INTERNATIONAL STANDARD

**ISO 5828**

Second edition
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# Resistance welding equipment — Secondary connecting cables with terminals connected to water-cooled lugs — Dimensions and characteristics

*Équipements de soudage par résistance — Câbles de raccordement secondaires avec extrémités raccordées à des plages refroidies par eau — Dimensions et caractéristiques*

Reference number
ISO 5828:2001(E)

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Tel. + 41 22 749 01 11
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## Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 5828 was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 6, *Resistance welding*.

This second edition cancels and replaces the first edition (ISO 5828:1983) which has been technically revised. In particular it has been extended to take in lowly flexible cables with requirements for type LF cables given in clause 6. The values of the chemical composition and electrical properties are identical to those of Cu-ETP and Cu-FRHC, defined in ISO 1337:1980 which has been withdrawn.

# Resistance welding equipment — Secondary connecting cables with terminals connected to water-cooled lugs — Dimensions and characteristics

## 1 Scope

This International Standard specifies dimensions and characteristics of secondary connecting cables which are air-cooled over their length and with terminals connected to water-cooled lugs.

The secondary connecting cables are used for connection between the secondary terminals of a welding transformer and the electrode holders.

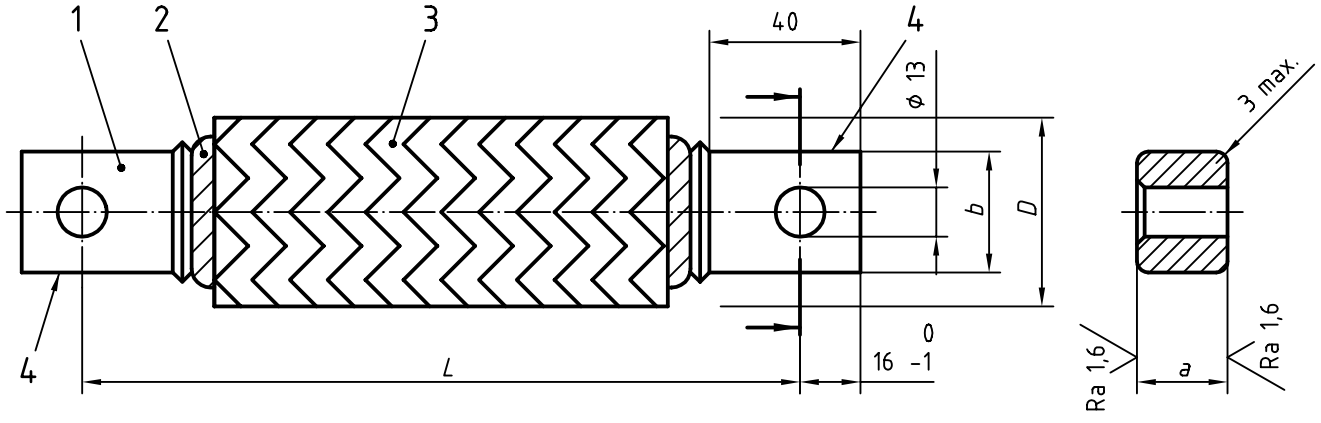
## 2 Classification

The secondary connecting cables are classified into low flexibility (LF), flexible (F) and highly flexible types (HF) depending on diameter of wire (see clause 6).

## 3 Dimensions

The dimensions of the secondary connecting cables shall be as given in Figure 1 and Table 1.

Dimensions in millimetres,
surface roughness in micrometres




**Key**

1 Terminal
2 Cable
3 Insulation cover
4 Marking

**Figure 1 — Dimensions**

**Table 1 — Dimensions**

Dimensions in millimetres

| Dimension | Section, mm$^2$ | | | | | | |
|---|---|---|---|---|---|---|---|
| | 200 | 250 | 315 | 400 | 500 | 630 | 800 |
| $a$ | 11 | 13 | 16 | 20 | 24 | 24 | 32 |
| $b$ | 32 | 32 | 32 | 32 | 32 | 38 | 38 |
| $D$ | 36 | 38 | 40 | 45 | 50 | 55 | 65 |
| $L$ [a] | Permissible permanent current $I_{2p}$, A[b] | | | | | | |
| 160 | 2 500 | 2 800 | 3 150 | 3 550 | 4 000 | — | — |
| (180) | 2 360 | 2 650 | 3 000 | 3 350 | 3 750 | — | — |
| 200 | 2 240 | 2 500 | 2 800 | 3 150 | 3 550 | — | — |
| (224) | 2 120 | 2 360 | 2 650 | 3 000 | 3 350 | 3 750 | — |
| 250 | 2 000 | 2 240 | 2 500 | 2 800 | 3 150 | 3 550 | 4 000 |
| (280) | 1 900 | 2 120 | 2 360 | 2 650 | 3 000 | 3 350 | 3 750 |
| 315 | 1 800 | 2 000 | 2 240 | 2 500 | 2 800 | 3 150 | 3 550 |
| (355) | 1 700 | 1 900 | 2 120 | 2 360 | 2 650 | 3 000 | 3 350 |
| 400 | 1 600 | 1 800 | 2 000 | 2 240 | 2 500 | 2 800 | 3 150 |
| (450) | 1 500 | 1 700 | 1 900 | 2 120 | 2 360 | 2 650 | 3 000 |
| 500 | 1 400 | 1 600 | 1 800 | 2 000 | 2 240 | 2 500 | 2 800 |
| (560) | — | — | — | 1 900 | 2 120 | 2 360 | 2 650 |
| 630 | — | — | — | 1 800 | 2 000 | 2 240 | 2 500 |

NOTE Values in brackets should be avoided as far as possible.

a Preferred numbers according to series R 20; intermediate values according to series R 40, may be chosen.

b The permissible secondary current $I_X$, at a given duty factor $X$, may be calculated from

$$I_X = I_{2p}\sqrt{\frac{100}{X}}$$

The figures in this table are based on a temperature rise of 60 °C and terminals connected to water-cooled lugs.

## 4 Designation

The designation of a secondary connecting cable shall consist, in order, of the words “secondary connecting cable”, the number of this International Standard, the cross-sectional area of the cable in square millimetres, the length in millimetres and the type of flexibility.

EXAMPLE Designation of a secondary connecting cable with cross-section of 400 mm$^2$, a length of 500 mm, flexible type (F):

**Secondary connecting cable ISO 5828 - 400 × 500 - F**

## 5 Materials

The materials used shall meet the following requirements:

Chemical composition: Cu (+Ag) min. 99,9 %

Average density: 8,9 kg/dm$^3$

Maximum mass resistivity: 0,153 28 Ω·g/m$^2$ (at 20 °C)

NOTE Equivalent values for guidance:
Maximum volume resistivity: 0,0172 41 Ω·mm$^2$/m
Minimum conductivity: 100 % IACS or 58,00 m/Ω·mm$^2$

The external insulating cover protecting the connecting cable shall be resistant to common industrial chemical agents and possible spatter, and shall also withstand, without deterioration, a maximum termperature of 100 °C.

The cable assembly shall not contain silicone.

## 6 Construction

Low flexibility = LF, diameter of wire > 0,16 to ⩽ 0,25 mm

Flexible = F, diameter of wire > 0,08 to ⩽ 0,16 mm

Highly flexible = HF, diameter of wire ⩽ 0,08 mm

Twist of cable 1/2 revolution minimum on length $L$.

## 7 Endurance test (type test)

### 7.1 Test conditions

For double series spot welding the secondary connecting cables shall be connected to the cooled secondary terminals of the transformer and to the cooled electrode holders, in accordance with the assembly diagram and dimensions indicated in Figure 2, the centre of the connecting cables being unsupported.

Rate of 20 strokes/min at 4 % duty cycle for a minimum duration of 8 h without interruption.

The applicable welding current shall be calculated from the figures given in Table 1. Under this condition the connecting cable shall withstand 300 000 mechanical and electrical operations.

### 7.2 Interpretation of results

At the beginning and at the end of the endurance test, a precise measurement of the resistance shall be carried out at a temperature of 20 °C. The final resistance shall not exceed the initial resistance by more than 15 %.

Dimensions in millimetres

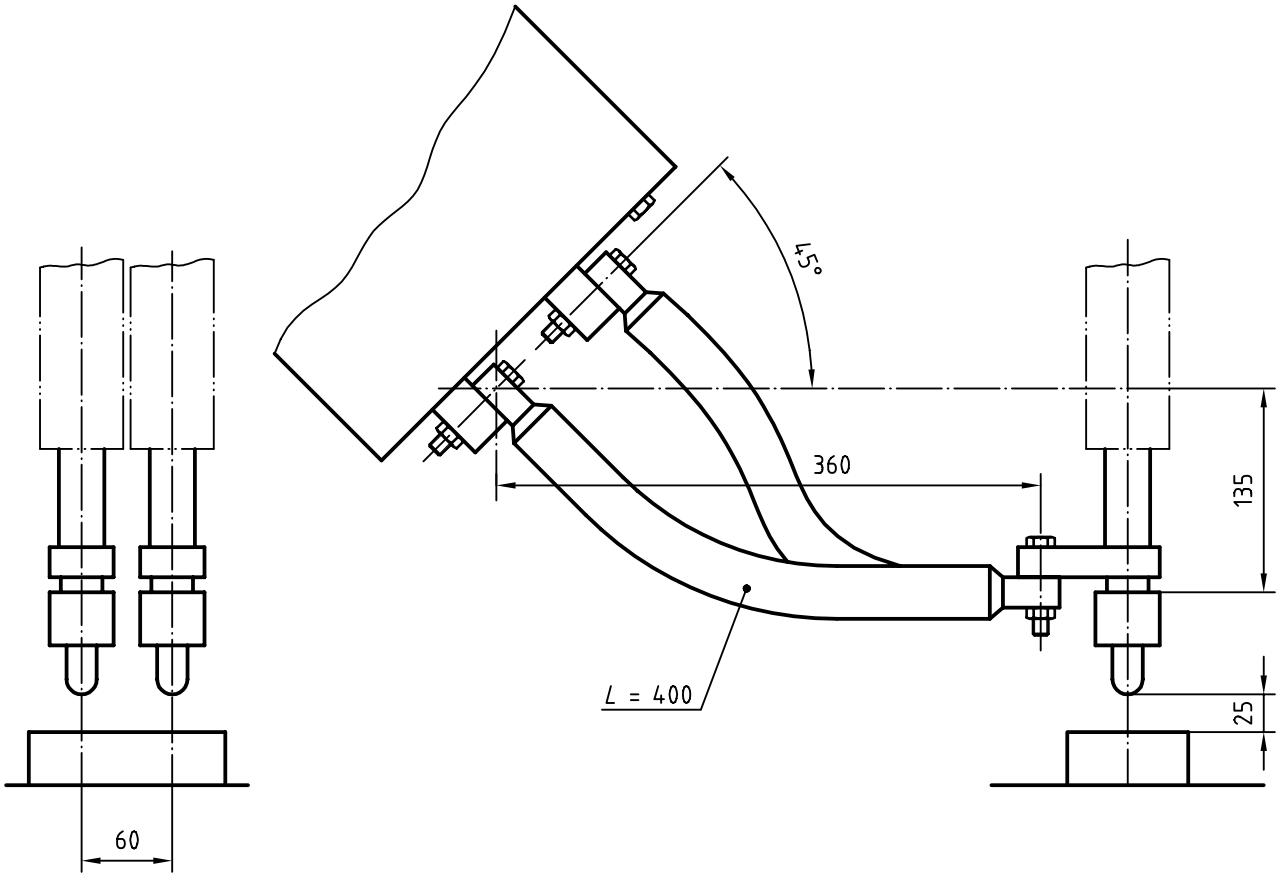



**Figure 2 — Test arrangement for endurance test**

## 8 Marking

Connecting cables in accordance with this International Standard shall be marked on the opposite edges of both terminals according to Figure 1 with the values of cross-section × length and the letter LF, F or HF.

EXAMPLE 400 × 500 - F.

**ICS 25.160.30**

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