



UL 486F

STANDARD FOR SAFETY

Bare and Covered Ferrules

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CSA Group
CSA C22.2 No. 291:19
Second Edition



Underwriters Laboratories Inc.
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Bare and Covered Ferrules

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Commitment for Amendments

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PREFACE

This is the harmonized CSA Group and UL standard for Bare and Covered Ferrules. It is the second edition of CSA C22.2 No. 291 and the second edition of UL 486F. This edition of CSA C22.2 No. 291 supersedes the previous edition published in 2014.

The major differences between this edition and the previous edition include editorial updates to Tables 1 – 6, clarification to dielectric voltage withstand test, addition of wire gauge to marking requirements, expansion of the scope to include wire ranges covered by this standard and updates to the referenced publications.

This harmonized standard was prepared by CSA Group and Underwriters Laboratories Inc. (UL). The efforts and support of the Technical Harmonization Subcommittee, CANENA Technical Harmonization Committee 99 – Electrical Connectors of the Council on the Harmonization of Electrotechnical Standards of the Nations of the Americas (CANENA), are gratefully acknowledged.

This standard is considered suitable for use for conformity assessment within the stated scope of the standard.

This standard was reviewed by the CSA Integrated Committee on Electrical Connectors, under the jurisdiction of the CSA Technical Committee on Wiring Products and the CSA Strategic Steering Committee on Requirements for Electrical Safety, and has been formally approved by the CSA Technical Committee. This Standard has been developed in compliance with Standards Council of Canada requirements for National Standards of Canada. It has been published as a National Standard of Canada by CSA Group.

Application of Standard

Where reference is made to a specific number of samples to be tested, the specified number is to be considered a minimum quantity.

Note: Although the intended primary application of this standard is stated in its scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

Level of Harmonization

This standard uses the IEC format but is not based on, nor is it considered equivalent to, an IEC standard.

This standard is published as an equivalent standard for CSA Group and UL.

An equivalent standard is a standard that is substantially the same in technical content, except as follows: Technical national differences are allowed for codes and governmental regulations as well as those recognized as being in accordance with NAFTA Article 905, for example, because of fundamental climatic, geographical, technological, or infrastructural factors, scientific justification, or the level of protection that the country considers appropriate. Presentation is word for word except for editorial changes.

Reasons for differences from IEC

At present there is no IEC standard for bare and covered ferrules. Therefore, this standard does not employ any IEC standard for base requirements.

Interpretations

The interpretation by the standards development organization of an identical or equivalent standard is based on the literal text to determine compliance with the standard in accordance with the procedural rules of the standards development organization. If more than one interpretation of the literal text has been identified, a revision is to be proposed as soon as possible to each of the standards development organizations to more accurately reflect the intent.

1 Scope

1.1 These requirements cover bare and covered ferrules intended for field wiring and factory wiring for use in accordance with the National Electrical Code, ANSI/NFPA-70 and Canadian Electrical Code, Part I, CSA C22.1.

1.2 These ferrules are intended to facilitate the connection of stranded wire on to devices, such as terminal blocks. Their purpose is to treat stripped wire and prevent turned back strands during installation. They are intended to be used to attach to one stranded copper conductor or two stranded copper conductors of the same size.

1.3 When intended for use with one conductor, these ferrules are suitable for use with 1/0 – 26 AWG, 50 – 0.14 mm², stranded copper conductors.

1.4 When intended for use with two conductors, these ferrules are suitable for use with (2) 6 – (2) 26 AWG, (2) 16 – (2) 0.25 mm², stranded copper conductors.

1.5 These ferrules are intended to be terminated in wire connection devices rated for solid conductors.

1.6 Ferrules are not intended for use in IDC (insulation displacement connection) terminal blocks.

1.7 This standard does not apply to wire connectors such as pin adapters covered in CSA C22.2 No. 65 or UL 486A-486B.

1.8 In Canada, general requirements applicable to this Standard are provided in CAN/CSA-C22.2 No. 0.

2 Reference Publications

2.1 Normative references

Where reference is made to any Standards, such reference shall be considered to refer to the latest editions and revisions thereto available at the time of printing, unless otherwise specified.

2.1.1 CSA Group Standards

C22.1-18

Canadian Electrical Code, Part I

CAN/CSA-C22.2 No. 0-10 (R2015)

General Requirements – Canadian Electrical Code, Part II

CAN/CSA-C22.2 No. 0.17-00 (R2018)

Evaluation of Properties of Polymeric Materials

2.1.2 UL Standards

UL 94

Tests for Flammability of Plastic Materials for Parts in Devices and Appliances

UL 746C

Polymeric Materials – Use in Electrical Equipment Evaluations

UL 1694

Tests for Flammability of Small Polymeric Component Materials

2.1.3 NFPA Standards

ANSI/NFPA 70-2011

National Electrical Code (NEC)

3 Units of Measurement

3.1 The values given in SI (metric) units shall be normative, except for AWG conductor sizes. Any other values given are for information only.

3.2 AWG is the normative wire size of the standard. The mm² is the closest equivalent to that size.

4 Definitions

For the purpose of this Standard, the following terms and definitions apply.

4.1 Covered – Encased within material of composition or thickness that is not recognized as electrical insulation.

4.2 Covered ferrule – A ferrule provided with a plastic sleeve.

4.3 Ferrule – A conductive sleeve used to facilitate the termination of stranded wire in devices used to terminate solid conductors.

4.4 Plastic sleeve – A non-conductive plastic material used for identification purposes. The term "covering" is also referred to in the Standard as a "plastic sleeve".

5 Symbols and Abbreviations

5.1 ° – Degree

5.2 AWG – American Wire Gage/gauge

5.3 C – Celsius

5.4 mm² – Squared millimeters

5.5 V – Volts

6 Construction

6.1 General

6.1.1 A ferrule shall be provided with one opening to accept one or two stranded type copper conductors applied with compression tooling.

6.1.2 A ferrule shall comply with the dimensional requirements in [Table 1](#) – [Table 8](#) and [Figure 1](#) – [Figure 10](#) and the following:

a) Dimensions for the length of the ferrules in all Tables and Figures represent common sizes and longer lengths are permissible as these dimensions are indicated as minimum values. For [Table 3](#) and [Table 5](#), which specify “strip length”, any increase in overall length of the ferrule shall include an equal amount of increase in the strip length specified by the manufacturer.

b) Dimensions for the diameter and thickness for plastic sleeves in [Table 6](#) and [Table 7](#) and [Figure 8](#) and [Figure 10](#) represent common sizes. Wider dimensions and thicker materials for the plastic sleeves are permissible, as these dimensions are indicated as minimum values.

6.2 Materials

6.2.1 A ferrule shall be of copper or a copper alloy containing at least 80% copper and be coated with tin.

6.3 Flammability

6.3.1 The covering material shall comply with one of the following requirements for flammability:

a) have a minimum flammability classification of HB as determined by tests described in UL 94 or CAN/CSA-C22.2 No. 0.17. This flammability classification may be determined at the minimum thickness employed in the construction or a nominal thickness of 0.8 mm (0.031 in), whichever is greater;

b) meet the glow wire test as specified in UL 746C or CSA C22.2 No 0.17 for a temperature of 650° C; or

c) be evaluated and classed with a flammability rating of SC-0, SC-1, SC-TC 0, or SC-TC 1 in accordance with UL 1694.

6.4 Thermal properties

6.4.1 A polymeric material used for covering shall have a minimum relative thermal index (RTI) of 80 °C (176°F) (electrical only). The material shall be evaluated using the specimen thickness employed in the covering or a nominal thickness of 0.8 mm (0.031 in), whichever is greater. The electrical RTI value may be determined regardless of the color used for the plastic sleeve.

7 Test Requirements

7.1 General

7.1.1 All ferrules shall comply with the test requirements in [7.2](#). Covered ferrules shall additionally comply with the test requirements in [7.3](#) – [7.4](#).

7.2 Tensile test

7.2.1 During testing in accordance with [9.2](#), the conductor shall not visibly move (with normal or corrected to normal vision) within the ferrule or be pulled out of the ferrule.

7.3 Mold stress relief

7.3.1 As a result of conditioning as specified in [9.3](#), there shall not be any warpage, shrinkage, or other distortion that results in interference with the operation, function, or installation of the device.

7.4 Dielectric voltage-withstand

7.4.1 The plastic sleeve of a covered ferrule shall withstand the applied potential without breakdown when tested in accordance with [9.4](#).

8 Sampling Requirements

8.1 General

8.1.1 The number of samples required for each test shall be as described in [8.2](#) – [8.4](#).

8.2 Tensile test

8.2.1 Three samples shall be tested for each of the assemblies in [9.1.1](#) and [9.1.2](#).

8.2.2 Testing on shorter ferrule lengths represent longer ferrules when all other dimensions are identical.

8.3 Mold stress test

8.3.1 Six samples shall be tested for each of the assemblies in [9.1.1](#) and [9.1.2](#).

8.4 Dielectric voltage-withstand

8.4.1 The same samples subjected to the mold stress test shall then be subjected to the dielectric voltage-withstand test.

9 Test Methods

9.1 General

9.1.1 A ferrule shall be assembled to the following conductors in the intended manner using the identified tooling and strip length [see [10.1.1](#) (e) and (f)]:

- a) largest size conductor with highest stranding count;
- b) largest size conductor with lowest stranding count;
- c) smallest size conductor with highest stranding count; and
- d) smallest size conductor with lowest stranding count.

9.1.2 A two conductor (twin) ferrule shall be assembled to the following conductors in the intended manner using the identified tooling and strip length [see [10.1.1](#) (e) and (f)]:

- a) largest size conductors with highest stranding count;
- b) largest size conductors with lowest stranding count;
- c) smallest size conductors with highest stranding count; and
- d) smallest size conductors with lowest stranding count.

9.2 Tensile test

9.2.1 The conductor shall be inserted through a punched hole in a plate which is securely fastened to a tensile machine. A minimum force in accordance with Table 8 shall be applied at a rate not to exceed 25.4 mm per min (1 in per min). The force shall be applied for 1 min.

9.3 Mold stress test

9.3.1 Fully assembled ferrules shall be placed in a full-draft circulating-air oven for 7 h. The temperature shall be maintained at a uniform temperature of not less than 90 °C (194 °F).

9.3.2 The assembled ferrules shall be removed from the oven and allowed to cool to room temperature before determining compliance.

9.3.3 The connector shall be subjected to and comply with the dielectric voltage withstand test in [9.4](#).

9.4 Dielectric voltage withstand test

9.4.1 After completing the mold stress test, assembled samples shall be subjected to an ac test potential of 1000 V for a period of 1 min. Each sample shall be embedded in No. 7-1/2 conductive shot that is to serve as the outer electrode (see [Figure 11](#)). Only that portion of the plastic sleeve that covers uninsulated current-carrying parts shall be covered with the outer electrode. A smaller than No. 7-1/2 (higher size number) shot may be used with the concurrence of those concerned. Conductive metal foil shall be used as the outer electrode when the ferrule has openings that will allow entry of the shot.

10 Marking, Labeling, and Packaging

10.1 General

10.1.1 The following shall appear on or with the smallest package:

- a) manufacturer's name, trademark or trade name;
- b) a distinctive catalog number or the equivalent;
- c) wire type (CU or Copper) and size (AWG / mm²);
- d) stranding type, (i.e. Class B, C...);
- e) installation tool, manufacturer's name and catalog number;
- f) strip length; and
- g) for covered ferrules only: "Plastic sleeve for covered ferrules is for identification purposes only and it is not electrical insulation", or equivalent.

TABLES

Table 1
Ferrules without plastic sleeve, Form A

| Nominal size | | Conductor cross-section | | d_1 | | d_2 | | l_1 | | l_2 | | s | |
|--|---------------------|-------------------------|-----------------|-------|-----------|---------------------|-----------|---------------------|-----------|-----------------------------|-----------|------|-----------|
| Conductor cross-section, mm ² | Length l_1 | AWG | mm ² | | Tolerance | | Tolerance | | Tolerance | | Tolerance | | Tolerance |
| 0,25 | 5 7 | 24 | 0,25 | 0,8 | ±0,14 | 1,7 | -0,2 | 5 7 | -0,4 | 4,7 6,7 | -0,4 | 0,15 | ±0,05 |
| 0,34 | 5 7 | 22 | 0,34 | 0,9 | | 1,8 | | 5 7 | | 4,7 6,7 | | | |
| 0,5 | 6 8 10 | 20 | 0,5 | 1 | | 2,1 | | 6 8 10 | | 5,7 7,7 9,7 | | | |
| | 0,75 | | | | | | | 6 10 | | 18 | | | |
| 1 | 6 10 | — | 1 | 1,4 | | 2,5 | | 6 10 | | 5,7 9,7 | | | |
| 1,5 | 7 10 12 18 | 16 | 1,5 | 1,7 | ±0,25 | 2,8 | | 7 10 12 18 | | 6,4 9,4 11,4 17,4 | | | |
| | 2,5 | | | | | 7 10 12 18 | | 14 | | 2,5 | | 2,2 | |
| 4 | 9 12 15 18 | 12 | 4 | 2,8 | | 4 | | 9 12 15 18 | | 8,4 11,4 14,4 17,4 | | 0,2 | |
| 6 | 10 12 | 10 | 6 | 3,5 | | ±0,3 | | 4,7 | | 10 12 | | | |

Table 1 Continued on Next Page

Table 1 Continued

| Nominal size | | Conductor cross-section | | d_1 | | d_2 | | l_1 | | l_2 | | s | |
|--|--------------|-------------------------|-----------------|-------|-----------|-------|-----------|-------|-----------|-------|-----------|-----|-----------|
| Conductor cross-section, mm ² | Length l_1 | AWG | mm ² | | Tolerance | | Tolerance | | Tolerance | | Tolerance | | Tolerance |
| 10 | 15 | 8 | 10 | 4,5 | ±0,4 | 5,8 | -0,5 | 15 | | 14,4 | | | |
| | 18 | | | | | | | 17,4 | | | | | |
| | 12 | | | | | | | 11,2 | | | | | |
| | 15 | | | | | | | 14,2 | | | | | |
| 16 | 18 | 6 | 16 | 5,8 | | 7,5 | | 18 | 17,2 | | | | |
| | 12 | | | | | | | 10,9 | | | | | |
| | 15 | | | | | | | 13,9 | | | | | |
| | 18 | | | | | | | 16,9 | | | | | |
| | 25 | | | | 23,9 | | | | | | | | |
| 32 | 30,9 | | | | | | | | | | | | |
| 25 | 15 | 4 | 25 | 7,3 | ±0,4 | 9,5 | -0,5 | 15 | -0,4 | 13,4 | | | |
| | 18 | | | | | | | 16,4 | | | | | |
| | 25 | | | | | | | 23,4 | | | | | |
| | 32 | | | | | | | 29,4 | | | | | |
| 35 | 18 | 2 | 35 | 8,3 | | 11 | | 18 | -0,4 | 16,4 | | | |
| | 25 | | | | | | | 23,4 | | | | | |
| | 32 | | | | | | | 30,4 | | | | | |
| 50 | 18 | 1/0 | 50 | 10,3 | | 13 | | 18 | -0,4 | 15,4 | | | |
| | 25 | | | | 22,4 | | | | | | | | |
| | 32 | | | | 29,4 | | | | | | | | |
| Note – All dimensions in mm unless otherwise stated. | | | | | | | | | | | | | |

Table 2
Crimp-type ferrules with and without wire insulation grip, Forms B and C (Figure 2 and Figure 3)

| Nominal size | | Conductor cross section | | a_1 | a_2 | b_1 | b_2 | h_1 | h_2 | l_1 | s |
|--|----------------------|-------------------------|-----------------|------------|-------|-------|-------|-------|-------|-----------|-------|
| Conductor cross section, mm ² | Length l_1 -0,4 mm | AWG | mm ² | -0,5 | ±0,5 | ±0,5 | ±0,5 | ±0,5 | ±0,5 | -0,5 | ±0,05 |
| 1 | 7 10 | 20 – 18 | 0,5 – 1 | 11 14 | 2,5 | 2,5 | 3,7 | 2,6 | 3,8 | 7 10 | 0,3 |
| 1,5 | 7 10 | 18 – 16 | 1 and 1,5 | 11 14 | | 3 | | 3,3 | 4,2 | 7 10 | |
| 2,5 | 7 10 | 16 – 14 | 1,5 and 2,5 | 11 14 | | 3,8 | 5 | 4,1 | 5,2 | 7 10 | |
| 4 | 8,5 12 | 14 – 12 | 2,5 and 4 | 14 17,5 | 3,5 | 4 | 5,6 | 4,8 | 6,3 | 8,5 12 | 0,4 |
| 6 | 8,5 12 | 12 – 10 | 4 and 6 | 14 17,5 | 3,5 | 4,8 | 6,4 | 5,4 | 7,8 | 8,5 12 | |
| | 15 | | | 20,5 | | | | | | 15 | |

Note – All units are in mm unless otherwise stated.

Table 3
Assembled crimp-type ferrules with and without wire insulation grip, Forms B and C (Figure 2 and Figure 3)

| Nominal size | | Conductor Cross section | | Conductor strip length l_2 | b_3 | d | h_3 |
|--|----------------------|-------------------------|-----------------|------------------------------|-------|-----|-------|
| Cross section of conductor mm ² | Length l_1 -0,4 mm | AWG | mm ² | max | | max | max |
| 1 | 7 10 | 20 – 18 | 0,5 – 1 | 8 11 | 2 | 2,7 | 1,2 |
| 1,5 | 7 10 | 18 – 16 | 1 and 1,5 | 8 11 | 2,4 | 3,1 | 1,5 |
| 2,5 | 7 10 | 16 – 14 | 1,5 and 2,5 | 8 11 | 2,8 | 3,6 | 2,4 |
| 4 | 8,5 12 | 14 – 12 | 2,5 and 4 | 10 13,5 | 3,6 | 4,2 | 3,1 |
| 6 | 8,5 12 | 12 – 10 | 4 and 6 | 10 13,5 | 4,3 | 5,2 | 4 |
| | 15 | | | 15,5 | | | |

Note – All units are in millimeters unless otherwise stated.

Table 4
Conductor-embracing ferrules without wire insulation grip, Form D

| Nominal size | | Conductor cross-section | | <i>b</i> | <i>h</i> | <i>l₁</i> |
|-------------------------|--|-------------------------|-----------------|----------|----------|----------------------|
| Conductor cross section | Length <i>l₁</i> -0,4 mm | AWG | mm ² | ±0,5 | ±0,5 | |
| 1 | 7 10 | 20 – 18 | 0,5 – 1 | 2,5 | 2,6 | 7 10 |
| 1,5 | 7 10 | 16 | 1,5 | 2,5 | 2,8 | 7 10 |
| 2,5 | 7 10 | 14 | 2,5 | 3 | 3,2 | 7 10 |

Note – All units are in millimeters unless otherwise stated.

Table 5
Conductor-embracing ferrules without wire insulation grip, Form D

| Nominal size | | Conductor Cross section | | <i>d</i> | Strip length <i>l₂</i> |
|---|--|-------------------------|-----------------|----------|-----------------------------------|
| Conductor cross section mm ² | Length <i>l₁</i> -0,4 mm | AWG | mm ² | max | |
| 1 | 7 10 | 20 – 18 | 0,5 – 1 | 1,8 | 8 11 |
| 1,5 | 7 10 | 16 | 1,5 | 2 | 8 11 |
| 2,5 | 7 10 | 14 | 2,5 | 2,5 | 8 11 |

Note – All units are in millimeters unless otherwise stated.

Table 6
Tubular ferrules with plastic sleeve, Form E

| Nominal size | | Conductor cross-section | | d_1 | | d_2 | | l_1 | | l_2 | | s_1 | | s_2 | | Color identification code for plastic sleeve (Informative only) |
|---|---------------------|-------------------------|-----------------|-------|-----------|-------|-----------|------------------------------|------------|---------------------|--------------|-------|-----------|-------|-----------|---|
| Conductor cross section mm ² | Length | AWG | mm ² | | Tolerance | | Tolerance | | Tolerance | | Tolerance | | Tolerance | | Tolerance | |
| 0,14 | 6 8 | 26 | 0,14 | 0,8 | ±0,14 | 1,9 | -0,2 | 10,5 12,5 | -1,5 | 6 8 | -0,4 | 0,15 | ±0,05 | 0,25 | -0,1 | grey |
| 0,25 | 6 8 | 24 | 0,25 | 0,8 | ±0,14 | 1,9 | -0,2 | 10,5 12,5 | -1,5 | 6 8 | -0,4 | 0,15 | ±0,05 | 0,25 | -0,1 | yellow |
| 0,34 | 6 8 10 12 | 22 | 0,34 | 0,8 | ±0,14 | 1,9 | -0,2 | 10,5 12,5 14,5 16,5 | -1,5 | 6 8 10 12 | -0,4 | 0,15 | ±0,05 | 0,25 | -0,1 | turquoise |
| 0,5 | 6 8 10 | 20 | 0,5 | 1 | ±0,14 | 2,6 | -0,2 | 12 14 16 | -1,5 | 6 8 10 | -0,4 | 0,15 | ±0,05 | 0,25 | -0,1 | white |
| 0,75 | 6 8 10 12 | 18 | 0,75 | 1,2 | ±0,14 | 2,8 | -0,2 | 12 14 16 18 | -1,5 | 6 8 10 12 | -0,4 -0,6 | 0,15 | ±0,05 | 0,25 | -0,1 | grey |
| 1 | 6 8 10 12 | — | 1 | 1,4 | ±0,14 | 3 | -0,2 | 12 14 16 18 | -1,5 | 6 8 10 12 | -0,4 -0,6 | 0,15 | ±0,05 | 0,25 | -0,1 | red |
| 1,5 | 8 10 12 18 | 16 | 1,5 | 1,7 | ±0,25 | 3,5 | -0,2 | 14 16 18 24 | -1,5 -2 | 8 10 12 18 | -0,4 -0,6 | 0,15 | ±0,05 | 0,25 | -0,1 | black |
| 2,5 | 8 12 | 14 | 2,5 | 2,2 | ±0,25 | 4,2 | -0,2 | 14 18 | -1,5 | 8 12 | -0,4 -0,6 | 0,15 | ±0,05 | 0,25 | -0,1 | blue |

Table 6 Continued on Next Page

Table 6 Continued

| Nominal size | | Conductor cross-section | | d_1 | | d_2 | | l_1 | | l_2 | | s_1 | | s_2 | | Color identification code for plastic sleeve (Informative only) |
|--|----------|-------------------------|-----------------|-------|-----------|-------|-----------|----------|-----------|----------|-----------|-------|-----------|-------|-----------|---|
| Conductor cross section mm ² | Length | AWG | mm ² | | Tolerance | | Tolerance | | Tolerance | | Tolerance | | Tolerance | | Tolerance | |
| | 18 | | | | | | | 24 | -2 | 18 | | | | | | |
| 4 | 10 | 12 | 4 | 2,8 | ±0,25 | 4,8 | -0,4 | 17 | -1,5 | 10 | -0,4 | 0,2 | ±0,05 | 0,3 | -0,1 | grey |
| | 20 | | | | | | | 12 | | -0,6 | | | | | | |
| | 18 | | | | | | | 26 | -2 | 18 | | | | | | |
| 6 | 12 | 10 | 6 | 3,5 | ±0 3 | 6,3 | -0,4 | 20 | -1,5 | 12 | -0,6 | 0,2 | ±0,05 | 0,3 | -0,1 | yellow |
| | 18 | | | | | | | 26 | -2 | 18 | | | | | | |
| 10 | 12 18 | 8 | 10 | 4,5 | ±0,3 | 7,6 | -0,4 | 22 28 | -2 | 12 18 | -0,6 | 0,2 | ±0,05 | 0,4 | -0,15 | red |
| 16 | 12 18 | 6 | 16 | 5,8 | ±0,3 | 8,8 | -0,4 | 24 28 | -2 | 12 18 | -0,6 | 0,2 | ±0,05 | 0,4 | -0,15 | blue |
| 25 | 16 | 4 | 25 | 7,3 | ±0,4 | 11,2 | -0,5 | 30 | -2 | 16 | -0,6 | 0,2 | ±0,05 | 0,4 | -0,15 | yellow |
| | 18 | | | | | | | 18 | | | | | | | | |
| | 22 | | | | | | | 36 | | 22 | | | | | | |
| 35 | 16 | 2 | 35 | 8,3 | ±0,4 | 12,7 | -0,5 | 30 | -2 | 16 | -0,6 | 0,2 | ±0,05 | 0,4 | -0,15 | red |
| | 18 | | | | | | | 30 | | 18 | | | | | | |
| | 25 | | | | | | | 39 | | 25 | | | | | | |
| 50 | 20 25 | 1/0 | 50 | 10,3 | ±0,4 | 15 | -1 | 36 40 | -2 | 20 25 | -0,6 | 0,3 | ±0,05 | 0,5 | -0,15 | blue |
| Note – All dimensions in mm unless otherwise stated. | | | | | | | | | | | | | | | | |

Table 7
Two conductor (Twin) ferrules, Form F

| Nominal size | | Conductor cross-section | | d_1 | | d_2 | | d_3 | | l_1 | | l_2 | | s_1 | | s_2 | | Color identification code for plastic sleeve (Informative only) | | | | |
|--|---------------------|-------------------------|-----------------|-------|-----------|-------|-----------|-------|-----------|----------------------|--------------|---------------|--------------|---------------------|-----------|-------|-----------|---|-----|-----|-------|--------|
| Conductor cross section | Length l_2 | AWG | mm ² | | Tolerance | | Tolerance | | Tolerance | | Tolerance | | Tolerance | | Tolerance | | Tolerance | | | | | |
| 2 × 0,25 | 8 | 2 × 24 | 2 × 0,25 | 1,15 | ±0,14 | 1,8 | | 3,4 | -0,2 | 15 | | 8 | -0,4 | 0,15 | | 0,25 | | Any | | | | |
| 2 × 0,34 | 8 | 2 × 22 | 2 × 0,34 | 1,15 | | 1,8 | | 3,4 | | 15 | | 8 | | 0,15 | | 0,25 | | Any | | | | |
| 2 × 0,50 | 8 | 2 × 20 | 2 × 0,50 | 1,40 | | 2,5 | | 4,7 | | 15 | | 8 | | 0,15 | | 0,25 | | White | | | | |
| 2 × 0,75 | 8 10 | 2 × 18 | 2 × 0,75 | 1,7 | ±0,25 | 2,8 | -0,2 | 5 | -0,4 | 15 17 | -1,5 | 8 10 | -0,4 | 0,15 | ±0,05 | 0,25 | -0,1 | Grey | | | | |
| 2 × 1 | 8 10 12 18 | 2 × 18 | 2 × 1 | 1,95 | | 3,4 | | 5,4 | | 15 17 19 25 | | -0,2 | | 8 10 12 18 | | -0,6 | | 0,15 | 0,3 | Red | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| 2 × 1,5 | 8 12 18 | 2 × 16 | 2 × 1,5 | 2,2 | | 3,6 | | 6,6 | | 16 20 26 | -1,5 -0,2 | 8 12 18 | -0,4 -0,6 | 0,15 | | 0,3 | Black | | | | | |
| 2 × 2,5 | 10 13 | 2 × 14 | 2 × 2,5 | 2,8 | | 4,2 | | 7,8 | | 18,5 21,5 | -1,5 | 10 13 | -0,4 | 0,2 | | 0,3 | Blue | | | | | |
| 2 × 4 | 12 | 2 × 12 | 2 × 4 | 3,7 | | ±0,3 | | 4,9 | | -0,4 | 8,8 | -0,5 | 23 | -0,2 | | 12 | -0,6 | 0,2 | | 0,4 | -0,15 | Grey |
| 2 × 6 | 14 | 2 × 10 | 2 × 6 | 4,8 | | | | 6,9 | | | 10 | | 26 | | | 14 | | 0,2 | | 0,4 | | Yellow |
| 2 × 10 | 14 | 2 × 8 | 2 × 10 | 6,4 | | ±0,4 | | 7,2 | | | 13 | | 26 | | | 14 | | 0,2 | | 0,4 | | Red |
| 2 × 16 | 14 | 2 × 6 | 2 × 16 | 8,2 | 9,6 | | 18,4 | -1 | 30 | | 12 | | 0,2 | | 0,4 | Blue | | | | | | |
| Note – All dimensions in mm unless otherwise stated. | | | | | | | | | | | | | | | | | | | | | | |

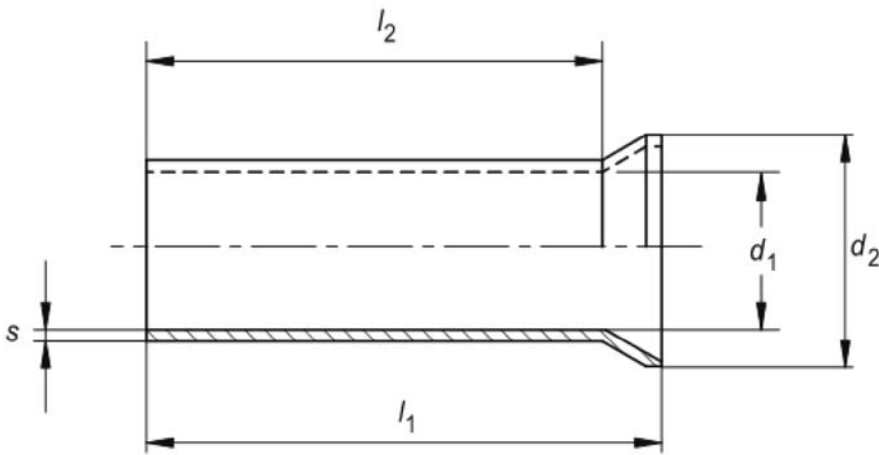
Note – All dimensions in mm unless otherwise stated.

Table 8
Tensile force

| Conductor cross section | | Force | |
|-------------------------|-----------------|-------|-----|
| AWG | mm ² | lb | N |
| 26 | 0,14 | 1,6 | 7 |
| 24 | 0,25 | 2,2 | 10 |
| 22 | 0,34 | 3,4 | 15 |
| 20 | 0,5 | 4,5 | 20 |
| 18 | 0,75 | 6,7 | 30 |
| – | 1 | 7,9 | 35 |
| 16 | 1,5 | 9 | 40 |
| 14 | 2,5 | 11,2 | 50 |
| 12 | 4 | 13,5 | 60 |
| 10 | 6 | 18 | 80 |
| 8 | 10 | 20,2 | 90 |
| 6 | 16 | 22,5 | 100 |
| 4 | 25 | 30,3 | 135 |
| 2 – 1/0 | 35 – 50 | 42,7 | 190 |

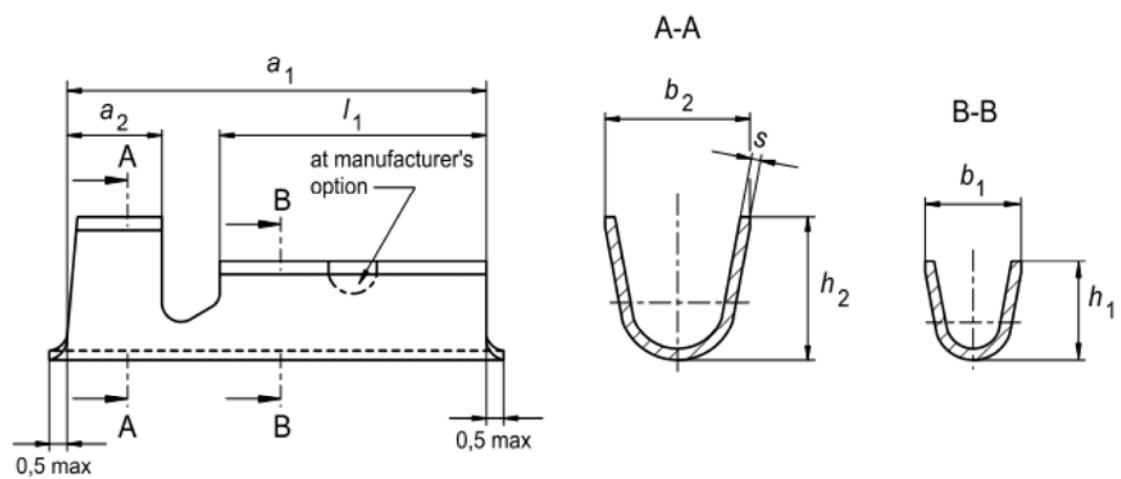
FIGURES

Figure 1
Tubular ferrules without plastic sleeve, Form A



su0878a

Figure 2
Crimp-type ferrule with wire insulation grip, Form B



su0879

Figure 3
Crimp-type ferrule without wire insulation grip, Form C

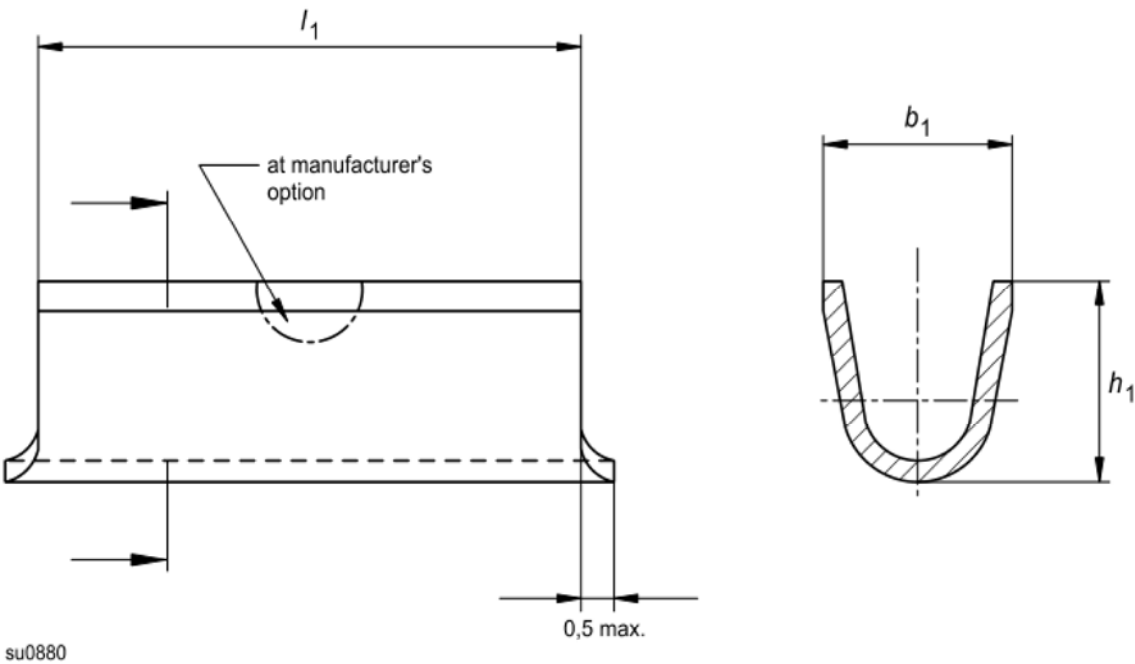
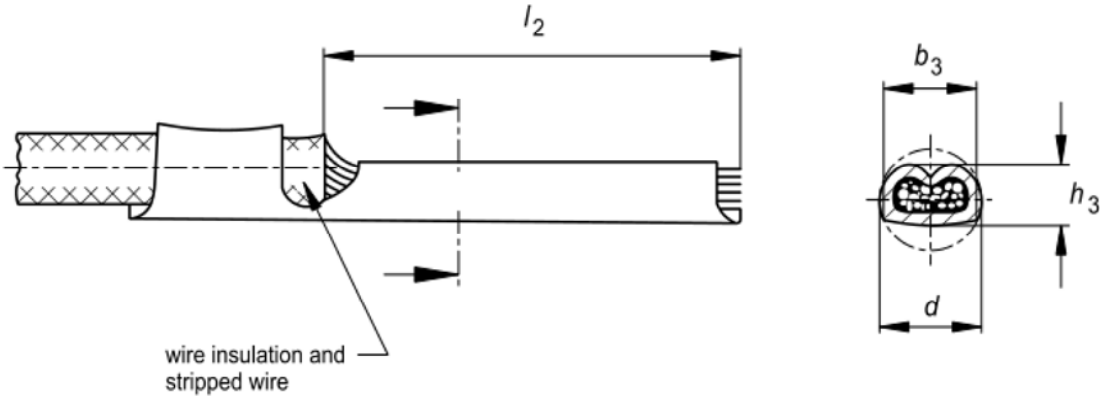


Figure 4
Crimp dimensions for Form B



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Figure 5
Crimp dimensions for Form C

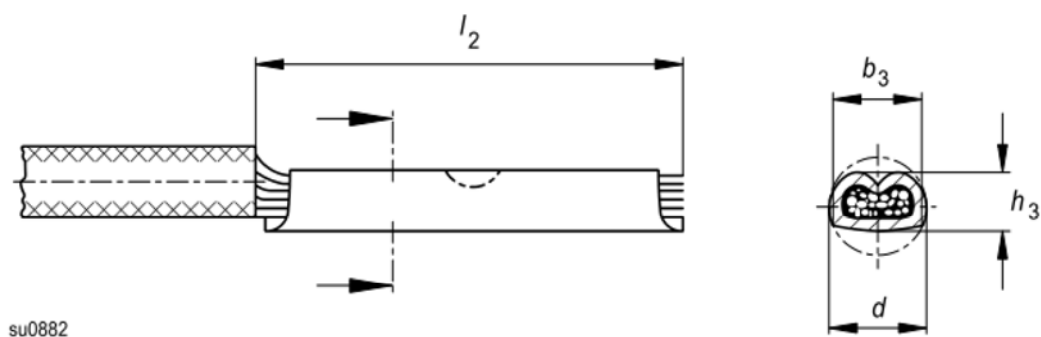
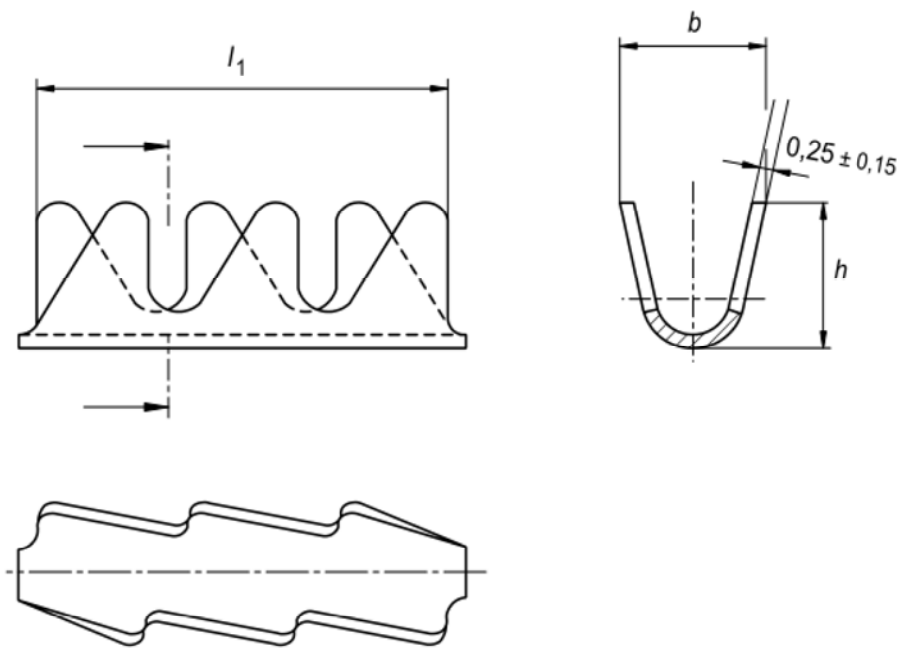
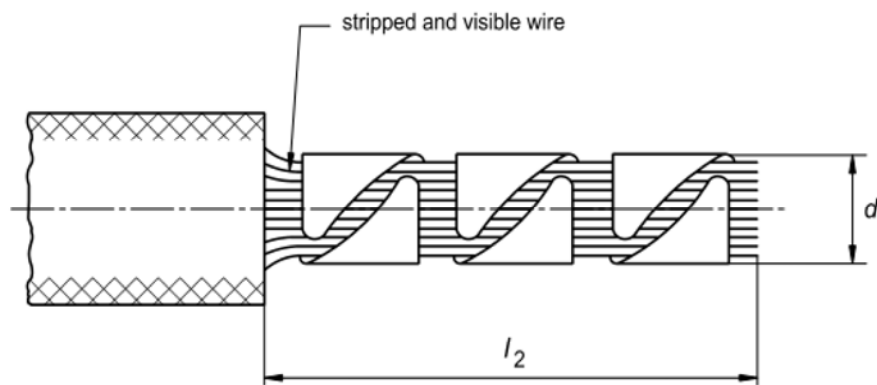


Figure 6
Form D



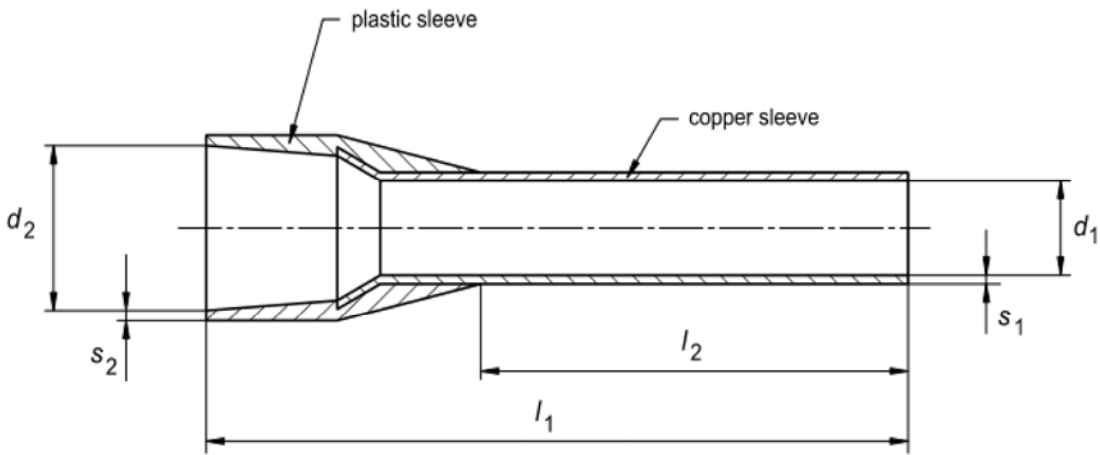
su0883

Figure 7
Form D



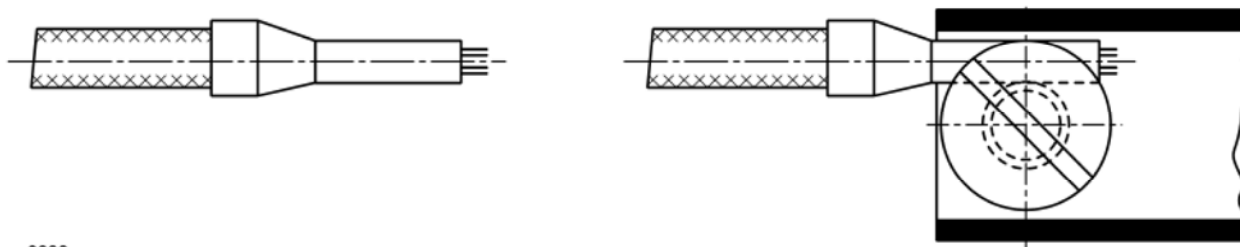
su0884

Figure 8
Ferrule with plastic sleeve, Form E



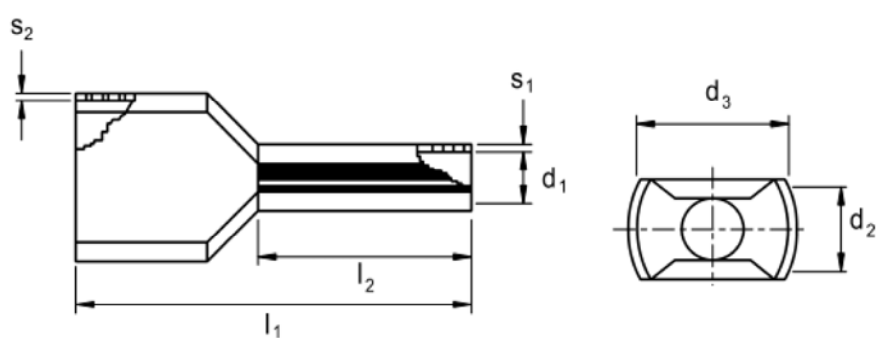
su0885

Figure 9
Form E



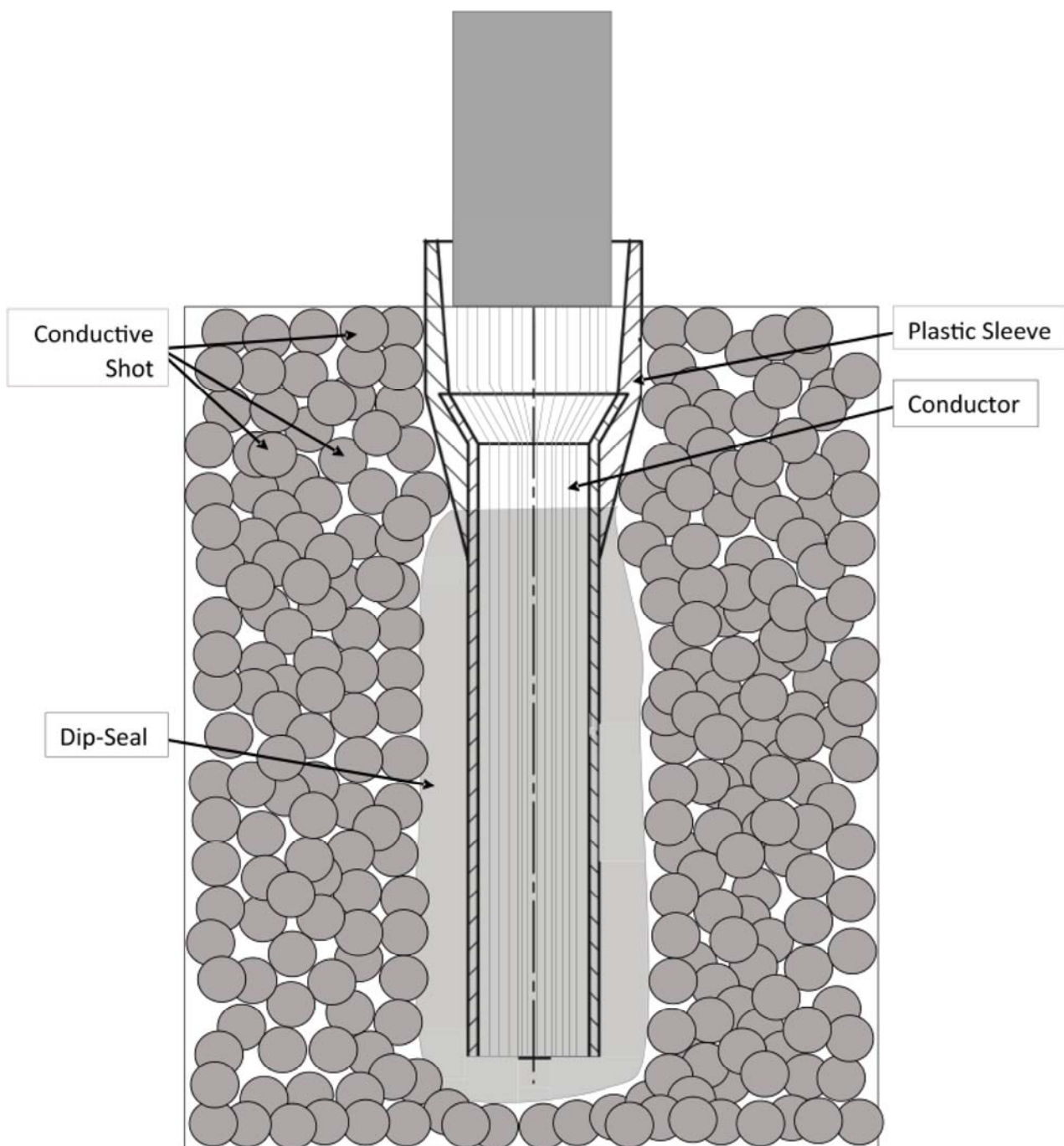
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Figure 10
Two conductor (twin) ferrules, Form F



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Figure 11
Ferrule with sleeve dipped in a conductive shot





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