
Welding consumables — Solid wire electrodes, solid wires and rods for fusion welding of magnesium and magnesium alloys — Classification

Produits consommables pour le soudage — Fils-électrodes pleins, fils pleins et baguettes pleines pour le soudage par fusion du magnésium et des alliages de magnésium — Classification

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 19288:2016

<https://standards.iteh.ai/catalog/standards/sist/d7eeb0a4-d8bc-4254-ba9f-129992c9453f/iso-19288-2016>



iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 19288:2016

<https://standards.iteh.ai/catalog/standards/sist/d7eeb0a4-d8bc-4254-ba9f-129992c9453f/iso-19288-2016>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2016, Published in Switzerland

All rights reserved. Unless otherwise specified, 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
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

	Page
Foreword.....	iv
Introduction.....	v
1 Scope.....	1
2 Normative references.....	1
3 Classification.....	1
4 Symbols and requirements.....	1
4.1 Symbol for the product.....	1
4.2 Symbol for the chemical composition.....	1
5 Mechanical properties.....	2
6 Chemical analysis.....	2
7 Rounding procedure.....	2
8 Retest.....	2
9 Technical delivery conditions.....	2
10 Designation.....	4
Annex A (informative) Explanation of classification symbols for chemical composition.....	5

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 19288:2016](https://standards.iteh.ai/catalog/standards/sist/d7eeb0a4-d8bc-4254-ba9f-129992c9453f/iso-19288-2016)

<https://standards.iteh.ai/catalog/standards/sist/d7eeb0a4-d8bc-4254-ba9f-129992c9453f/iso-19288-2016>

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 44, *Welding and allied processes*, Subcommittee SC 3, *Welding consumables*.

Requests for official interpretations of any aspect of this International Standard should be directed to the Secretariat of ISO/TC 44/SC 3 via your national standards body. A complete listing of these bodies can be found at www.iso.org.

Introduction

This International Standard proposes a classification in order to designate solid wire electrodes, solid wires and rods in terms of their chemical composition.

There is no unique relationship between the product form (solid wire electrodes, solid wires or rods) and the welding process used (gas-shielded metal arc welding, tungsten inert gas arc welding, plasma arc welding or laser beam welding). For this reason, solid wire electrodes, solid wires and rods may be classified in terms of their chemical composition.

In this International Standard, the symbol of the welding process is not used because

- a) different joining processes are performed with the same chemical component consumable, and
- b) the producer is not able to determine the process symbol before shipping.

Mechanical properties of all-weld metal test specimens or welded joints will vary from those obtained in production due to differences in welding procedure and the parent material. Mechanical properties of all-weld metal or welded joints are consequently not specified.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 19288:2016](https://standards.iteh.ai/catalog/standards/sist/d7eeb0a4-d8bc-4254-ba9f-129992c9453f/iso-19288-2016)

<https://standards.iteh.ai/catalog/standards/sist/d7eeb0a4-d8bc-4254-ba9f-129992c9453f/iso-19288-2016>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 19288:2016

<https://standards.iteh.ai/catalog/standards/sist/d7eeb0a4-d8bc-4254-ba9f-129992c9453f/iso-19288-2016>

Welding consumables — Solid wire electrodes, solid wires and rods for fusion welding of magnesium and magnesium alloys — Classification

1 Scope

This International Standard specifies requirements for the classification of solid wire electrodes, solid wires and rods for fusion welding of magnesium and magnesium alloys. The classification is based on their chemical composition.

The compositions of solid wire electrodes for metal inert gas (MIG) welding are the same as solid wire electrodes, solid wires and rods for tungsten inert gas (TIG) arc welding, plasma arc welding, laser beam welding, laser-MIG hybrid welding and other fusion welding processes.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 14344, *Welding consumables — Procurement of filler materials and fluxes*

ISO 80000-1:2009, *Quantities and units — Part 1: General*, Corrected by ISO 80000-1:2009/Cor 1:2011

3 Classification

The classification is divided into two parts as follows:

- a) the first part gives a symbol indicating the product to be identified (see [4.1](#));
- b) the second part gives a symbol indicating the chemical composition of the solid wire electrodes, solid wires and rods (see [Table 1](#)).

4 Symbols and requirements

4.1 Symbol for the product

The symbol for the solid wire electrodes, solid wires and rods shall be S.

4.2 Symbol for the chemical composition

The numerical symbols in [Table 1](#) indicate the chemical composition of a solid wire or rod, determined under the conditions given in [Clause 6](#). The first two digits indicate the alloy group. See [Annex A](#) for an explanation of the numerical symbols.

The optional additional chemical symbols in [Table 1](#) indicate the chemical composition and include an indication of the characteristic alloying elements.

5 Mechanical properties

Mechanical properties of all-weld metal or welded joints are not part of this classification.

6 Chemical analysis

Chemical analysis shall be performed on specimens of the product or the stock from which it is made. Any analytical technique may be used but, in cases of dispute, reference shall be made to established published methods.

7 Rounding procedure

For purposes of determining compliance with the requirements of this International Standard, the actual test values obtained shall be subject to ISO 80000-1:2009, B.3, Rule A. If the measured values are obtained by equipment calibrated in units other than those of this International Standard, the measured values shall be converted to the units of this International Standard before rounding. If an arithmetic average value is to be compared with the requirements of this International Standard, rounding shall be done only after calculating the arithmetic average. The rounded results shall fulfil the requirements of the appropriate table for the classification under test.

8 Retest

If any test fails to meet the requirement, that test shall be repeated twice. The results of both retests shall meet the requirement. Specimens for the retest may be taken from the original test sample or from a new test sample. For chemical analysis retests need be only for those specific elements that failed to meet their test requirement. If the results of one or both retests fail to meet the requirement, the material under test shall be considered as not meeting the requirements of this specification for that classification. In the event that, during preparation or after completion of any test, it is clearly determined that prescribed or proper procedures were not followed in preparing the weld test sample or test specimen(s), or in conducting the tests, the test shall be considered invalid, without regard to whether the test was actually completed, or whether the test results met, or failed to meet, the requirement. That test shall be repeated, following proper prescribed procedures. In this case, the requirement for doubling the number of test specimens does not apply.

9 Technical delivery conditions

Technical delivery conditions shall meet the requirements of ISO 544 and ISO 14344 (but when Schedule 4 is specified, only chemical composition is required).

Table 1 — Chemical composition requirements

Alloy symbols		Chemical composition, % (by mass) ^a										
Numerical	Chemical	Mg	Al	Zn	Mn	Si	Cu	Ni	Fe	Ca	Be	Others ^b
Mg 0602A	MgAl6Mn	bal.	5,5 to 6,5	0,30	0,24 to 0,6	0,10	0,01	0,002	0,005	—	—	0,30
Mg 0602B	MgAl6Ca2Mn	bal.	5,6 to 6,4	0,20	0,26 to 0,50	0,08	0,008	0,001	0,004	1,5 to 2,5	—	0,01
Mg 1101	MgAl10Zn1Mn	bal.	9,5 to 10,5	0,75 to 1,25	0,15 to 0,5	0,05	0,05	0,005	0,005	—	0,0002 to 0,0008	0,30
Mg 1313	MgAl3Zn1Mn	bal.	2,4 to 3,6	0,50 to 1,50	0,15 to 1,00	0,10	0,05	0,005	0,005	0,04	—	0,30
Mg 1313A	MgAl3Zn1Ca1Mn	bal.	2,4 to 3,6	0,50 to 1,50	0,15 to 1,00	0,10	0,05	0,005	0,005	0,5 to 1,5	—	0,05
Mg 1611	MgAl7Zn1Mn	bal.	5,8 to 7,2	0,40 to 1,5	0,15 to 0,5	0,05	0,05	0,005	0,005	—	0,0002 to 0,0008	0,30
Mg 1611A	MgAl6Zn1	bal.	5,5 to 6,5	0,50 to 1,50	0,15 to 0,40	0,10	0,05	0,005	0,005	—	—	0,30
Mg 1611B	MgAl6Zn1Ca2	bal.	5,5 to 6,5	0,50 to 1,50	0,05 to 0,40	0,08	0,025	0,001	0,004	1,5 to 2,5	—	0,01
Mg 1611C	MgAl6Zn1Ca1	bal.	5,5 to 6,5	0,50 to 1,50	0,15 to 0,40	0,10	0,05	0,005	0,005	0,5 to 1,5	—	0,05
Mg 1911A	MgAl9Zn1	bal.	8,3 to 9,7	0,35 to 1,0	0,15 to 0,50	0,10	0,03	0,002	0,005	—	—	0,30
Mg 1911B	MgAl9Zn1Ca1	bal.	8,3 to 9,7	0,35 to 1,0	0,15 to 0,50	0,10	0,03	0,002	0,005	0,5 to 1,5	—	0,30
Mg 1911C	MgAl9Zn1Ca2	bal.	8,3 to 9,7	0,35 to 1,0	0,15 to 0,50	0,10	0,03	0,002	0,005	1,5 to 2,5	—	0,30
Mg 1922	MgAl9Zn2Mn	bal.	8,3 to 9,7	1,7 to 2,3	0,15 to 0,5	0,05	0,05	0,005	0,005	—	0,0002 to 0,0008	0,30
Mg 2331c	MgRE3Zn3Zr	bal.	—	2,0 to 3,1	—	—	—	—	—	—	0,0008	0,30
Z ^d Any other agreed composition												

^a Single values are maxima, unless otherwise noted.

^b Need not be reported unless specifically required by purchaser.

^c Zr 0,45 % to 1,0 %, rare earths (RE) 2,5 % to 4,0 %.

^d Consumables for which the chemical composition is not listed in this table shall be symbolized similarly and prefixed by the letter Z. The chemical composition ranges are not specified and therefore it is possible that two electrodes with the same Z classification are not interchangeable.