
**Rotary shaft lip-type seals incorporating
thermoplastic sealing elements —**

**Part 5:
Identification of visual imperfections**

*Bagues d'étanchéité à lèvres pour arbres tournants incorporant des
éléments d'étanchéité thermoplastiques —*

Partie 5: Identification des imperfections visuelles



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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.ch
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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 3.

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 part of ISO 16589 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16589-5 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 7, *Sealing devices*.

ISO 16589 consists of the following parts, under the general title *Rotary shaft lip-type seals incorporating thermoplastic sealing elements*:

- *Part 1: Nominal dimensions and tolerances*
- *Part 2: Vocabulary*
- *Part 3: Storage, handling and installation*
- *Part 4: Performance test procedures*
- *Part 5: Identification of visual imperfections*

Introduction

Rotary shaft lip-type seals are used to retain fluid in equipment where the differential pressure is relatively low. Typically, the shaft rotates and the housing is stationary, although in some applications the shaft is stationary and the housing rotates.

Dynamic sealing is normally the result of a designed interference fit between the shaft and a flexible element incorporated in the seal.

Similarly, a designed interference fit between the outside diameter of the seal and the diameter of the housing bore retains the seal and prevents static leakage.

Careful storage, handling and proper installation of all seals are necessary to avoid hazards, both prior to and during installation, which would adversely affect service life.

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Rotary shaft lip-type seals incorporating thermoplastic sealing elements —

Part 5: Identification of visual imperfections

1 Scope

ISO 16589 describes seals utilizing sealing elements manufactured from suitably formulated compounds, based on thermoplastic materials, such as polytetrafluoroethylene (PTFE).

NOTE ISO 16589 is complementary to ISO 6194 which covers elastomeric seals.

This part of ISO 16589 defines and classifies typical surface imperfections that could impair the function of the seals, and is intended as a convenience for purchasers and manufacturers in their discussions about the importance of these imperfections in different applications.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 16589. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 16589 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 5598:1985, *Fluid power systems and components — Vocabulary*

ISO 16589-2:2001, *Rotary shaft lip-type seals incorporating thermoplastic sealing elements — Part 2: Vocabulary*

3 Terms and definitions

For the purposes of this part of ISO 16589, the terms and definitions given in ISO 5598 and ISO 16589-2 apply.

4 Characteristic imperfections

4.1 Definition of sealing lip contact area

See Figure 1.

4.2 Typical imperfections

Some typical imperfections are shown in Figures 2 to 19 and listed in Tables 1 and 2.

4.3 Visual imperfections on seals with additional components

4.3.1 Outer circumference portion

The imperfections on the outer circumference portion are the following:

- a) scratch;
- b) incorrect chamfer;
- c) incomplete bond.

4.3.2 Minor lip

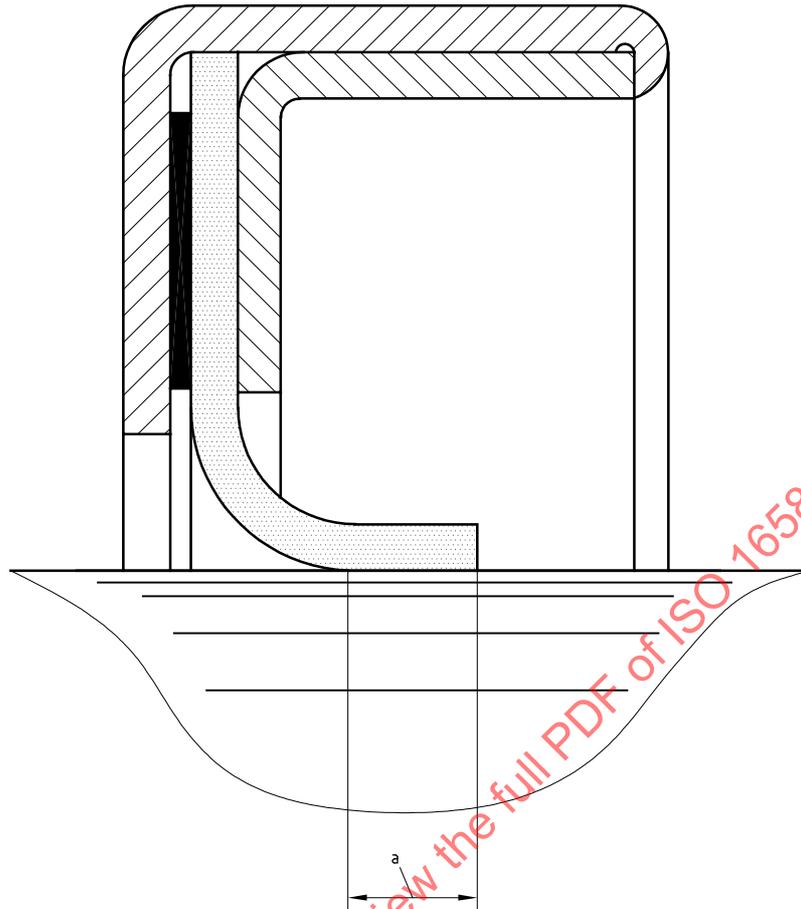
The imperfections on the minor lip are the following:

- a) tear;
- b) cut or nick;
- c) non-fill;
- d) flash.

5 Identification statement (Reference to this part of ISO 16589)

Manufacturers are strongly recommended to use the following statement in test reports, catalogues and sales literature when electing to comply with this part of ISO 16589:

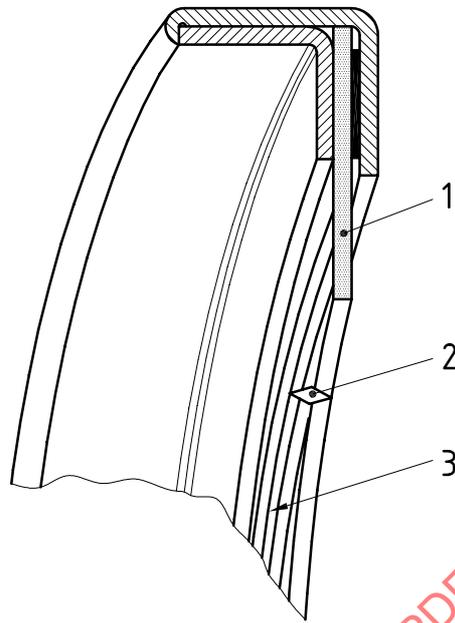
“The visual imperfections and assembly faults are in accordance with ISO 16589–5:2001, *Rotary shaft lip-type seals incorporating thermoplastic sealing elements — Part 5: Identification of visual imperfections.*”



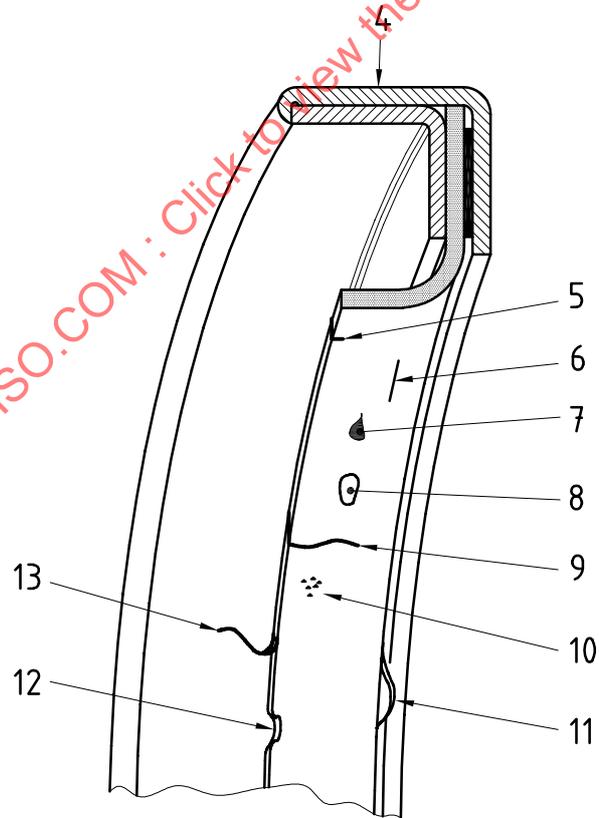
NOTE In cases of wear, imperfections in the sealing lip contact area can impair the function of the rotary shaft lip-type seal during its lifetime. This dimension may vary according to the design standards of individual manufacturers.

^a Sealing lip contact area

Figure 1 — Sealing lip contact area



a) Before lip has been formed



b) After lip has been formed

Figure 2 — Typical imperfections

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Table 1 — Typical visual imperfections

Figure 2 Item No.	Description	Detail illustration Figure No.
1	Sealing element reversal (hydrodynamic aid on the inside)	3
2	Nick	4
3	Incorrect hydrodynamic aid feature	—
4	Uneven outer diameter sealant	—
5	Cut	5
6	Crack	6
7	Inclusion	7
8	Polymer window	8
9	Tear	9
10	Filler projections	10
11	Gasket extrusion	11
12	Sealing lip inversion	12
13	Incomplete trim	13

Table 2 — Typical miscellaneous imperfections

Description	Detail illustration Figure No.
Incorrect hydrodynamic aid feature	14
Rough surface finish, sealing element	15
Incorrect roll-over of retaining flange	16
Missing gasket	17
Lip eccentric to outer-case diameter (incorrectly formed on mandrel)	18
Lip eccentric to outer-case diameter (outer diameter of sealing element undersized)	19

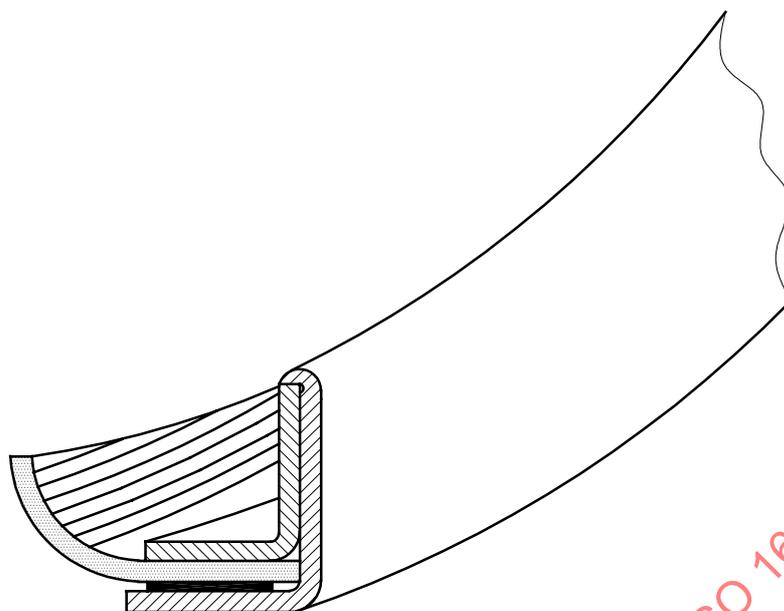


Figure 3 — Sealing element reversal (hydrodynamic aid on the inside)

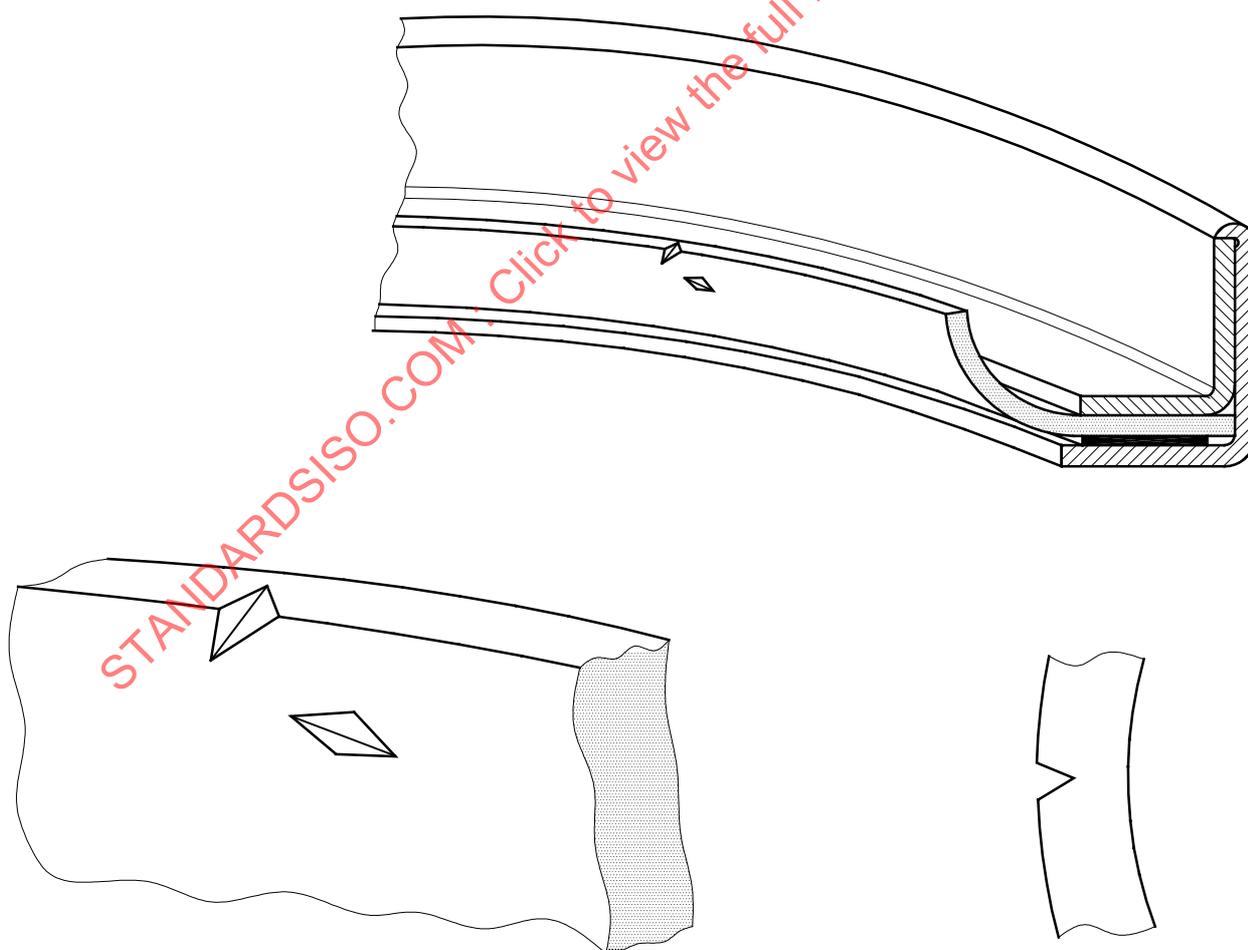


Figure 4 — Nicks

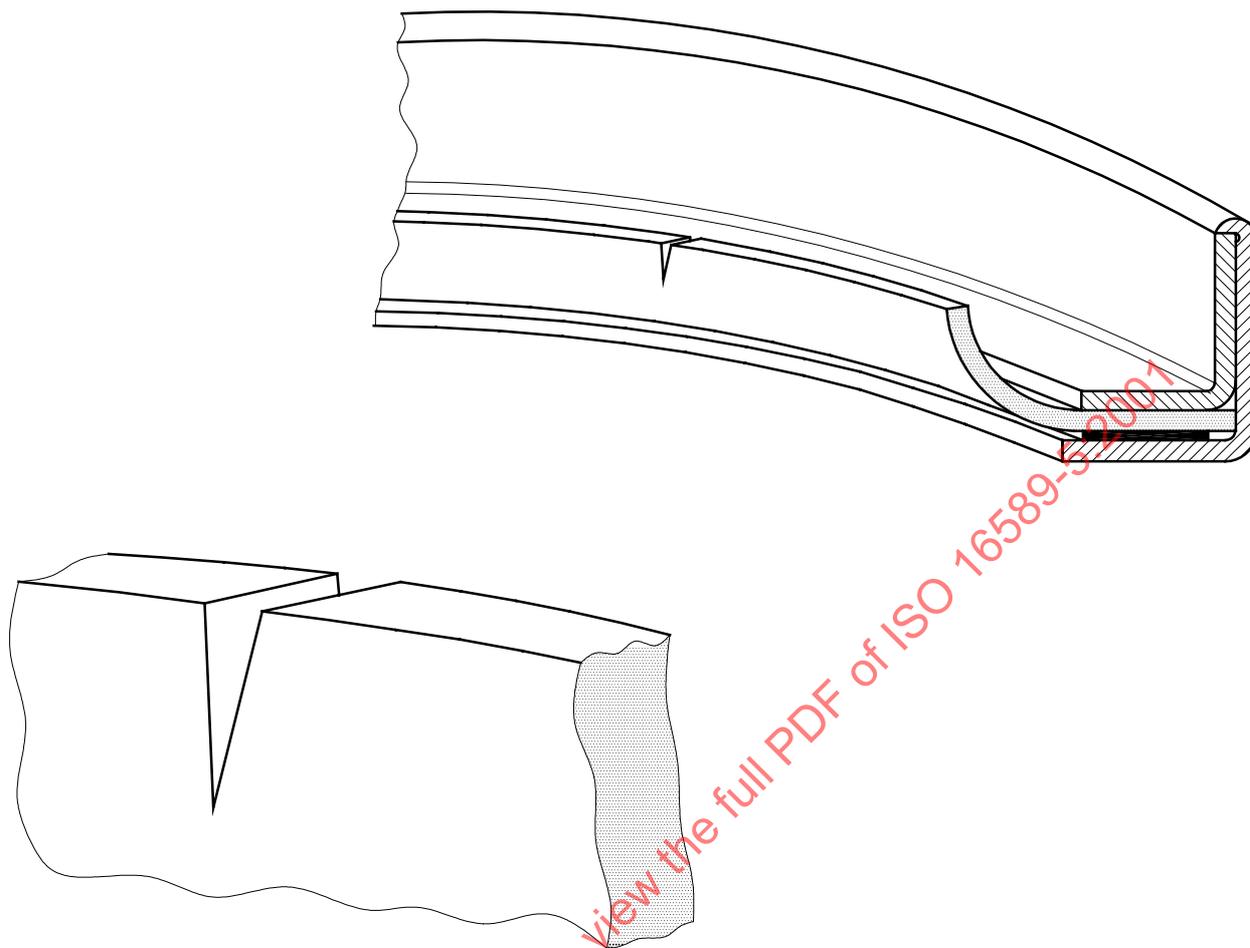


Figure 5 — Cut

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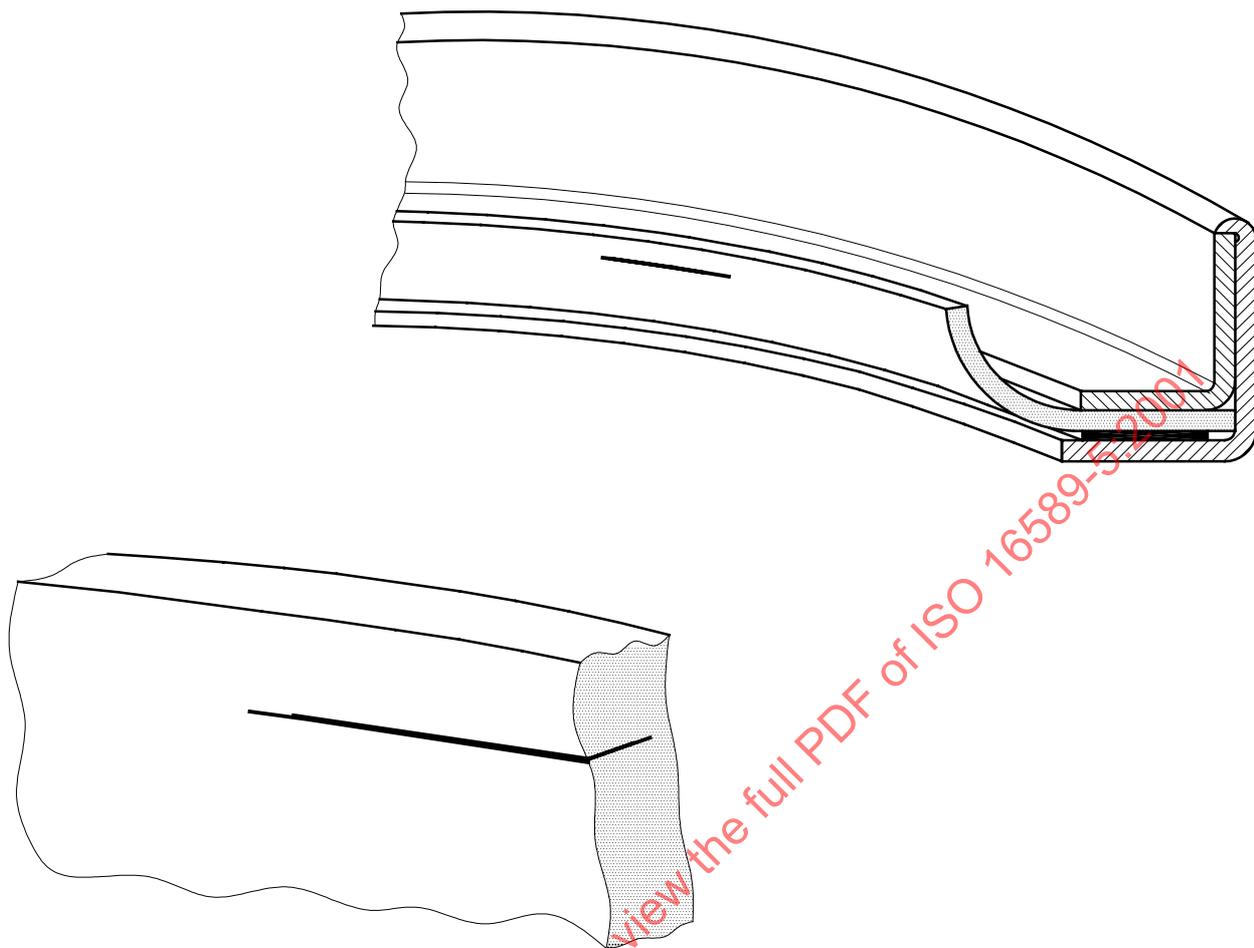


Figure 6 — Crack

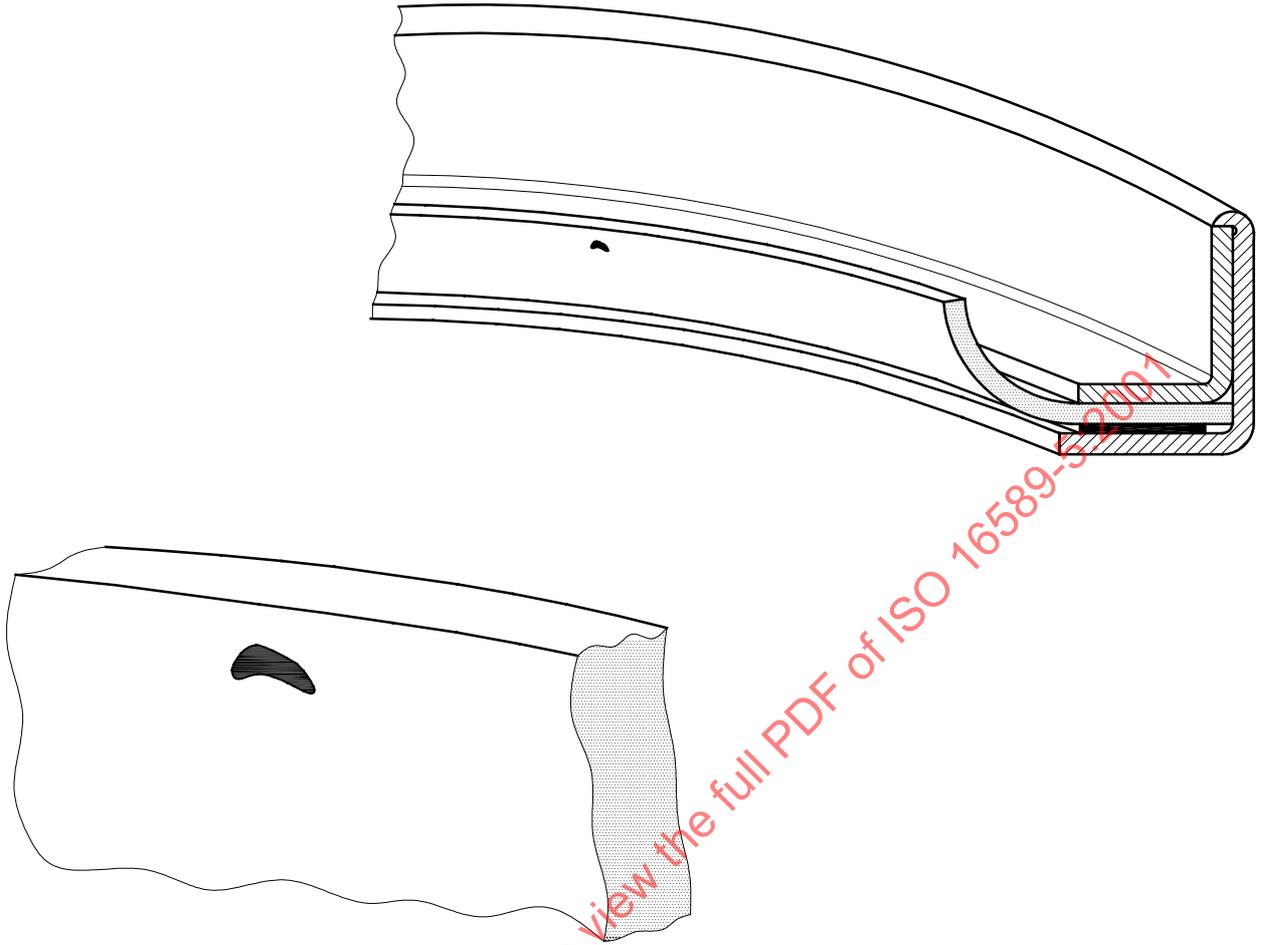


Figure 7 — Inclusion

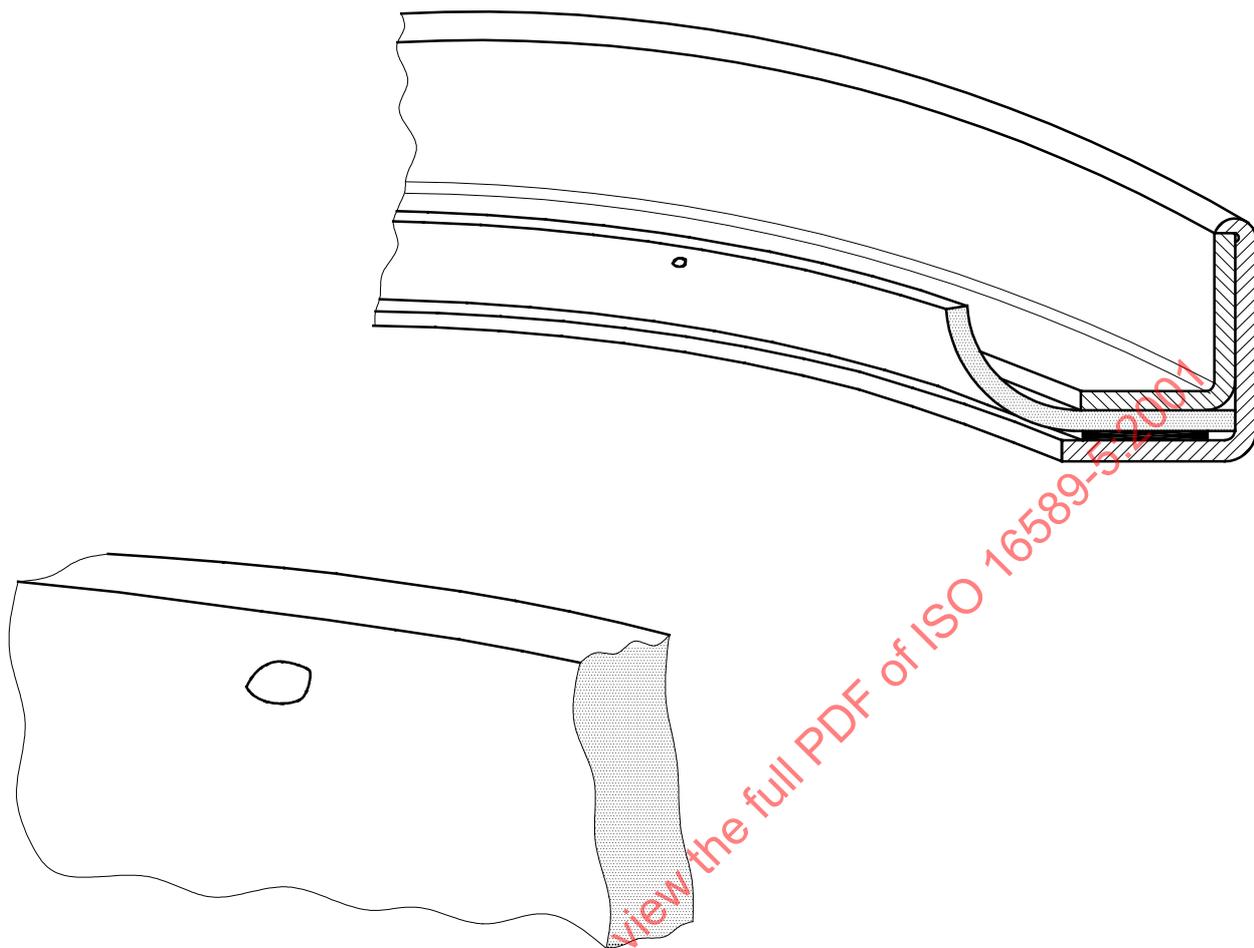


Figure 8 — Polymer window

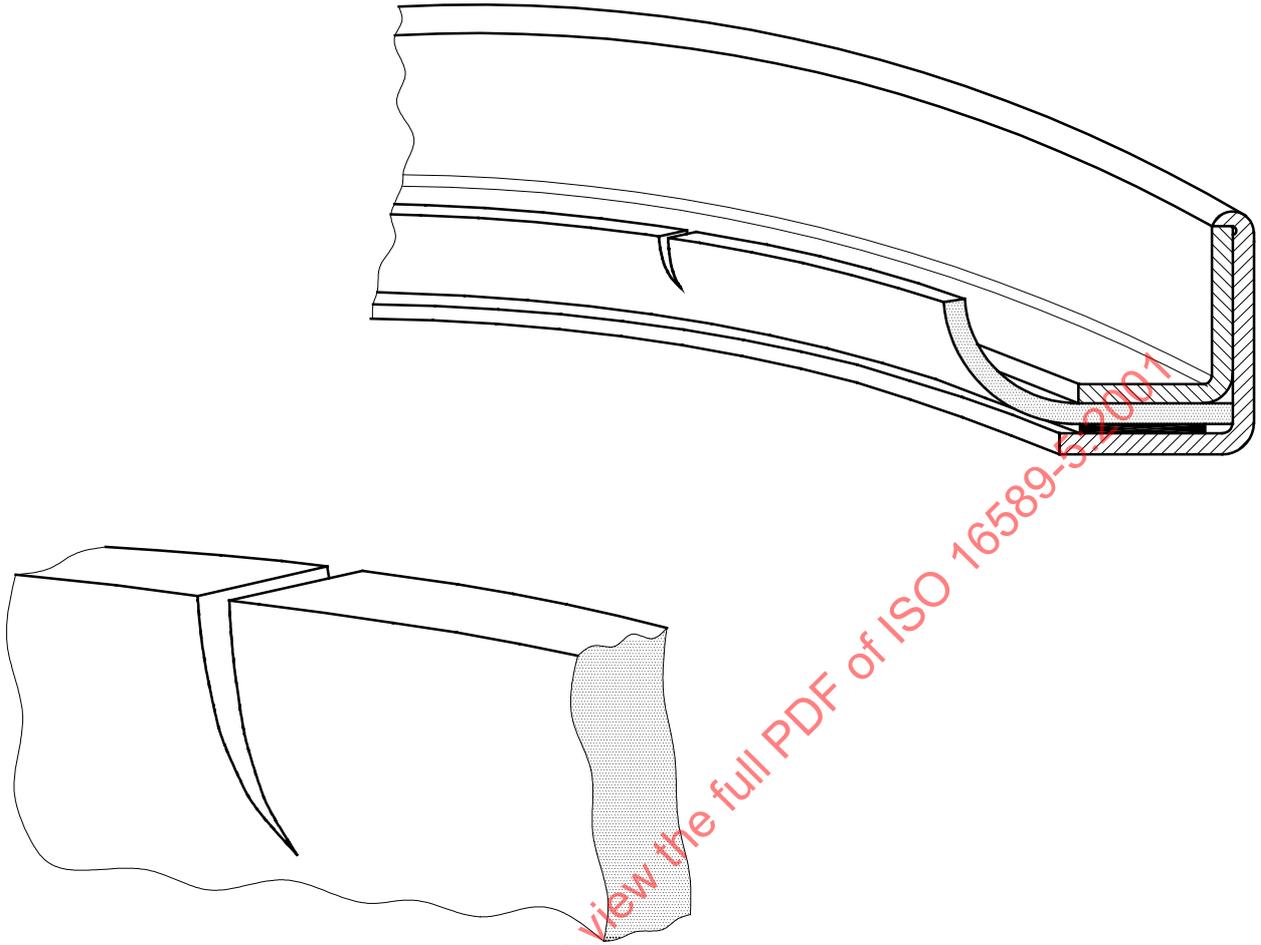


Figure 9 — Tear

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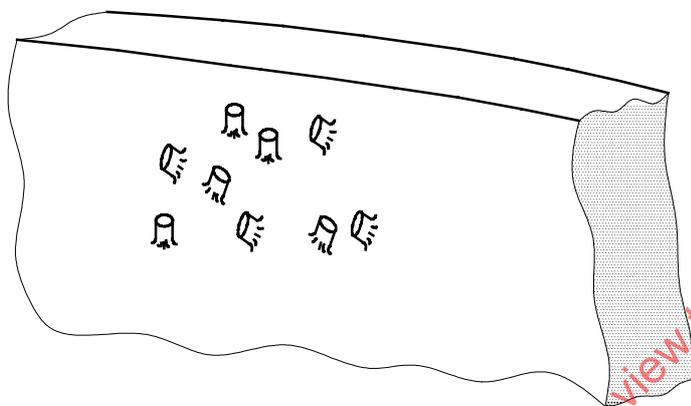
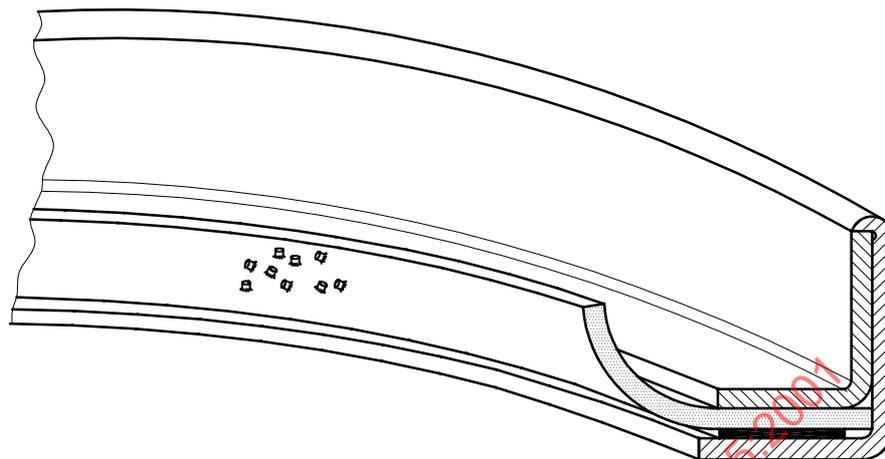


Figure 10 — Filler projections

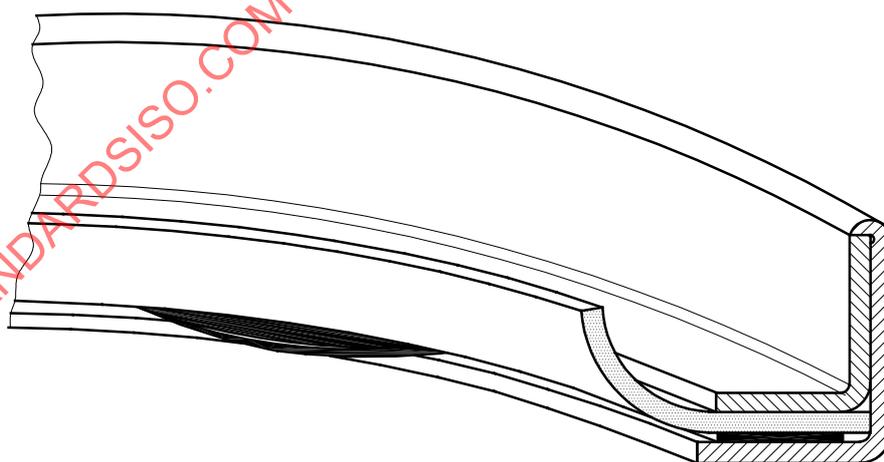


Figure 11 — Gasket extrusion

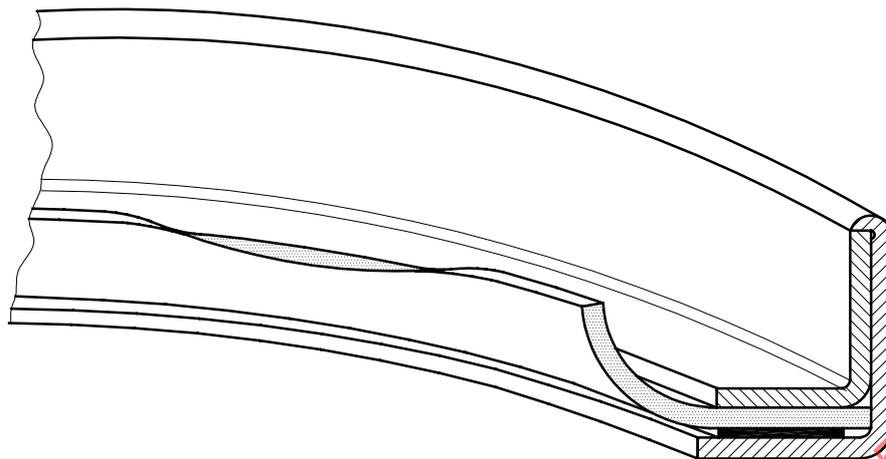


Figure 12 — Sealing lip inversion

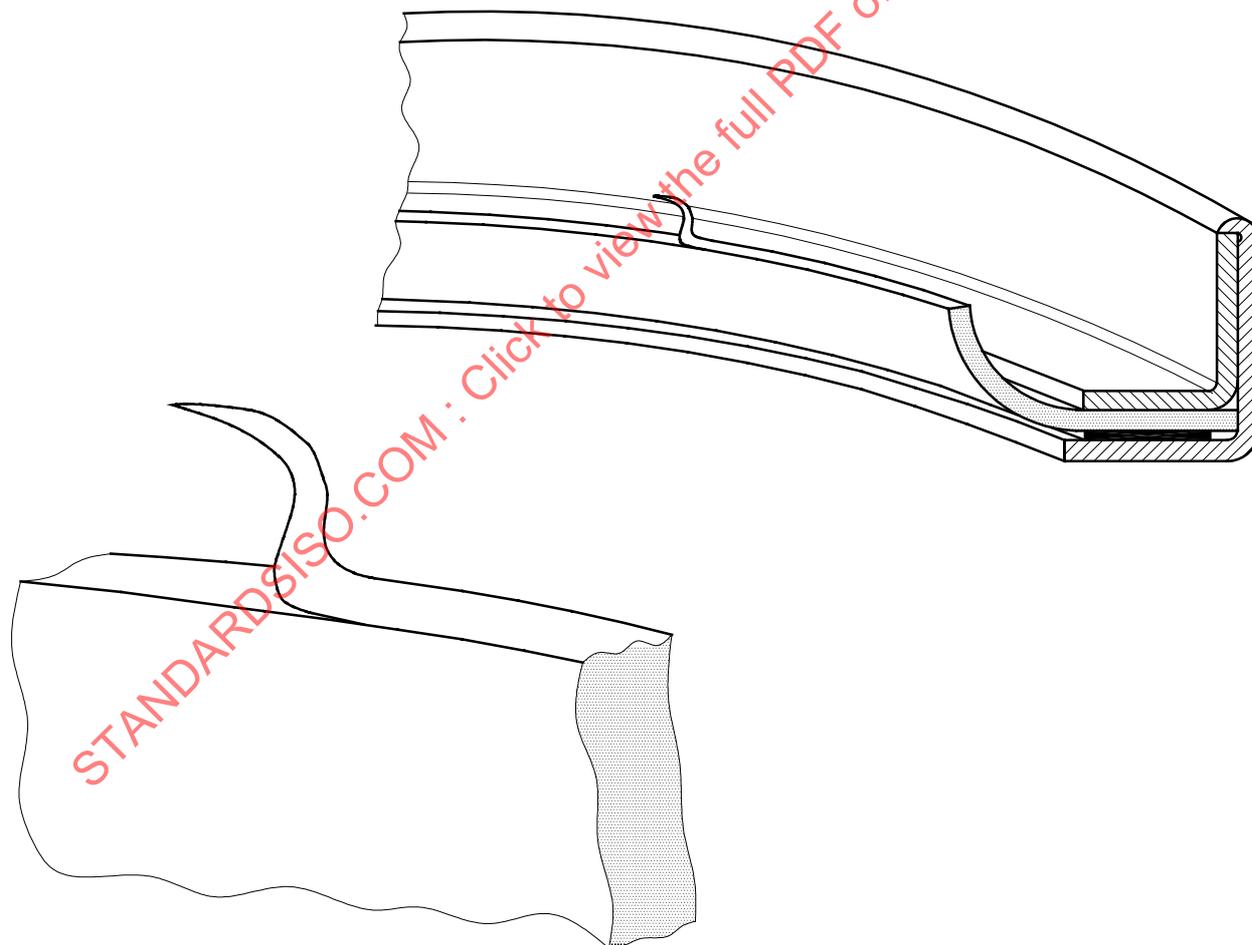
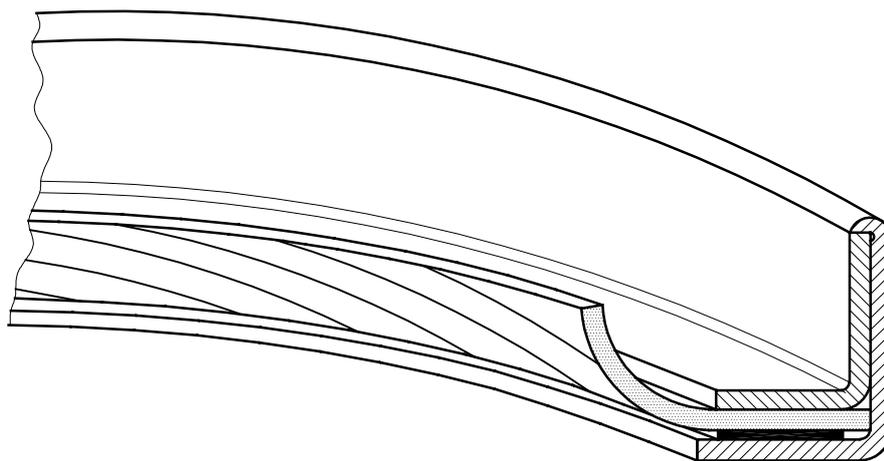
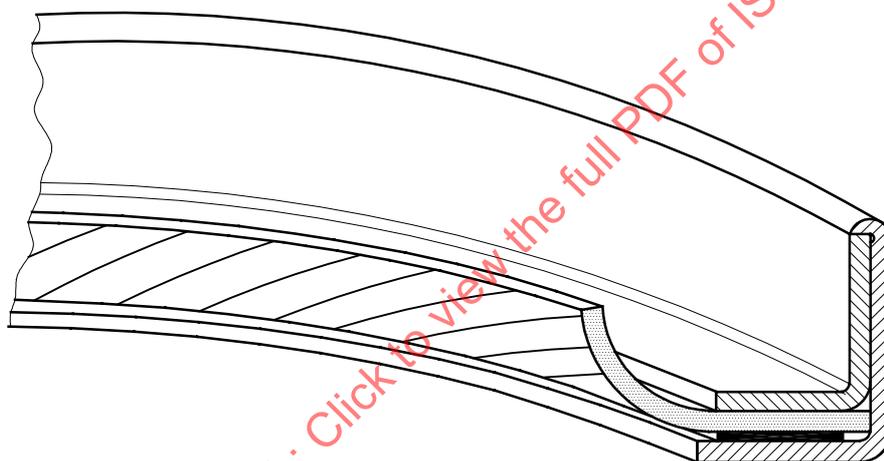


Figure 13 — Incomplete trim or folded flash



a) Correct spiral direction: Hydrodynamic aid feature to suit clockwise rotating shaft when viewed from backside (air side)



b) Incorrect spiral direction

Figure 14 — Example of correct and incorrect spiral directions