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IS 10631 (1983): Stainless steel for welding electrode core wire [MTD 16: Alloy Steels and Forgings]

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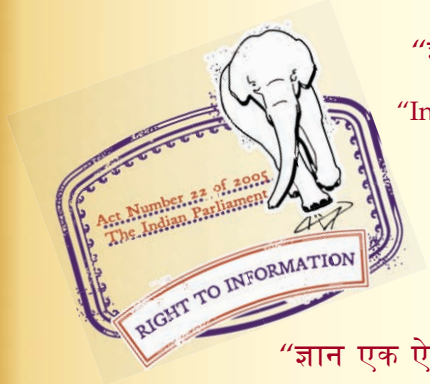



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"Knowledge is such a treasure which cannot be stolen"

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IS : 10631 - 1983
(Reaffirmed 2004)

# *Indian Standard*

# SPECIFICATION FOR STAINLESS STEEL FOR WELDING ELECTRODE CORE WIRE

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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# *Indian Standard*

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# *Indian Standard*

# SPECIFICATION FOR STAINLESS STEEL FOR WELDING ELECTRODE CORE WIRE

## 0. FOREWORD

**0.1** This Indian Standard was adopted by the Indian Standards Institution on 30 August 1983, after the draft finalized by the Alloy Steels and Special Steels Sectional Committee had been approved by the Structural and Metals Division Council.

**0.2** This standard is being issued in order to assist both the welding electrode and steel manufacturers keeping in view the difficulties experienced by the electrode manufacturers to obtain the right type of stainless steel for electrode core wire and the prevalent diverse view regarding the quality of steel required for the purpose.

**0.3** For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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## 1. SCOPE

**1.1** This standard covers the requirements for stainless steel in the form of billets and wire rods used for manufacturing of welding electrode core wire.

## 2. TERMINOLOGY

**2.1** For the purpose of this standard, definitions given in relevant parts of IS : 1956† shall apply.

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*Rules for rounding off numerical values ( *revised* ).
†Glossary of terms relating to iron and steel ( Parts 1 to 8 ).

## 3. SUPPLY OF MATERIAL

**3.1** General requirements relating to the supply of material shall conform to IS : 1387-1967*.

**3.2** Stainless steel for core wire for electrodes shall be supplied in the form of billets or rolled wire rods in sizes as specified by the purchaser.

**3.3** The manufacturer shall furnish with each supply, all the check analysis of the cast.

## 4. MANUFACTURE

**4.1** The steel shall be made by electric melting process. Sufficient reduction and discard shall be made from each ingot/billet to ensure freedom from piping, segregation and other harmful defects.

## 5. CHEMICAL COMPOSITION

**5.1** The product analysis of the steel, when determined either by the method specified in the relevant parts of IS : 228† or any other established instrumental/chemical method shall be as given in Table 1. In case of dispute the procedure given in the latest edition of relevant parts of IS : 228† for chemical analysis, shall be the referee method.

## 6. FREEDOM FROM DEFECTS

**6.1** The billets shall be free from piping, segregation and other harmful defects. The wire rods shall have a clean finish, free from slivers, depressions, scratches and scale that would adversely affect the welding characteristics or the operation of the equipment.

## 7. SIZE AND TOLERANCES

**7.1** Billets and wire rods shall be supplied to the sizes specified by the purchaser subject to the tolerances given below:

a) *Billets*

| *Width Across Flat* | *Tolerance* |
|---|---|
| Up to 75 | ± 1·5 |
| Over 75 and up to 100 | ± 2·0 |
| Over 100 | ± 3·0 |

A tolerance of ± 150 mm shall be allowed on specified lengths of billets.

*General requirements for the supply of metallurgical materials ( *first revision* ).
†Method of chemical analysis of steels ( issued in various parts ) ( *second revision* ).

## TABLE 1 CHEMICAL COMPOSITION OF STAINLESS CORE WIRE WELDING ELECTRODES

( *Clause* 5.1 )

| Sl No. | Designation [ *see* IS : 1762 ( Part 1 )-1974* ] | Constituent, Percent | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | C | Si | Mn | Cr | Ni | Mo | S, *Max* | P, *Max* |
| 1. | X03Cr19Ni10 | 0·06 *Max* | 0·5 *Max* | 1·0-1·5 | 18-20·0 | 9·0-11·0 | — | 0·03 | 0·04 |
| 2. | X04Cr21Ni10 | 0·08 *Max* | 0·25-0·60 | 1·0-2·5 | 19·5-22·0 | 9·0-11·0 | — | 0·03 | 0·04 |
| 3. | X01Cr21Ni10 | 0·03 *Max* | 0·25-0·60 | 1·0-2·5 | 19·5-22·0 | 9·0-11·0 | — | 0·03 | 0·04 |
| 4. | X01Cr19Ni10Mo2 | 0·03 *Max* | 0·25-0·60 | 1·0-2·5 | 18·0-20·0 | 11·0-14·0 | 2·0-3·0 | 0·03 | 0·04 |
| 5. | X07Cr24Ni12 | 0·12 *Max* | 0·45 *Max* | 1·5-2·0 | 23·0-25·0 | 11·5-13·0 | — | 0·03 | 0·04 |
| 6. | X01Cr24Ni12 | 0·025 *Max* | 0·45 *Max* | 1·5-2·0 | 23·0-25·0 | 11·5-13·0 | — | 0·03 | 0·04 |
| 7. | X12Cr26Ni21 | 0·08-0·15 | 0·5 *Max* | 1·0-2·5 | 25·0-28·0 | 20·0-22·5 | — | 0·03 | 0·04 |
| 8. | X05Cr30Ni9 | 0·10 *Max* | 0·45 *Max* | 1·5-2·0 | 29·0-31·0 | 8·5-10·0 | — | 0·03 | 0·04 |
| 9. | X05Cr12 | 0·10 *Max* | 0·5 *Max* | 0·5-1·0 | 12·0-13·0 | — | — | 0·03 | 0·04 |
| 10. | X05Cr17 | 0·10 *Max* | 0·5 *Max* | 0·5-1·0 | 16·0-18·0 | — | — | 0·03 | 0·04 |
| 11. | X04Cr19Ni12Mo2 | 0·08 *Max* | 0·25-0·60 | 1·0-2·5 | 18·0-20·0 | 11·0-14·0 | 2·0-3·0 | 0·03 | 0·04 |
| 12. | X04Cr18Ni11Nb1 | 0·08 *Max* | 0·25-0·60 | 1·0-2·00 | 17·0-19·0 | 9·0-13·0 | — | 0·03 | 0·04<br>Nb ( 10 × C − 1·0 ) |
| 13. | X06Cr19Ni9Mo1 | 0·12 *Max* | 0·80 *Max* | 0·5-1·0 | 18·5-20·0 | 8·5-10·0 | 1·0-1·5 | 0·03 | 0·04 |

NOTE — For certain critical applications phosphorus content of 0·03 percent may be agreed to between the manufacturer and the user.

*Code of designation of steel: Part 1 Based on letter symbols ( *first revision* ).

b) *Wire Rods*

| *Diameter* | *Tolerance* | *Maximum Differences Between Two Readings Taken on Any Two Diameters on the Cross Section* |
|---|---|---|
| mm | mm | mm |
| Up to 5 | + 1·00<br>— 0·00 | 0·50 |
| Over 5 | ± 0·50 | 0·65 |

## 8. SAMPLING AND CRITERIA FOR CONFORMITY

**8.1 Lot** — In a consignment all the billets or wire rods manufactured at a time from a single cast, shall form a lot of 25 tonnes or less. If the material from a single cast is more than 25 tonnes, two or more lots shall be formed. From each lot the samples shall be taken and tested for various requirements.

**8.2 Freedom from Defects and Dimensional Tolerances** — From each lot, the number of billets/coils to be sampled shall be as specified in Table 2. The samples shall be selected by random sampling procedures as given in IS : 4905-1968*.

**8.2.1** The sample billets/coils shall be examined from freedom from defects as well as dimensional tolerances ( **6.1** and **7.1** ). For this purpose, each coil shall be opened and examined at a number of points over the lengths of the wire rod. Any billet/coil failing in one or more requirements in respect of freedom from defects and dimensional tolerances shall not exceed the corresponding permissible number given in col 3 of Table 2 for acceptances of the lot under this clause.

**8.3 Samples for Chemical Analysis** — From each lot, one test shall be conducted for chemical analysis and for this purpose, the shavings or turnings shall be taken across the face of the whole section of the billet or rod. The lot shall be considered to have passed in respect of chemical analysis if the sample tested satisfies the relevant requirements.

## 9. RETEST

**9.1** Should any one of the test samples first selected fail to comply with the requirements specified in **5.1**, two further samples shall be selected from the lot represented by the sample which failed. Should both the test samples comply with the requirements, the lot shall be deemed to have passed. Should either of the retest samples fail, the lot represented

*Methods for random sampling

shall be rejected. In cases where it is not possible to identify the particular lot, the material from the entire cast shall be deemed as one lot for retest purposes and in case of failure, the entire cast shall be rejected.

**TABLE 2 SCALE OF SAMPLING FOR VISUAL AND DIMENSIONAL REQUIREMENTS**

( *Clause* 8.2 )

**For Billets**

| No. of Billets in the Lot | No. of Billets to be Sampled | Permissible No. of Defectives |
|---|---|---|
| (1) | (2) | (3) |
| Up to 50 | 13 | 1 |
| 51 to 100 | 20 | 1 |
| 101 to 300 | 32 | 2 |
| 301 to 500 | 50 | 3 |
| 501 and above | 80 | 5 |

**For Wire Rods**

| No. of Coils in the Lot | No. of Coils to be Sampled | Permissible No. of Defectives |
|---|---|---|
| (1) | (2) | (3) |
| Up to 25 | 5 | 0 |
| 26 to 50 | 8 | 0 |
| 51 to 100 | 13 | 1 |
| 101 and above | 20 | 1 |

## 10. MARKING

**10.1** Unless otherwise agreed, the material shall be marked with:

a) the name or trade-mark or other identification mark of the manufacturer, and

b) the cast number.

**10.1.1** The product may also be marked with Standard mark.

**10.1.2** The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

**10.2** In the case of billets, the marking shall be made at one end either on the face or on the side. In case of rods metal tags bearing the marking shall be securely tied to each coil.

( *Continued from page* 2 )

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