ISO 7438

Metallic materials — Bend test

Matériaux métalliques — Essai de pliage

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below or ISO's member body in the country of the requester.

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Foreword

M
D
E
ECISS – European Committee for Iron and Steel Standardization,
b

Any feedback or questions on this document should be directed to the user's national standards body. A

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Metallic materials — Bend test

1 Scope

2 Normative references

3 Terms and definitions

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

4 Symbols, designations and units

Table 1 — Symbols, designations and units

Symbol	Designation	Unit
a		
b		
c		
D		
f		
$\bar{\theta}$		—
L		
l		
η		—
p		
R		
r		
α		

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5 Principle

-

6 Test equipment

6.1 General

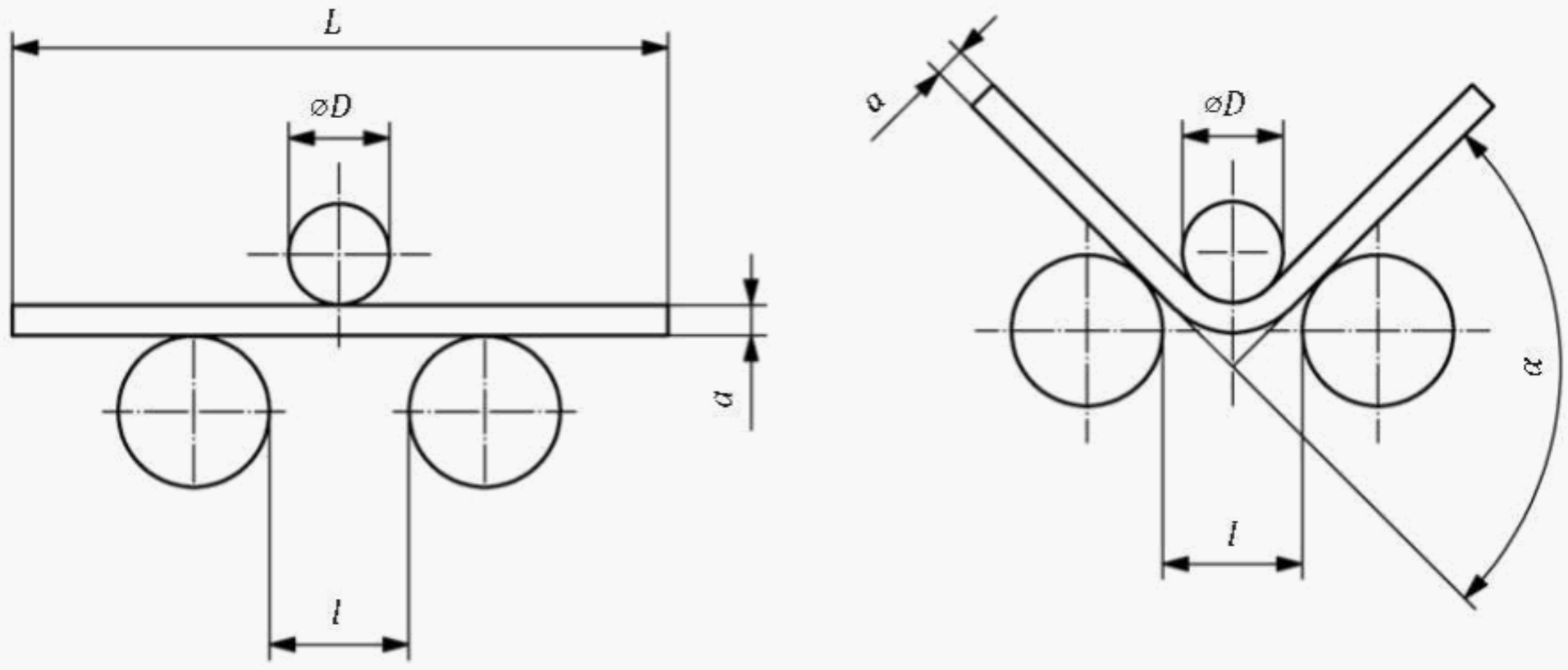

Figure 1 — Bending device with two supports and a former

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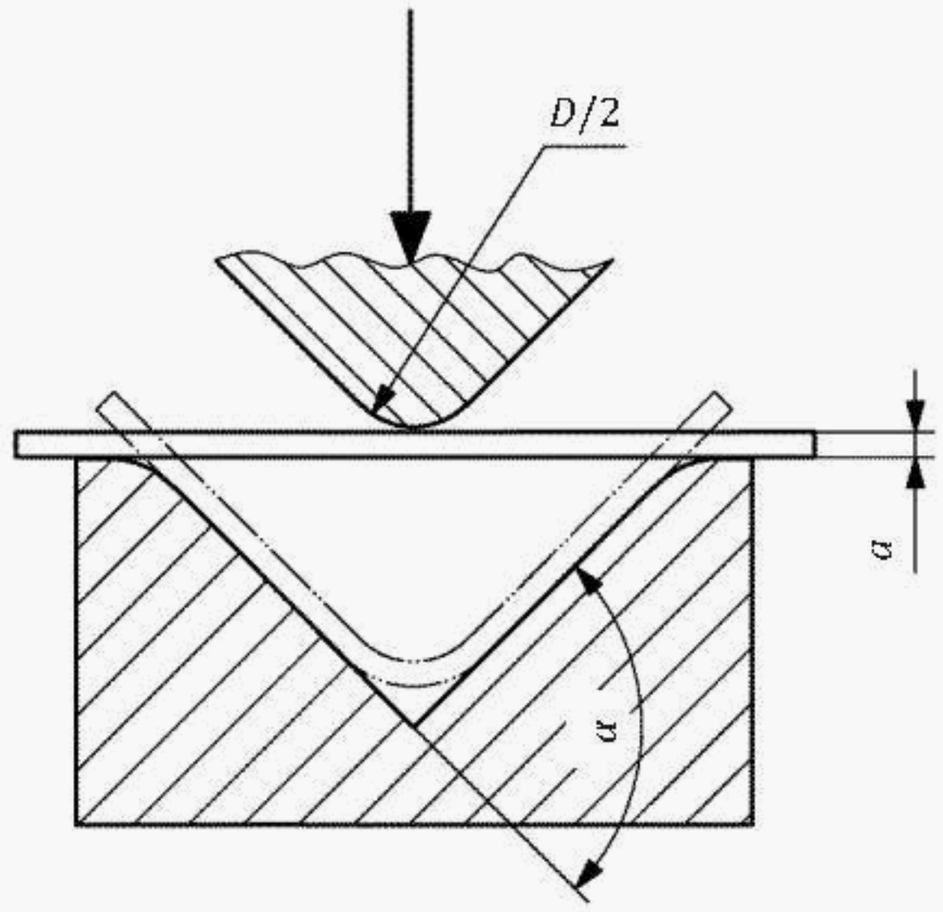
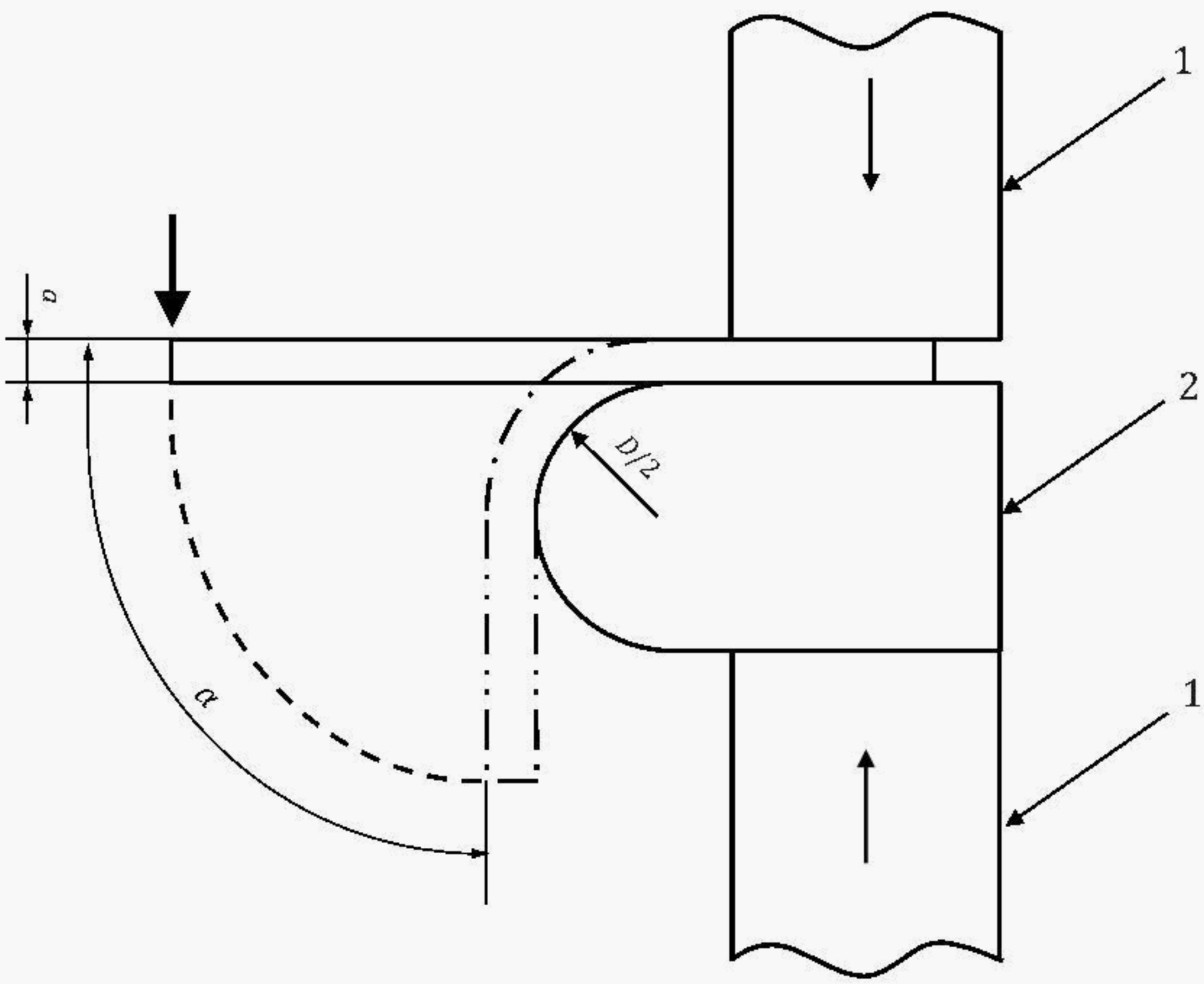


Figure 2 — Bending device with a V-block and a former



Key

Figure 3 — Bending device with a clamp

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6.2 Bending device with supports and a former

6.2.1

6.2.2

l

D

6.3 Bending device with a V-block

The tapered surfaces of the V-block shall form an angle of 180° − α (see Figure 2). The angle α is specified

6.4 Bending device with a clamp

7 Test piece

7.1 General

7.2 Edges of rectangular test pieces

—

— 1,5 mm, when the thickness of the test pieces is less than 50 mm and more than or equal to 10 mm;

— 1 mm when the thickness is less than 10 mm.

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7.3 Width of the test piece

7.4 Thickness of the test piece

7.4.1

7.4.2

-

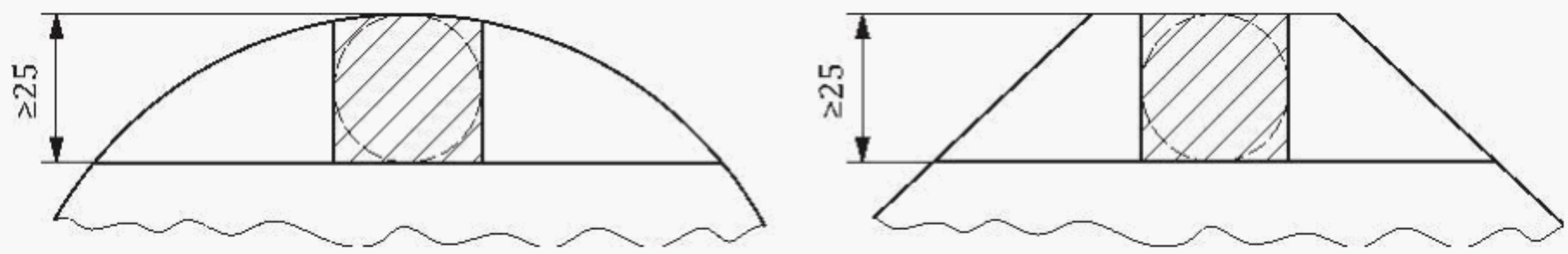

Figure 4 — Diameter and inscribed circle diameter of the test piece

7.5 Test pieces from forgings, castings and semi-finished products

7.6 Agreement for test pieces of greater thickness and width

7.7 Length of the test piece

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8 Procedure

WARNING — During the test, adequate safety measures and guarding equipment shall be provided.

8.1

8

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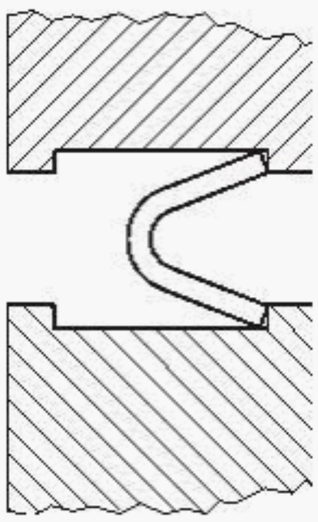

Figure 5 — Bending the legs of the test piece

Figure 6 — Legs of the test piece parallel to each other

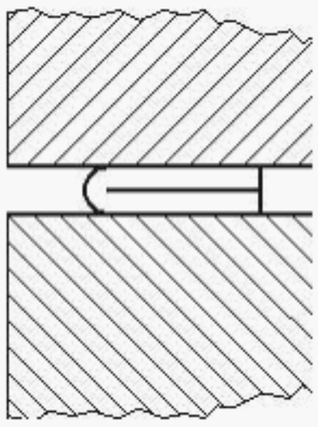

Figure 7 — Legs of the test piece in direct contact

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8.3

α, can be calculated from the measurement of the displacement of the former as

8.4

9 Interpretation of results

9.1

9.2

10 Test report

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Annex A

Determination of the bend angle from the measurement of the displacement of the former

α, of a test piece under force. The direct

α, of the test piece

$$\sin\frac{\alpha}{2} = \frac{p \times c + W \times (f-c)}{p^2 + (f-c)^2}$$

$$\cos\frac{\alpha}{2} = \frac{W \times p - c \times (f-c)}{p^2 + (f-c)^2}$$

$$W = \sqrt{\quad} + c -$$

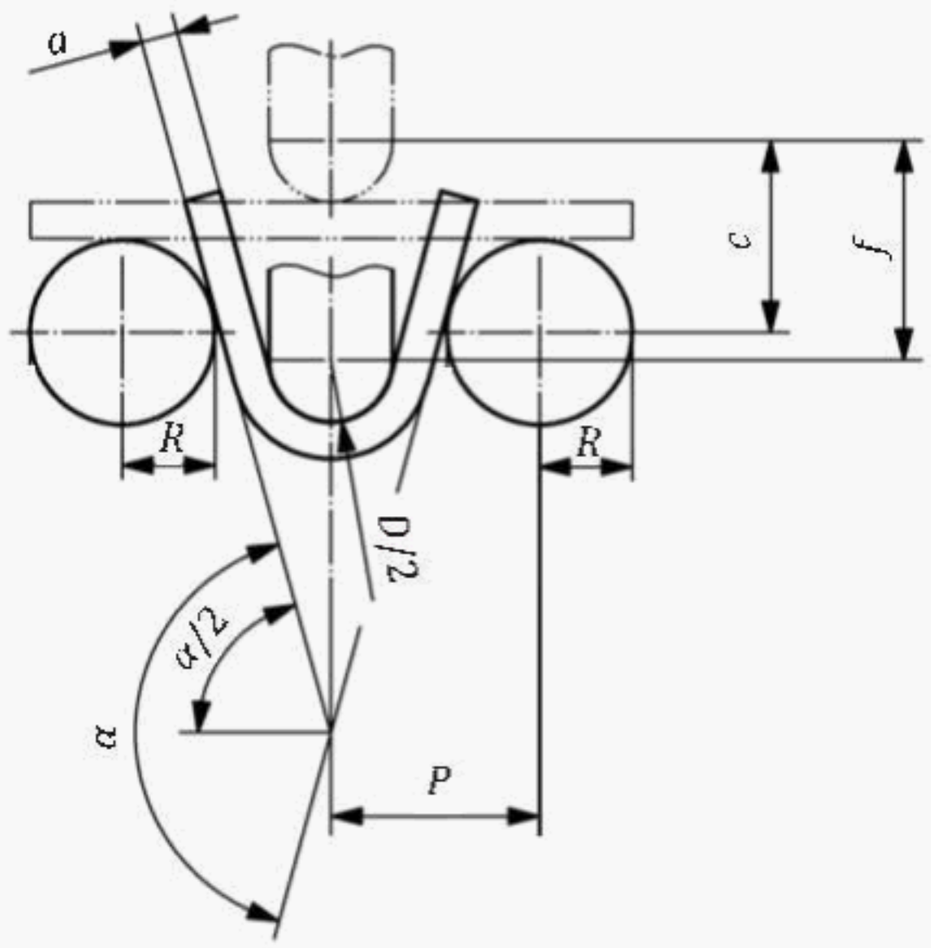

Figure A.1 — Values for the calculation of the bend angle, α

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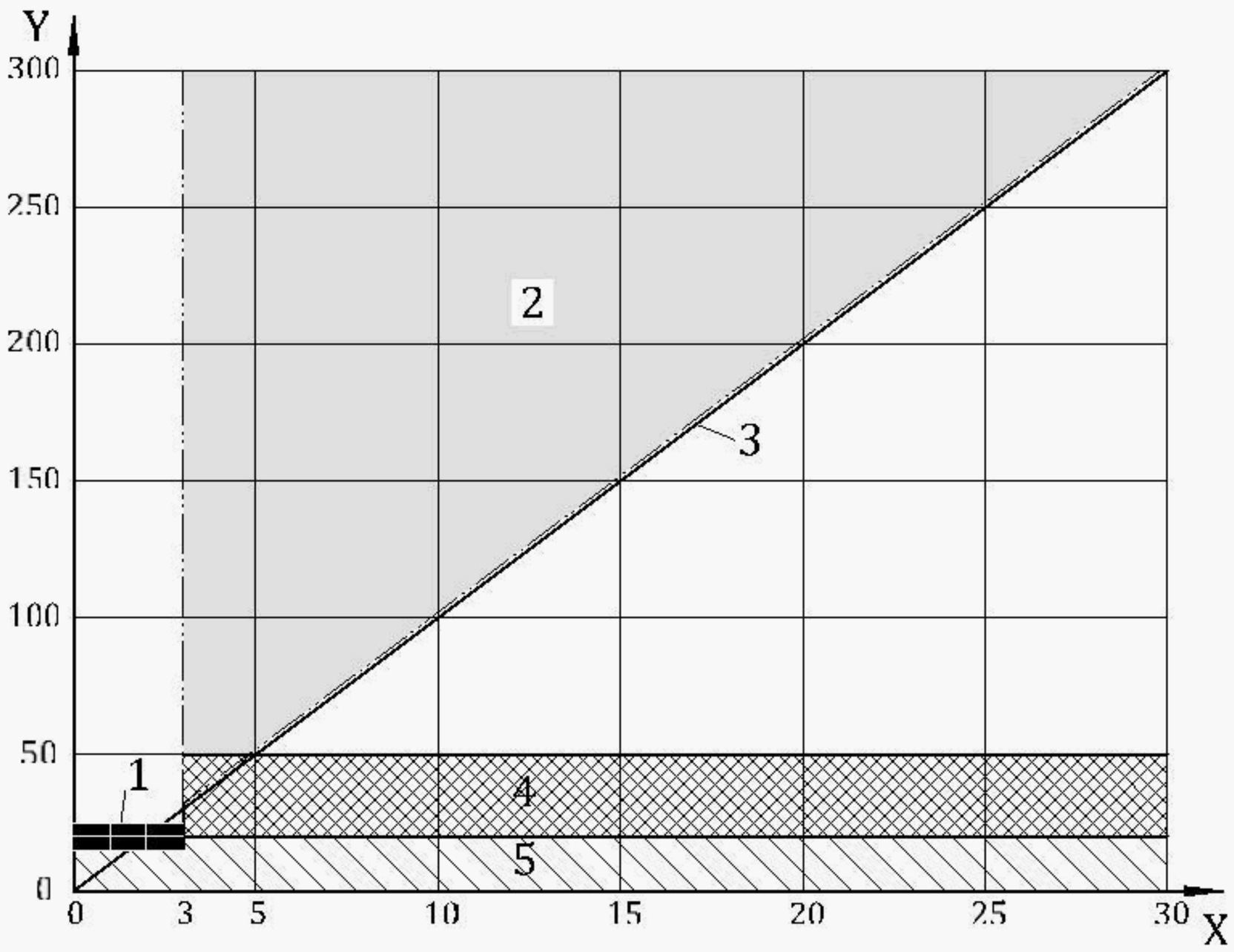
Annex B

Bend test at plane strain conditions

B.1 Overview



Key

$b \geq 10 \times a$ and $a > 3$ [see Annex B]

$b \geq 10 \times a$

$a \geq 3$ [see 7.3 b) 2)]

$b \leq 20$ [see 7.3 a)]

Figure B.1 — Combinations of thickness (a) and width (b) in relation to plane strain condition, for test pieces given in 7.3

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b
a) ≥ 10 should be employed.

—

— as a consequence, test pieces can fail;

— increase of the testing force;

— increase of the weight of the test piece;

— the bendability requirements in product standards may not be fulfilled.

B.2 General

η
η, and the
θ
θ

$$\cos\frac{\pi(1-\theta)}{2} = -\frac{2}{\eta}\sqrt{\eta - \frac{1}{2}\left(3\right.}$$

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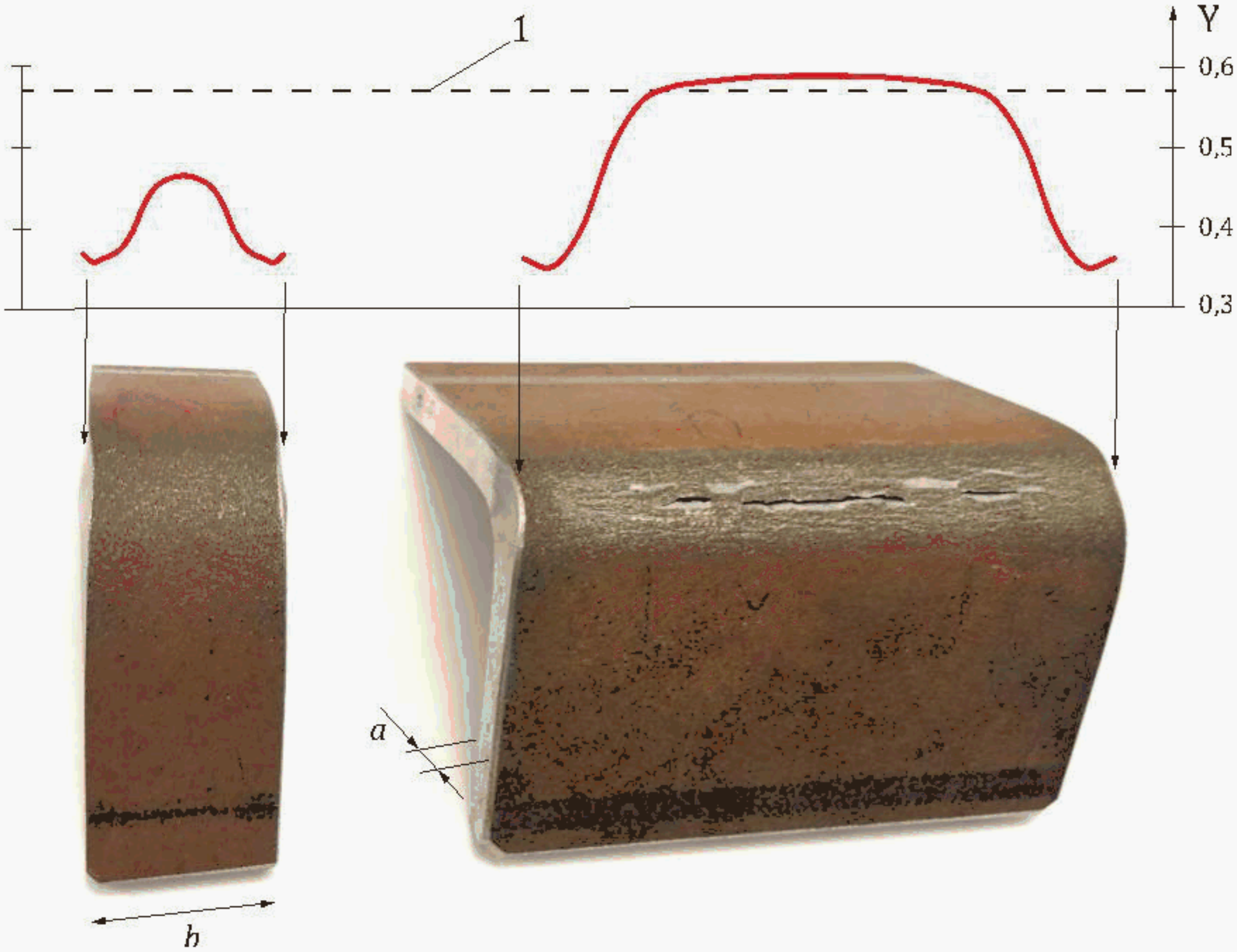

Key

Figure B.2 — Differences in bendability depending on width (*b*)

B.3 Test piece

a) ≥ 10 shall be used.

B.4 Assessment

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B.5 Test report

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