



**International  
Standard**

**ISO 636**

**Welding consumables — Rods,  
wires and deposits for tungsten  
inert gas welding of non-alloy and  
fine-grain steels — Classification**

*Produits consommables pour le soudage — Baguettes, fils et  
dépôts pour soudage TIG des aciers non alliés et des aciers à  
grains fins — Classification*

**Sixth edition  
2024-09**

iteh Standards  
Standards.iteh.ai)  
Document Preview

[ISO 636:2024](#)

<https://standards.iteh.ai/catalog/standards/iso/0c1a05a6-37bd-4952-8e48-063ed8457746/iso-636-2024>

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

ISO 636:2024

<https://standards.iteh.ai/catalog/standards/iso/0c1a05a6-37bd-4952-8e48-063ed8457746/iso-636-2024>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

	Page
<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>vi</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Classification</b> .....	<b>2</b>
4.1 General.....	2
4.2 Classification systems.....	2
<b>5 Symbols and requirements</b> .....	<b>2</b>
5.1 Symbol for the product/process.....	2
5.2 Symbol for strength and elongation of all-weld metal.....	2
5.3 Symbol for impact properties of all-weld metal.....	3
5.3.1 System A - Classification by yield strength and 47 J impact energy.....	3
5.3.2 System B - Classification by tensile strength and 27 J impact energy.....	3
5.4 Symbol for the chemical composition of rods or wires.....	4
<b>6 Mechanical tests</b> .....	<b>8</b>
6.1 Mechanical tests and conditions.....	8
6.2 Preheating and interpass temperatures.....	8
6.3 Welding conditions and pass sequence.....	9
6.4 PWHT condition.....	9
<b>7 Chemical analysis</b> .....	<b>9</b>
<b>8 Rounding procedure</b> .....	<b>9</b>
<b>9 Retesting</b> .....	<b>10</b>
<b>10 Technical delivery conditions</b> .....	<b>10</b>
<b>11 Designation examples</b> .....	<b>10</b>
11.1 General.....	10
11.2 Example 1 - Classification by yield strength and 47 J impact energy - System A.....	10
11.3 Example 2 - Classification by tensile strength and 27 J impact energy - System B.....	10
11.4 Example 3 - Classification by yield strength and 47 J impact energy - System A.....	11
11.5 Example 4 - Classification by tensile strength and 27 J impact energy - System B.....	11
11.6 Example 4 - Classification by tensile strength and 27 J impact energy - System B.....	12
<b>Bibliography</b> .....	<b>13</b>

## 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 document 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](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 3, *Welding consumables*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 121, *Welding and allied processes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This sixth edition cancels and replaces the fifth edition (ISO 636:2017), which has been technically revised.

The main changes are as follows:

- document has been reformatted in single column format;
- dated references have been updated to current editions;
- text added to [4.1](#) and [Table 8](#) regarding differences in mechanical properties;
- chemical compositions have been updated for some classifications;
- five new classifications have been added to system B;
- footnote for boron added to [Table 4](#);
- table footnotes have been revised for clarity;
- requirements in [Table 5](#) have been aligned with other standards;
- information on preheating and interpass temperatures has been revised in [Table 6](#);
- [Clause 7](#) was revised to clarify the effect of chemical elements that do not change during production;
- examples in [Clause 11](#) have been revised and examples have been added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## ISO 636:2024(en)

Official interpretations of ISO/TC 44 documents, where they exist, are available from this page:  
<https://committee.iso.org/sites/tc44/home/interpretation.html>.

# iTeh Standards (<https://standards.itih.ai>) Document Preview

[ISO 636:2024](#)

<https://standards.itih.ai/catalog/standards/iso/0c1a05a6-37bd-4952-8e48-063ed8457746/iso-636-2024>

## Introduction

This document provides a classification for the designation of rods and wires in terms of their chemical composition and, where required, in terms of the yield strength, tensile strength, and elongation of the all-weld metal. The ratio of yield to tensile strength of weld metal is generally higher than that of the parent metal. Matching weld metal yield strength to parent metal yield strength will not necessarily ensure that the weld metal tensile strength matches that of the parent material.

Where the application requires matching tensile strengths, selection of consumables is made by reference to columns 3 and 7 of [Table 2](#).

Of note is that the mechanical properties of all-weld metal test specimens used to classify the rods and wires vary from those obtained in production joints because of differences in welding procedure such as diameter, width of weave, welding position, and material composition.

The classification according to system A is mainly based on EN 1668:1997<sup>[1]</sup>. The classification according to system B is mainly based upon standards used around the Pacific Rim.

# iTeh Standards (<https://standards.iteh.ai>) Document Preview

[ISO 636:2024](#)

<https://standards.iteh.ai/catalog/standards/iso/0c1a05a6-37bd-4952-8e48-063ed8457746/iso-636-2024>

# Welding consumables — Rods, wires and deposits for tungsten inert gas welding of non-alloy and fine-grain steels — Classification

## 1 Scope

This document specifies requirements for classification of rods, wires and deposits in the as-welded condition and in the post-weld heat-treated condition for tungsten inert gas welding of non-alloy and fine-grain steels with a minimum yield strength of up to 500 MPa or a minimum tensile strength of up to 570 MPa.

This document is a combined specification providing classification utilizing a system based upon the yield strength and the average impact energy of 47 J of all-weld metal or utilizing a system based upon the tensile strength and the average impact energy of 27 J of all-weld metal.

- a) Components which carry the suffix “system A” are applicable only to rods, wires and deposits classified to the system based upon the yield strength and the average impact energy of 47 J of all-weld metal in accordance with this document.
- b) Components which carry the suffix “system B” are applicable only to rods, wires and deposits classified to the system based upon the tensile strength and the average impact energy of 27 J of all-weld metal in accordance with this document.
- c) Components which have neither the suffix “system A” nor the suffix “system B” are applicable to all rods, wires and deposits classified in accordance with this document.

## 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 544, *Welding consumables — Technical delivery conditions for filler materials and fluxes — Type of product, dimensions, tolerances and markings*

ISO 13916, *Welding — Guidance on the measurement of preheating temperature, interpass temperature and preheat maintenance temperature*

ISO 14175:2008, *Welding consumables — Gases and gas mixtures for fusion welding and allied processes*

ISO 14344, *Welding consumables — Procurement of filler materials and fluxes*

ISO 15792-1:2020, *Welding consumables — Test methods — Part 1: Preparation of all-weld metal test pieces and specimens in steel, nickel and nickel alloys*

ISO 80000-1:2022, *Quantities and units — Part 1: General*

## 3 Terms and definitions

No terms and definitions are listed in this document.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

## 4 Classification

### 4.1 General

Classification designations are based upon two approaches to indicate the tensile properties and the impact properties of the all-weld metal obtained with rods or wires. The two designation approaches include additional designators for some other classification requirements, but not all. In most cases, a given commercial product can be classified to the classification requirements in both systems. Then, either or both classification designations can be used for the product.

Rods or wires shall be classified according to their chemical composition in accordance with [Table 4](#).

Deposits shall be classified in accordance with the chemical composition of the wire or rod used in accordance with [Table 4](#) and the mechanical properties of the all-weld metal deposit in accordance with system A or B in [Table 2](#) and [Table 3](#).

### 4.2 Classification systems

Each classification system, A and B, is split into four parts as given in [Table 1](#).

**Table 1 — Parts of the classification systems, A and B**

Part of classification designation	Classification system	
	System A Classification by yield strength and 47 J impact energy	System B Classification by tensile strength and 27 J impact energy
1	Symbol indicating the product/process to be identified.	
2	Symbol indicating the strength and elongation of the all-weld metal (see <a href="#">Table 2</a> )	Symbol indicating the strength and elongation of the all-weld metal in either the as-welded or post-weld heat-treated condition (see <a href="#">Table 2</a> ).
3	Symbol indicating the impact properties of all-weld metal (see <a href="#">Table 3</a> ).	Symbol indicating the impact properties of all-weld metal in the same condition as specified for the tensile strength (see <a href="#">Table 3</a> ). The letter “U” after this designator indicates that the deposit meets an average 4 optional requirement of 47 J at the designated Charpy test temperature.
4	Symbol indicating the chemical composition of the rods or wires used (See system A or system B in <a href="#">Table 4</a> ).	

## 5 Symbols and requirements

### 5.1 Symbol for the product/process

The symbol of weld deposit by the tungsten inert gas welding process shall be the letter “W” placed at the beginning of the designation.

The symbol of rods or wires for the tungsten inert gas welding shall be the letter “W” placed at the beginning of the rod or wire designation.

### 5.2 Symbol for strength and elongation of all-weld metal

See [Table 2](#).



Table 2 — Symbol for strength and elongation of all-weld metal

System A Classification by yield strength and 47 J impact energy				System B Classification by tensile strength and 27 J impact energy			
Symbol	Minimum yield strength <sup>a</sup> MPa	Tensile strength MPa	Minimum elongation <sup>b</sup> %	Symbol <sup>c</sup>	Minimum yield strength <sup>a</sup> MPa	Tensile strength MPa	Minimum elongation <sup>b</sup> %
35	355	440 to 570	22	43X	330	430 to 600	20
38	380	470 to 600	20	49X	390	490 to 670	18
42	420	500 to 640	20	55X	460	550 to 740	17
46	460	530 to 680	20	57X	490	570 to 770	17
50	500	560 to 720	18				

<sup>a</sup> For yield strength, the lower yield ( $R_{eL}$ ) is used when yielding occurs. Otherwise, the 0,2 % proof strength ( $R_{p0,2}$ ) is used.

<sup>b</sup> Gauge length is equal to five times the test specimen diameter.

<sup>c</sup> X is "A" or "P". Where "A" indicates testing in the as-welded condition and "P" indicates testing in the post weld heat-treated condition.

### 5.3 Symbol for impact properties of all-weld metal

#### 5.3.1 System A - Classification by yield strength and 47 J impact energy

The symbols in [Table 3](#) indicate the temperature at which impact energy of 47 J is achieved under the conditions given in [Clause 6](#).

Three test specimens shall be tested. Only one individual value can be lower than 47 J, but not lower than 32 J. The average of the three values shall be at least 47 J.

#### 5.3.2 System B - Classification by tensile strength and 27 J impact energy

The symbol in [Table 3](#) indicates the temperature at which impact energy of 27 J is achieved in the as-welded condition or in the post-weld heat-treated condition under the conditions given in [Clause 6](#).

Five test specimens shall be tested. The lowest and highest values obtained shall be disregarded. Two of the three remaining values shall be equal or greater than the specified 27 J level. One of the three can be lower, but shall not be less than 20 J. The average of the three remaining values shall be at least 27 J.

The addition of the optional symbol U immediately after the symbol for condition of heat treatment indicates that the supplemental requirement of 47 J impact energy at the normal 27 J impact test temperature has also been satisfied. For the 47 J impact requirement, the number of specimens tested and values obtained shall meet the requirement of [5.3.1](#).

Table 3 — Symbol for impact properties of all-weld metal

Symbol	Temperature for minimum average impact energy of 47 J <sup>a</sup> or 27 J <sup>b</sup> °C
Z	No requirements
A <sup>a</sup> or Y <sup>b</sup>	+20
0	0
2	-20
3	-30

<sup>a</sup> System A - Classification by yield strength and 47 J impact energy.

<sup>b</sup> System B - Classification by tensile strength and 27 J impact energy.

Table 3 (continued)

Symbol	Temperature for minimum average impact energy of 47 J <sup>a</sup> or 27 J <sup>b</sup> °C
4	-40
5	-50
6	-60
7	-70
8	-80
9	-90
10	-100
<sup>a</sup> System A - Classification by yield strength and 47 J impact energy. <sup>b</sup> System B - Classification by tensile strength and 27 J impact energy.	

#### 5.4 Symbol for the chemical composition of rods or wires

The symbols in [Table 4](#) indicate the chemical composition of the rods or wires and includes an indication of characteristic alloying elements.

iTeh Standards  
(<https://standards.itih.ai>)  
Document Preview

[ISO 636:2024](#)

<https://standards.itih.ai/catalog/standards/iso/0c1a05a6-37bd-4952-8e48-063ed8457746/iso-636-2024>