# European Destructive Testing Technician (EDTT)

## Bend Tests of Metals and Welded Joints

**[Name of the Event & Date]**

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# Introduction

The bend test is performed to determine the mechanical properties of a material or to check the susceptibility to plastic deformation under the bending force of the base materials and welded joints.

After bending, the specimens are observed for discontinuities.

The bend test of a welded joint is intended to assess ductility and determine the presence of weld inconsistencies at or near the joint surface.

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# Standard

## ISO 7438:2020

Metallic materials — Bend test

This document specifies a method for determining the ability of metallic materials to undergo plastic deformation in bending.

This document applies to test pieces taken from metallic products, as specified in the relevant product standard. It is not applicable to certain materials or products, for example tubes in full section or welded joints, for which other standards exist.

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# Bend test
## Principle

## ISO 7438

The test consists of submitting a test piece of round square, rectangular or polygonal cross-section to plastic deformation by bending, without changing the direction of loading, until a specified angel of ben is reached.

The axes of two legs of the test piece remain in a plane perpendicular to the axis of bending. In the case of a 180° bend, the two lateral surface may depending on the requirements of the product standard, lie flat against each other or can be parallel at a specified distance, an insert used to control this distance.

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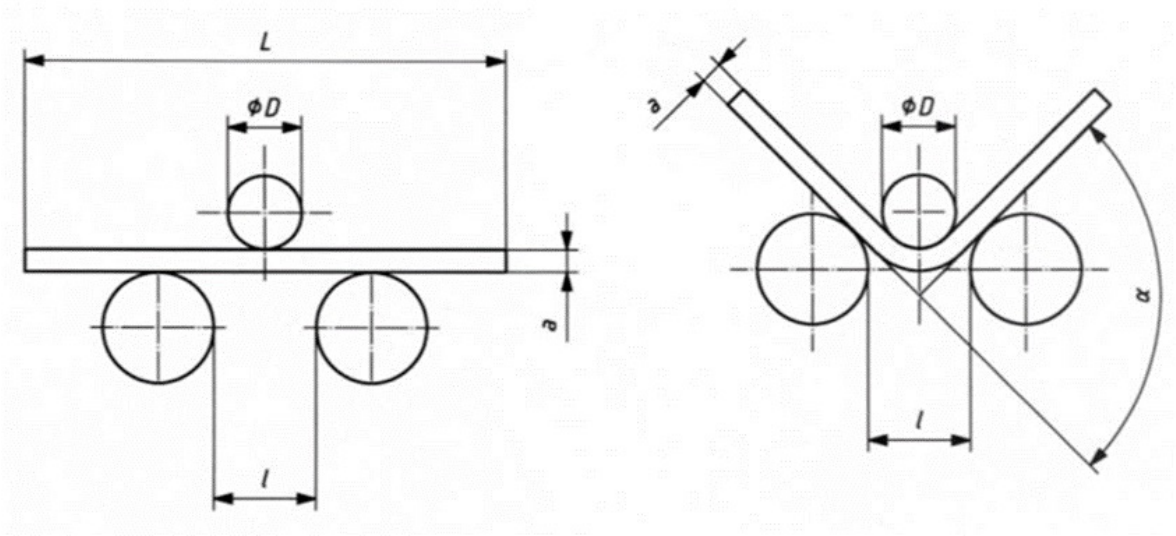
# Bend test
## Test equipment

## ISO 7438

Bending device with two supports and former




Where,
L – length of test piece,
D – diameter of the former,
a – thickness or diameter of test piece,
l – distance between supports,
α – angel of bend.

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# Bend test
## Test equipment

## ISO 7438

### Bending device with two supports and former

The length of the supports and the width of the former shall be grater than width or diameter of the test piece. The diameter of the former is determined by the product standard. The test piece supports and the former shall be of sufficient hardness.

Unless otherwise specified, the distance between the supports shall be:

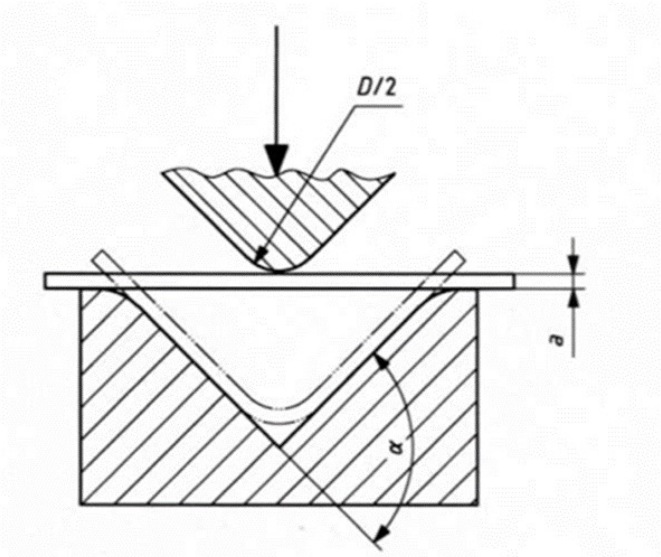
$$l = (D + 3a) \pm \frac{a}{2}$$

And shall not change during the bend test.

# Bend test
## Test equipment

## ISO 7438

Bending device with a V-block and a former




Where,
D – diameter of the former,
a – thickness or diameter of test piece,
α – angel of bend.

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# Bend test
## Test equipment

## ISO 7438

### Bending device with two supports and former

The tapered surface of the V-block shall form an angle of 180°- α. The angle α is specified in the relevant standard.

The edges of the V-block shall have a radius between 1 and 10 times the thickness of the test piece and shall be of sufficient hardness.

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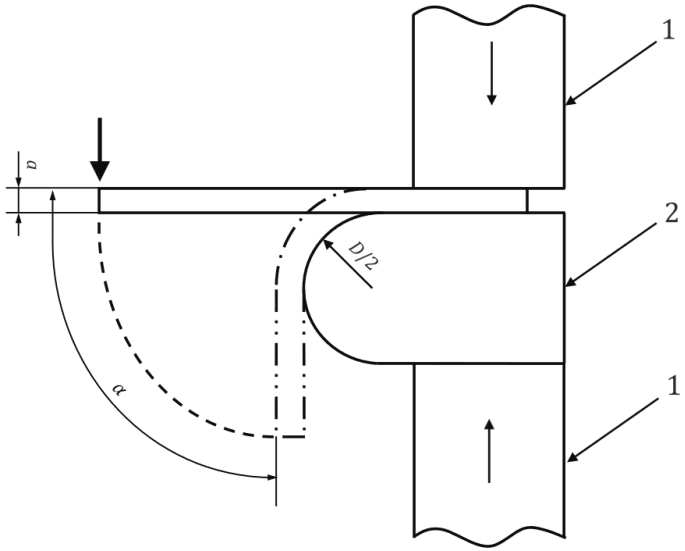
# Bend test
## Test equipment

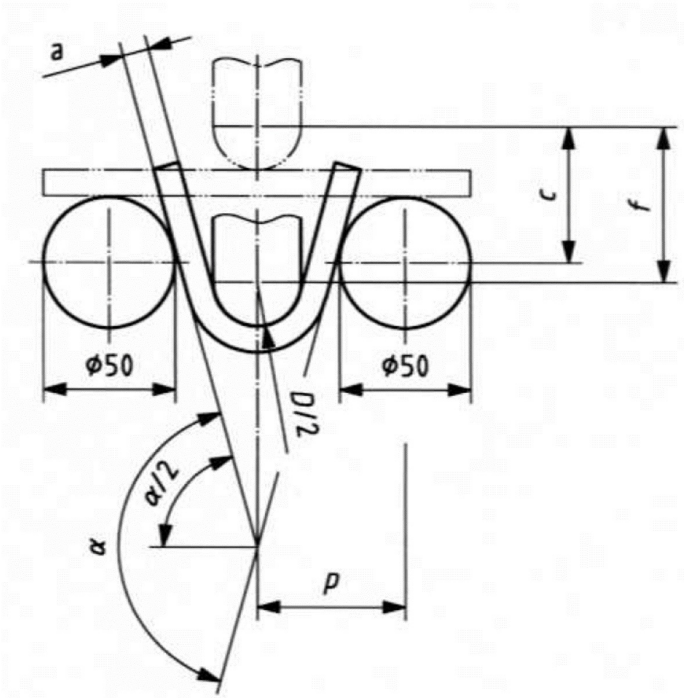
## ISO 7438

### Bending device with a clamp




Where,
1 – clamp,
2 – former,
D – diameter of the former,
a – thickness or diameter of test piece,
α – angel of bend.

# Bend test
## Bend angle




## ISO 7438

### Determination of the bend angle

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

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

$$W = \sqrt{p^2 + (f - c)^2 - c^2}$$

$$c = R + a + \frac{D}{2}$$

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# Bend test of welded joints

## ISO 5173:2023

### Destructive tests on welds in metallic materials — Bend tests

This document specifies a method for making transverse root, face and side bend tests on test specimens taken from butt welds, butt welds with cladding (subdivided into welds in clad plates and clad welds) and cladding without butt welds, in order to reveal imperfections on or near the surface of the test specimen which is under tension during bend testing and/or assess ductility. It also gives the dimensions of the test specimen.

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# Bend test of welded joints

## ISO 5173:2023

### Destructive tests on welds in metallic materials — Bend tests

In addition, this document specifies methods to be used instead of transverse bend tests with a former for welded joints when base materials, heat affected zones and/or weld metal have a significant difference in their physical and mechanical properties in relation to bending.
This document applies to metallic materials in all forms of product with welded joints made by any welding process.

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# Bend test of welded joints

## ISO 5173:2023

Destructive tests on welds in metallic materials — Bend tests

**DUE TO THE STANDARD IS NEW (2023.01) WE HAVE TO CHECK ANY CHANGES.**
**AFTER THAT THE PRESENTATION WILL BE COMPLETED.**

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TRUST

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*Any Questions?*

# Thank You!

[Name & contact email]

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