

# JIS

JAPANESE  
INDUSTRIAL  
STANDARD

Translated and Published by  
Japanese Standards Association

---

JIS Z 2257 : 2021

(OSTEC/JSA)

**Biaxial tensile testing method for sheet  
metals using a cruciform test piece**

---

ICS 77.040.10

Reference number : JIS Z 2257 : 2021 (E)

PROTECTED BY COPYRIGHT

18 S

Z 2257 : 2021

Date of Establishment: 2021-05-20

Date of Public Notice in Official Gazette: 2021-05-20

Investigated by: Japanese Industrial Standards Committee  
Standards Board for ISO area  
Technical Committee on Metal and Inorganic  
Materials

---

JIS Z 2257 : 2021, First English edition published in 2022-02

Translated and published by: Japanese Standards Association  
Mita MT Building, 3-13-12, Mita, Minato-ku, Tokyo, 108-0073 JAPAN

---

In the event of any doubts arising as to the contents,  
the original JIS is to be the final authority.

© JSA 2022

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

HN

PROTECTED BY COPYRIGHT

## Contents

	Page
Introduction .....	1
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions .....	1
4 Principle .....	2
5 Test piece .....	3
5.1 Shape and dimensions .....	3
5.2 Preparation of the test pieces .....	4
6 Testing machine and testing method .....	5
6.1 Testing machine .....	5
6.2 Measurement method of tensile force and strain .....	5
6.3 Installation of the test piece to a biaxial tensile testing machine .....	7
6.4 Testing methods .....	7
7 Determination of biaxial stress-strain curves .....	8
7.1 General .....	8
7.2 Determination of the original cross-sectional area of gauge area .....	8
7.3 Determination of true stress .....	8
7.4 Determination of true strain .....	9
7.5 Determination of plastic strain .....	9
8 Test report .....	10
8.1 Information in the report .....	10
8.2 Additional note .....	11
Annex A (informative) Method for measuring a yield surface .....	12
Annex B (informative) Factors affecting the maximum equivalent plastic strain applicable to the gauge area of cruciform test piece .....	17
Annex C (informative) Biaxial tensile testing machine .....	20
Annex JA (informative) Comparison table between JIS and corresponding International Standard .....	26

## Foreword

This Japanese Industrial Standard has been established by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal for establishment of Japanese Industrial Standard submitted by Osaka Science & Technology Center (OSTEC)/Japanese Standards Association (JSA) with a draft being attached, based on the provision of Article 12, paragraph (1) of the Industrial Standardization Act.

This **JIS** document is protected by the Copyright Act.

Attention is drawn to the possibility that some parts of this Standard may conflict with patent rights, published patent application or utility model rights. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying any of such patent rights, published patent application or utility model rights.

# Biaxial tensile testing method for sheet metals using a cruciform test piece

## Introduction

This Japanese Industrial Standard has been prepared based on **ISO 16842** : 2014, Edition 1, with some modifications of the technical contents.

The dotted underlines indicate changes from the corresponding International Standard. A list of modifications with the explanations is given in Annex JA.

## 1 Scope

This Standard specifies the method for measuring the stress-strain curves of sheet metals under biaxial tensile stresses using a cruciform test piece having a uniform thickness, fabricated from a sheet metal sample (hereafter referred to as test piece), by applying tensile forces in the orthogonal directions parallel to the centrelines of the test piece.

**NOTE** The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

ISO 16842 : 2014 *Metallic materials — Sheet and strip — Biaxial tensile testing method using a cruciform test piece* (MOD)

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and **JIS** are IDT (identical), MOD (modified), and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS G 0202 *Glossary of terms used in iron and steel (Testing)*

JIS Z 2241 *Metallic materials — Tensile testing — Method of test at room temperature*

JIS Z 8401 *Rounding of numbers*

## 3 Terms and definitions

For the purpose of this Standard, the terms and definitions given in JIS G 0202 and JIS Z 2241, and the following apply.

### 3.1

**cruciform test piece**