



**SLOVENSKI STANDARD**  
**SIST EN 12534:1999**

**01-december-1999**

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Welding consumables - Wire electrodes, wires, rods and deposits for gas shielded metal arc welding of high strength steels - Classification

Schweißzusätze - Drahtelektroden, Drähte, Stäbe und Schweißgut zum Schutzgasschweißen von hochfesten Stählen - Einteilung

Produits consommables pour le soudage - Fils-électrodes, fils baguettes et dépôts en soudage a l'arc sous protection gazeuse des aciers a haute résistance - Classification

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**ICS:**

25.160.20      Potrošni material pri varjenju      Welding consumables

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**en**

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EUROPEAN STANDARD  
 NORME EUROPÉENNE  
 EUROPÄISCHE NORM

**EN 12534**

August 1999

ICS 25.160.20

English version

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 deposits for gas shielded metal arc welding of high strength  
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Produits consommables pour le soudage - Fils-électrodes,  
 fils, baguettes et dépôts en soudage à l'arc sous protection  
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 Schweißgut zum Schutzgasschweißen von hochfesten  
 Stählen - Einteilung

This European Standard was approved by CEN on 2 July 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
 COMITÉ EUROPÉEN DE NORMALISATION  
 EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 121 "Welding", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2000, and conflicting national standards shall be withdrawn at the latest by February 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## Introduction

This standard proposes a classification in order to designate wire electrodes, wires and rods in terms of their chemistry 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 parent metal. Users should note that 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 strength, selection of the consumable should be based on column 3 of table 1. When selecting the consumables, it should be noted that with increasing thickness of the parent metal, the requirements of tensile strength and proof strength can decrease.

It should be noted that the mechanical properties of all-weld metal test specimens used to classify the wire electrodes, wires and rods will vary from those obtained in production joints because of differences in welding procedure such as wire electrode diameter, width of weave, gas shield used, welding position and material composition.

## 1 Scope

This standard specifies requirements for classification of wire electrodes, wires, rods and weld deposits in the as-welded or stress relieved condition for gas shielded metal arc welding and gas tungsten arc welding of steels with a minimum yield strength higher than 500 N/mm<sup>2</sup>. The classification of the wire electrodes, wires and rods is based on their chemical composition.

The classification of a weld deposit is based on tests of the all-weld metal in the as-welded or stress relieved condition. One wire electrode, wire and rod can be tested and classified with different gases.

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## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 439	Welding consumables – Shielding gases for arc welding and cutting
EN 759	Welding consumables - Technical delivery conditions for welding filler metals – Type of product, dimensions, tolerances and marking
EN ISO 13916	Welding - Guidance on the measurement of preheating temperature, interpass temperature and preheat maintenance temperature (ISO 13916:1996)
EN 1597-1	Welding consumables - Test methods for classification - Part 1: Test piece for all-weld metal test specimens in steel, nickel and nickel alloys
ISO 31-0:1992	Quantities and units - Part 0: General principles

### 3 Classification

A wire electrode, wire and rod shall be classified according to its chemical composition in table 3. A weld deposit shall be classified with additional symbols according to the mechanical properties of its all-weld metal.

The classification of a weld deposit is divided into six parts:

- 1) The first part gives a symbol indicating the product/process to be identified;
- 2) The second part gives a symbol indicating the strength and elongation of all-weld metal;
- 3) The third part gives a symbol indicating the impact properties of all-weld metal;
- 4) The fourth part gives a symbol indicating the type of shielding gas used;
- 5) The fifth part gives a symbol indicating the chemical composition of the wire electrode used.
- 6) The sixth part gives a symbol indicating the stress relief treatment in case this is applied.

### 4 Symbols and requirements

#### 4.1 Symbol for the product/process

The symbol for the wire electrode, wire or rod used in the arc welding process shall be the letter G (gas shielded metal arc welding) and/or W (gas tungsten arc welding).

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

The symbol in table 1 indicates yield strength, tensile strength and elongation of the all-weld metal in the as-welded condition determined in accordance with clause 5.

NOTE: Stress relief treatment can alter the strength of the weld metal from that obtained in the as-welded condition.

**Table 1: Symbol for strength and elongation of all-weld metal**

Symbol	Minimum <sup>1)</sup> yield strength N/mm <sup>2</sup>	Tensile strength N/mm <sup>2</sup>	Minimum elongation <sup>2)</sup> %
55	550	640 to 820	18
62	620	700 to 890	18
69	690	770 to 940	17
79	790	880 to 1080	16
89	890	940 to 1180	15

1) For yield strength the lower yield ( $R_{eL}$ ) shall be used when yielding occurs, otherwise the 0,2 % proof strength ( $R_{p0.2}$ ) shall be used.  
2) Gauge length is equal to five times the test specimen diameter.

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

The symbol in table 2 indicates the temperature at which an average impact energy of 47 J is achieved under conditions given in clause 5. Three specimens shall be tested. Only one individual value may be lower than 47 J but shall not be lower than 32 J. When an all-weld metal has been classified for a certain temperature, it automatically covers any higher temperature in table 2.

**Table 2: Symbol for impact properties of all-weld metal**

Symbol	Temperature for minimum average impact energy 47 J °C
Z	No requirements
A	+ 20
0	0
2	- 20
3	- 30
4	- 40
5	- 50
6	- 60

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NOTE: Stress relief treatment can alter the impact properties of the all-weld metal from that obtained in the as-welded condition.

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### 4.4 Symbol for shielding gas

The symbols M and C indicate shielding gas as described in accordance with EN 439. No symbol shall be used for TIG welding when argon shield EN 439-II is used.

The symbol M, for mixed gases, shall be used when the classification has been performed with the shielding gas EN 439 – M2, but without helium.

The symbol C shall be used when the classification has been performed with the shielding gas EN 439 – C1, carbon dioxide.

### 4.5 Symbol for the chemical composition of wire electrodes, wires and rods

The symbol in table 3 indicates the chemical composition of the wire electrode, wire and rod and includes an indication of characteristic alloying elements.



Table 3: Symbol for chemical composition of wire electrodes, wires and rods

Symbol	Chemical composition in % (1,2,3)										Total other elements
	C	Si	Mn	P	S	Cr	Ni	Mo	Cu		
Z	Any other agreed composition										
Mn3NiCrMo	0,14	0,60 to 0,80	1,30 to 1,80	0,015	0,018	0,40 to 0,65	0,50 to 0,65	0,15 to 0,30	0,30	0,25	
Mn3Ni1CrMo	0,12	0,40 to 0,70	1,30 to 1,80	0,015	0,018	0,20 to 0,40	1,20 to 1,60	0,20 to 0,30	0,35	0,25 V = 0,05 to 0,13	
Mn3Ni1Mo	0,12	0,40 to 0,80	1,30 to 1,90	0,015	0,018	0,15	0,80 to 1,30	0,25 to 0,65	0,30	0,25	
Mn3Ni1,5Mo	0,08	0,20 to 0,60	1,30 to 1,80	0,015	0,018	0,15	1,40 to 2,10	0,25 to 0,55	0,30	0,25	
Mn3Ni1Cu	0,12	0,20 to 0,60	1,20 to 1,80	0,015	0,018	0,15	0,80 to 1,25	0,20	0,30 to 0,65	0,25	
Mn3Ni1MoCu	0,12	0,20 to 0,60	1,20 to 1,80	0,015	0,018	0,15	0,80 to 1,25	0,20 to 0,55	0,30 to 0,65	0,25	
Mn3Ni2,5CrMo	0,12	0,40 to 0,70	1,30 to 1,80	0,015	0,018	0,20 to 0,60	2,30 to 2,80	0,30 to 0,65	0,30	0,25	
Mn4Ni1Mo	0,12	0,50 to 0,80	1,60 to 2,10	0,015	0,018	0,15	0,80 to 1,25	0,20 to 0,55	0,30	0,25	
Mn4Ni2Mo	0,12	0,25 to 0,60	1,60 to 2,10	0,015	0,018	0,15	2,00 to 2,60	0,30 to 0,65	0,30	0,25	
Mn4Ni1,5CrMo	0,12	0,50 to 0,80	1,60 to 2,10	0,015	0,018	0,15 to 0,40	1,30 to 1,90	0,30 to 0,65	0,30	0,25	
Mn4Ni2CrMo	0,12	0,60 to 0,90	1,60 to 2,10	0,015	0,018	0,20 to 0,45	1,80 to 2,30	0,45 to 0,70	0,30	0,25	
Mn4Ni2,5CrMo	0,13	0,50 to 0,80	1,60 to 2,10	0,015	0,018	0,20 to 0,60	2,30 to 2,80	0,30 to 0,65	0,30	0,25	

1) If not specified: Ti ≤ 0,10%, Zr ≤ 0,10%, Al ≤ 0,12%, and V ≤ 0,03%. Residual copper content in the steel including any coating shall comply with stated value.  
 2) Single values shown in the table are maximum values.  
 3) The results shall be rounded to the same number of significant figures as in the specified value using the rules in accordance with annex B, Rule A of ISO 31-0:1992.