
**Metallic materials — Sheet and strip
— Method for springback evaluation
in stretch bending**

*Matériaux métalliques — Tôles et bandes — Méthode d'évaluation du
retour élastique lors d'un cintrage sous traction*



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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.

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 documents 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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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 2, *Ductility testing*.

This second edition cancels and replaces the first edition (ISO 24213:2008), which has been technically revised.

The main changes compared to the previous edition are:

- the Normative references has been updated;
- [Clause 7](#) c) and [Clause 9](#) a) have been revised to specify the test piece more clearly;
- In [Figure 2](#) b), a label to the test piece has been added;
- [Clause 8](#) d) has been revised because the use of dial gauge is one of the methods for determining the radius of curvature;
- the Bibliography has been updated.

Introduction

This document has been established to evaluate the amount of springback occurring in metallic sheets deformed by stretch bending. It may be used for specifying a material, directly controlling a forming operation, designing dies, or calibrating finite element programs.

In metallic sheet forming processes, the geometry of the formed parts may deviate from the design geometry after the parts are removed from the dies due to elastic recovery. This phenomenon is referred to as springback.

Metallic materials — Sheet and strip — Method for springback evaluation in stretch bending

1 Scope

This document specifies a method for evaluating the amount of springback of sheets of metallic materials known to exhibit large amounts of springback subjected to plane-strain stretch bending, which is a typical deformation mode generated in press-formed panels. By using this method, the amount of springback under stretch bending is evaluated accurately and quantitatively^{[1][2]}.

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.

ISO 80000-1, *Quantities and units — Part 1: General*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

curvature

κ

reciprocal of the radius of curvature, r , determined at the centre of a stretch-bent specimen on the inner surface in the longitudinal direction

$$\kappa = \frac{1}{r}$$

3.2

amount of springback

η

relative change in curvature of a test piece under force and after removal of the force shown in [Figure 1](#)

$$\eta = \frac{|\kappa' - \kappa|}{\kappa} = \frac{r' - r}{r'}$$