International Standard ISO 2142

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Wrought aluminium, magnesium and their alloys — Selection of specimens and test pieces for mechanical testing

Aluminium, magnésium et leurs alliages corroyés — Choix des spécimens et des éprouvettes pour essais mécaniques

First edition — 1981-08-01

UDC 669.71/.721 : 620.11 **Ref. No. ISO 2142-1981 (E)**

Descriptors : metal industry, aluminium, aluminium alloys, magnesium, magnesium alloys, test specimens, test specimen conditioning, mechanical tests.

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2142 was developed by Technical Committee ISO/TC 79, *Light metals and their alloys*, and was circulated to the member bodies in May 1980.

It has been approved by the member bodies of the following countries :

Australia	Hungary	Romania
Austria	India	South Africa, Rep. of
Brazil	Ireland	Spain
Canada	Korea, Dem. P. Rep. of	Sweden
China	Korea, Rep. of	Switzerland
Czechoslovakia	Netherlands	United Kingdom
France	Norway	USA
Germany, F. R.	Poland	USSR

No member body expressed disapproval of the document.

This International Standard cancels and replaces ISO Recommendation R 2142-1971, of which it constitutes a technical revision.

Printed in Switzerland

Wrought aluminium, magnesium and their alloys — Selection of specimens and test pieces for mechanical testing

1 Scope and field of application

This International Standard specifies the method of selecting and preparing specimens and test pieces, representative of a wrought product in aluminium, magnesium and their alloys, for mechanical testing (tensile test and bend test).

2 References

ISO/R 190, *Tensile testing of light metals and their alloys.*[1)]

ISO/R 952, *Tensile testing of light metal and light metal alloy tubes.*[1)]

ISO/R 954, *Simple bend test for light metal and light metal alloy sheet and strip of thickness between* 0,2 mm (0.008 in) *and* 7 mm (0.25 in).[2)]

3 Definitions

For the purpose of this International Standard, the following definitions apply.

3.1 inspection lot : Consignment, or a part thereof, submitted for inspection, comprising products of the same grade or alloy, form, temper, thickness or cross-section, and processed in the same manner.

The size of the lot and the sampling rate to be used will be specified in the general section of the relevant product standard.

3.2 sample : One or more products taken from an inspection lot.

3.3 specimen : One or more pieces taken from each product in the sample, for the purpose of producing test pieces.

3.4 test piece : A piece taken from each specimen and suitably prepared for the test.

3.5 test : An operation to which the test piece is subjected in order to measure or classify a property.

4 Selection and preparation of specimens for mechanical testing

4.1 Location and size of specimens

Specimens shall be taken from samples in such a way that it is possible to orientate the test pieces in relation to the product, as specified in clause 5.

The specimens shall be sufficiently large to allow manufacture of the test pieces necessary to carry out the required tests, and shall include sufficient metal to allow manufacture of test pieces for any retests required.

4.2 Identification of specimens

Each specimen shall be marked in such a manner that, after removal, it is still possible to identify the product from which it was taken, and, if required, its location and orientation. If, during the course of subsequent operations, removal of the markings cannot be avoided, new markings shall be made before the originals are removed.

4.3 Preparation of specimens

Specimens shall be taken from the sample after completion of all the mechanical and heat treatments that the product has to undergo before delivery, and which may influence the mechanical properties of the metal. In cases where this is not possible, the sample or specimens may be taken at an earlier stage, but they shall be subjected to the same treatment as that to which it is intended to submit the product concerned.

Cutting shall be carried out in such a manner that it does not change the characteristics of the part of the specimen from which the test pieces are to be prepared. Thus, the dimensions of the specimens shall provide an adequate machining allowance to permit removal of the zone affected by cutting.

Specimens shall not be machined or treated in any way by which their mechanical properties may be altered. Any straightening required shall be carried out with great care, preferably by hand.

1) The revisions of ISO/R 190 and ISO/R 952 will be incorporated in ISO 6892.
2) The revision of ISO/R 954 will be incorporated in ISO 7438.

4.4 Number of specimens

The sampling rate shall be as specified in the general section of the relevant product standard.

5 Selection and preparation of test pieces

5.1 Identification of test pieces

Each test piece shall be marked in such a manner that it is possible to identify the inspection lot from which it was taken and, if required, its location and orientation in the product.

If a test piece is marked by stamping, this shall not be in a place or manner which may interfere with subsequent testing.

Where it is not convenient to mark a test piece, an identification tag may be attached.

5.2 Machining

Any machining necessary shall be carried out in such a manner that it does not change the characteristics of the metal in the test piece.

5.3 Test pieces for tensile test

5.3.1 General

One test piece shall be taken from each specimen.

The orientation of test pieces relative to the product shall be as specified in the general section of the relevant product standard.

The shape and recommended dimensions of test pieces are specified in ISO/R 190 and ISO/R 952.

5.3.2 Rolled flat products

Flat test pieces shall be used for thicknesses up to and including 12,5 mm (less than 0.5 in). The test piece shall be prepared so that both rolled surfaces are included undisturbed. For thicknesses exceeding 12,5 mm (0.5 in and greater), round test pieces shall be used. For thicknesses up to and including 40 mm (1.5 in), the longitudinal axis of the round test pieces shall be located at a distance from the surface equal to half the thickness.

5.3.3 Solid products with round section

These shall be tested longitudinally either in full section or by means of a round test piece.

Round test pieces shall be located as follows :

— for products of diameter up to and including 40 mm (1.5 in) : at the centre of the product;

— for products of diameter exceeding 40 mm (1.5 in) : at half the distance between the surface and the centre.

5.3.4 Solid products with square or polygonal section

The requirements of 5.3.3 shall apply. The largest inscribable circle within the cross-section shall determine the location of the test piece.

5.3.5 Solid products with rectangular section (extruded or drawn)

These shall be tested longitudinally either in full section, or

— for products of thickness up to and including 12,5 mm (less than 0.5 in) : flat test pieces prepared so that the two wider surfaces of the product are included undisturbed;

— for products of thickness exceeding 12,5 mm (0.5 in and greater) : round test pieces having their longitudinal axes located at the intersection of A-A and B-B as shown in the figures in the table.

5.3.6 Tubes

Test pieces are described in ISO/R 952.

5.3.7 Forgings

Test pieces shall be obtained by one of the following means, as agreed between the manufacturer and the user :

a) from the forging itself, in such a way that the longitudinal axis coincides as closely as possible with the principal direction of metal flow;

b) from a specimen attached to the forging;

c) from a separate specimen, forged from the same stock and heat treated with the forging itself;

d) from a separate specimen, machined from the same stock and heat treated with the forging itself.

5.3.8 Other semi-finished products

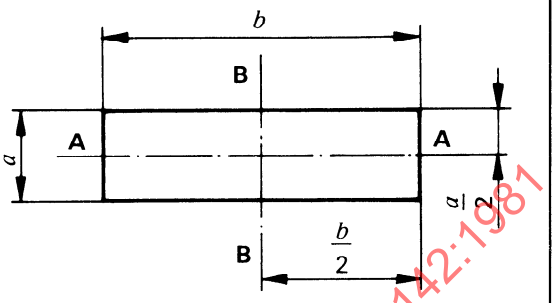
Unless otherwise agreed or specified, test pieces shall be taken at the most convenient place, provided, in each case, that the test piece is representative of the cross-section of the product.

5.4 Test pieces for bend test on sheet and strip — General

If this test is specified in the product standard, one test piece shall be taken from each specimen. Unless otherwise agreed or specified, the test pieces shall be made in such a way that their longitudinal axis is perpendicular to the direction of final rolling (i.e. so that after bending, the longitudinal axis of the bend is parallel to the direction of the final rolling).

The shape and recommended dimensions of test pieces are specified in ISO/R 954.

Table — Location of test pieces for solid products with rectangular section (extruded or drawn)

<table>
<tr><th>Thickness
a</th><th>Width
b</th><th>Location of longitudinal axis of test piece</th></tr>
<tr><td rowspan="2">Greater than 12,5 mm up to and including 40 mm (0.5 in to 1.5 in inclusive)</td><td>Greater than 12,5 mm up to and including 40 mm (0.5 in to 1.5 in inclusive)</td><td> 
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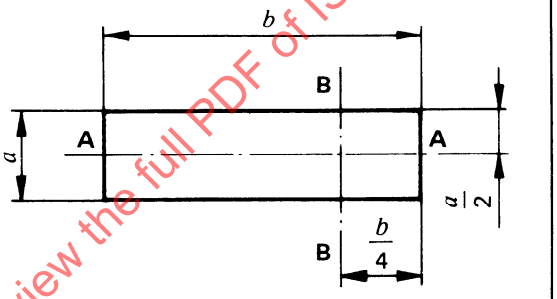
<tr><td rowspan="2">Greater than 40 mm (greater than 1.5 in)</td><td> 
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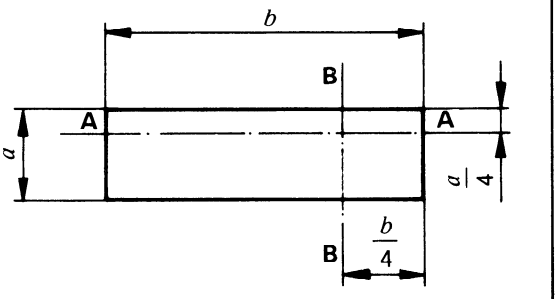
<tr><td>Greater than 40 mm (greater than 1.5 in)</td><td> 
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