

N O T E

This leaflet is part of a set which includes :

Leaflets in Sub-Section 89 (897-1 to 897-13) : Welding

C O N T E N T S

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1 - PURPOSE

This specification sets out the regulations for identifying electrodes for manual arc-welding of carbon, carbon-manganese and low-alloy steels used in the manufacture and repair of rolling stock.

DESCRIPTION

2.1. The abbreviated description is formed by symbols : digits and letters defined and placed in an order referring to the composition of the coatings and the characteristics of the deposited metal.

The symbols for the mechanical properties and hydrogen content are based on the results of tests detailed in UIC Leaflet 897-1 "Technical Specification for the acceptance and supply of electrodes for manual arc welding of carbon, carbon-manganese and low-alloy steels".

2.1.1. Symbol for the product

The general symbol for the arc welding electrode is "E". This symbol is placed at the beginning of the description.

2.1.2. Symbols for the tensile strength of the deposited metal

Two ranges of tensile strength are specified :

For a tensile strength of 430 to 510 N/mm² : symbol 43 (1)

For a tensile strength of 510 to 610 N/mm² : symbol 51 (1)

(1) Upper tolerance limit : + 40 N/mm²

2.1.3. Symbols for impact strength

The first digit specifies the group on the basis of a minimum impact strength of 28 J, V notch ISO/R 148, as follows :

Symbol	Test temperature (°C)
0	-
1	+ 20
2	0
3	- 20
4	- 30
5	- 40

A second digit specifies the group on the basis of an accumulated minimum impact strength of 47 J, V notch ISO/R 148 as follows :

Symbol	Test temperature (°C)
0	-
1	+ 20
2	0
3	- 20
4	- 30
5	- 40

2.1.4. Symbol denoting the type of coating

The type of coating is symbolised by a letter.

A = Acid (iron oxide)

AR = Acid (rutile)

B = Basic

C = Cellulose

R = Rutile (coating of average thickness)

RR = Rutile (thick coating)

S = Other types

2.1.5. Symbol for recovery

The nominal recovery expressed by a digit rounded off to the nearest multiple of 10 is used as a symbol. The values terminating with the digit 5 are rounded off to the next higher multiple of 10.

No symbol shall be used if the nominal recovery is less than 105%, nor for electrodes of type B if the nominal recovery is below 120%.

2.1.6. Symbol for welding position

The symbols to be used to denote the welding position for which the electrode is recommended are as follows :

1. All positions
2. All positions except vertical downwards
3. Flat butt welding, horizontal-vertical fillet welding, downhand fillet welding
4. Flat butt welding, horizontal-vertical fillet welding
5. Flat butt welding, horizontal-vertical fillet welding, downhand fillet welding, and recommended for vertical downwards.

2.1.7. Symbol for welding current and open-circuit voltage

The symbols to be used to denote the welding current and open circuit voltage are :

Symbol	Direct current Recommended polarity (2)	Alternating current Minimum open-circuit voltage (volts)
0 (1)	+	
1 2 3	Either - +	50 50 50
4 5 6	Either - +	70 (3) 70 (3) 70 (3)
7 8 9	Either - +	80 (3) 80 (3) 80 (3)
(1) Symbol reserved for electrodes used solely with direct current (2) Positive polarity + ; negative polarity -. (3) The open-circuit voltage is to be restricted to a value conforming to legal requirements.		

2.1.8. Symbol for hydrogen content

For electrodes with low hydrogen content, the symbol is supplemented by one or two letters :

- H if $10 < H_2 \leq 15$ cm³/100 gr. under mercury
 LH if $H_2 < 10$ cm³/100 gr. under mercury

3 - APPLICATION

The system of symbols for electrodes consists of a mandatory part, and of an optional part to be specified by the Railway.

The complete symbolisation for electrodes comprises, in the order shown, symbols for :

- type of product
- tensile strength
- impact strength
- nature of coating
- nominal recovery
- welding positions
- welding current and open-circuit voltage
- hydrogen content
- UIC No. 897

The obligatory part of the system of symbols comprises, in the order, symbols for :

- type of product
- tensile strength
- impact strength
- type of coating
- nominal recovery
- hydrogen content for electrodes with a low hydrogen content.

Example : complete system of symbols

E 51 43 B 160 36 H, UIC 897

mandatory part :

E 51 43 B 160 H

4 - MARKING

The system of symbols must appear on each unit holder.

The order or its appended documents shall indicate the marking to be applied to each electrode.

APPLICATION

Effective from 1 January 1986.

All Railways in the Union.

RECORD REFERENCES

Headings under which the question has been dealt with :

- Standardisation of welding materials (electrodes)
(Sub-Committee for Specifications, Paris, January 1971,
January 1972).

- Question 5/SA/FIC - Revision of leaflets.
Approval of revised leaflet 897-2.
(Traction and Rolling Stock Committee, Paris, June 1984).