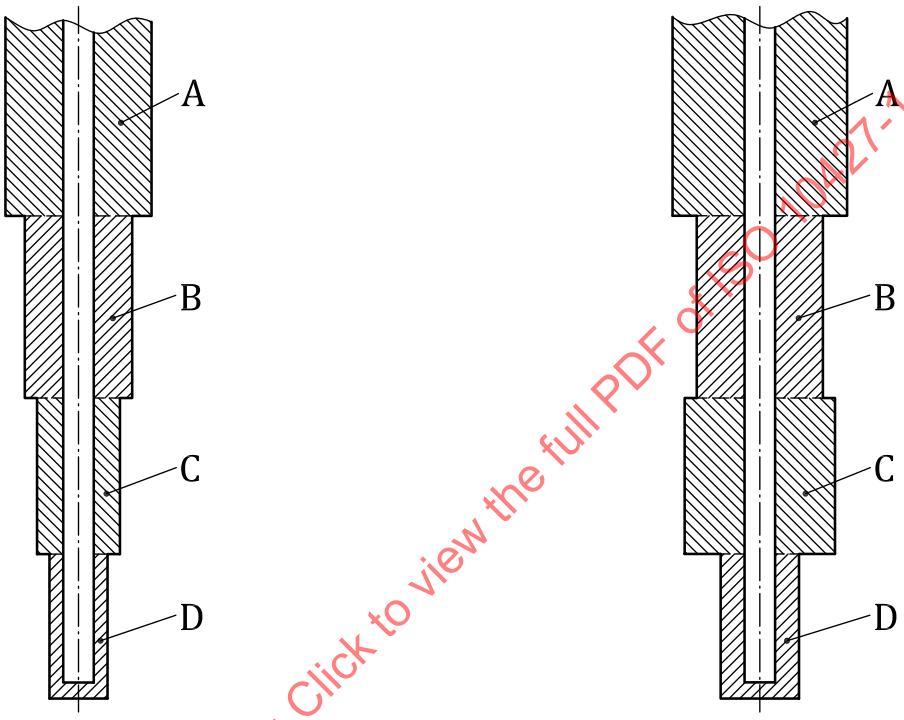
Figure 1 — Measuring the maximum diameter of the centralizer after the test

4.5 Centralizer Rigid OD

The centralizer rigid OD specified in API Spec 10D 7th edition (2021), A.5.2 and A.5.3 shall be defined as the maximum OD of either the centralizer or end collars when the bows are flat (whichever is largest).

5 Order of testing of running forces and restoring forces in conventional and under-reamed well configurations

In a conventional well, the centralizer is run into a well geometry with decreasing ID. In an under-reamed well, the centralizer is run into a well geometry with a smaller ID before being deployed in a well geometry with a larger ID (Figure 2).



a) Conventional well **b) Under-reamed well**

NOTE A, B, C and D are sections of the open hole with a) decreasing ID for a conventional well and b) decreasing and increasing ID for under-reamed wells.

Figure 2 — Conventional well and under-reamed well configuration

For a conventional well, a new centralizer shall be used to test each section of the open hole. The test starts with the running force (1), then the restoring force (2). In the example given in Table 1, four centralizers are used to test each section of the open hole (A, B, C and D).

For a well with an under-reamed section, new centralizers shall also be used to test each section of the open hole, except for the under-reamed section, where the same centralizer shall be used from the previous section of the open hole. All following sections of the open hole shall be tested with new centralizers. In the example given in Table 1, one centralizer is used for section A, one centralizer is used for section B and section C; and one centralizer is used for section D.