Making Permanent Joints – Course: Basic Skills and Knowledge of Electrical Engineering. Instruction Examples for Practical Vocational Training

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Making Permanent Joints – Course: Basic Skills and Knowledge of Electrical Engineering. Instruction Examples for Practical Vocational Training

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Introduction

The present booklet contains 4 selected instruction examples to practise the main techniques of making permanent joints, i.e. made by soldering, notching and pressing.

Sice a good command of these working techniques calls for much practice, the instruction examples are confined to the manufacture of joints between conductors and cable eyes.

The suggested instruction examples should be interprete in a flexible way to provide for adequate use of the products; the product as per Instruction Example 2 could be used, for example, for a bicycle lighting line.

In order to facilitate the preparation and execution of the work, the necessary materials, working, measuring and testing tools, and accessories are given for each instruction example as well as the additional knowledge required for carrying out the work.

Moreover, working drawings are attached to illustrate the sequence of operations and show more details of certain steps of work.

Instruction Example 3.1. Soldering of Cable Eyes

To practise the manufacture of a permanent joint between a conductor and cable eye by soldering.

Material

Stepped flexible rubber sheathed cable 3 × 2.5 mm^2
Length: approx. 2000 mm
Stepped length: 80 mm
Cable eyes, number: 3 off
Flexible insulating tubing length: 20 mm
number: 3 off

Working tools

Cable stripper (cable stripping knife) or stripping tool, 100 W soldering iron, flat nose plier

Measuring and testing tools

Folding rule or steel rule

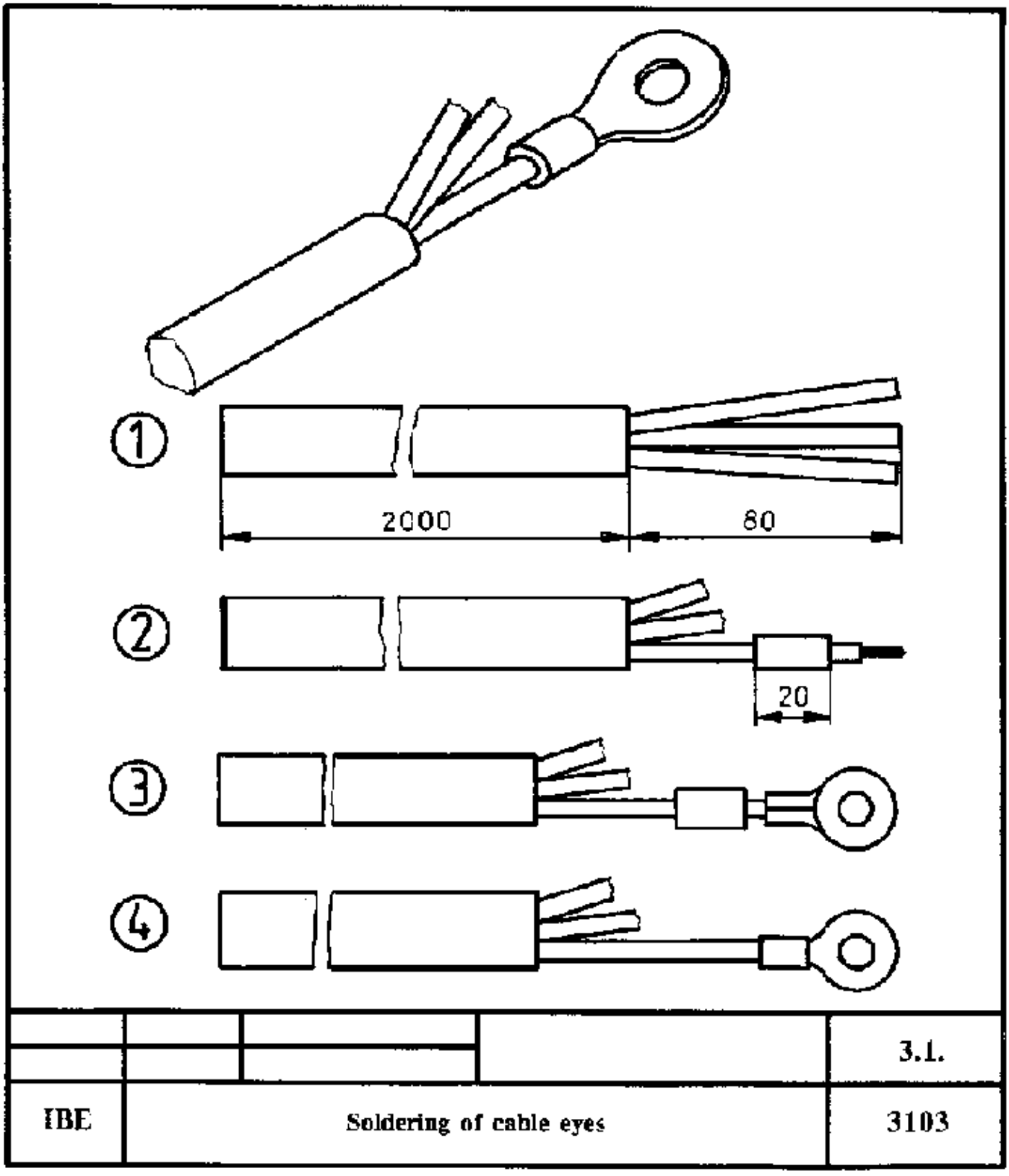
Accessories

Soldering flux, soldering tin

Necessary additional knowledge

Reading of drawings, treatment of cables and lines, measuring

Sequence of operations	Comments
1. Preparation of workplace. Making available the working materials.	Check tools and materials for completeness.
2. Checking of initial lengths.	Cut conductor to length, if necessary.
3. Stripping of conductors.	The stripping length is determined by the length of the cable eye sleeve. (1) Slip flexible insulating tubing on both ends of conductor prior to stripping. Twist stripped wire ends.
4. Bending down of stripped conductor towards insulation.	(2)
5. Feeding conductor in cable eye.	Stripped conductor must lie on base face of cable eye. (3)
6. Alternate pressing down of erect straps of cable eye on conductor by means of flat nose plier or adjusting plier.	(4)
7. Inspection of notched joint.	The conductor must be firmly seated in the cable eye.
8. Slipping flexible insulating tubing over cable eye sleeve.	



Soldering of cable eyes

Instruction Example 3.2. Notching of Cable Eyes and Conductors with Small Cross Section

To practise the manufacture of a permanent joint between a conductor and cable eye by notching.

Material

Flexible plastic–sheathed copper conductor 0.2 mm^2
Length: depending on purpose of use.
Notch–type cable eyes number: 2 off
Flexible insulating tubing length: 10 mm number: 2 off

Working tools

Paint stripper (scraper), flat nose plier or adjusting plier

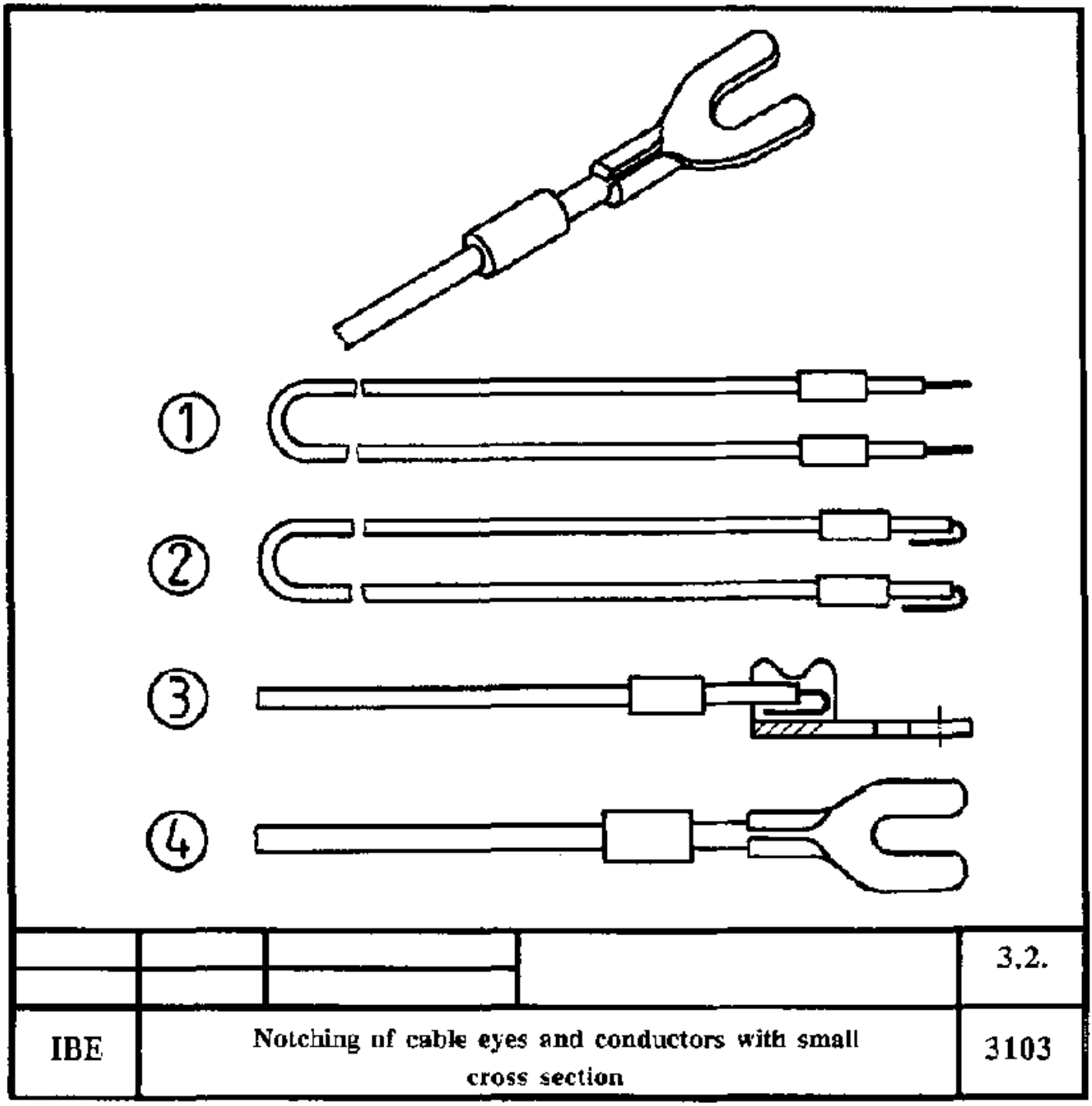
Measuring and testing tools

Folding rule or steel rule

Necessary additional knowledge

Measuring, treatment of cables and lines

Sequence of operations	Comments
1. Preparation of workplace. Making available the working materials.	Check tools and materials for completeness.
2. Checking of initial lengths.	Cut conductor to length, if necessary.
3. Stripping of conductors.	The stripping length is determined by the length of the cable eye sleeve. (1) Slip flexible insulating tubing on both ends of conductor prior to stripping. Twist stripped wire ends.
4. Bending down of stripped conductor towards insulation.	(2)
5. Feeding conductor in cable eye.	Stripped conductor must lie on base face of cable eye. (3)
6. Alternate pressing down of erect straps of cable eye on conductor by means of flat nose plier or adjusting plier.	(4)
7. Inspection of notched joint.	The conductor must be firmly seated in the cable eye.
8. Slipping flexible insulating tubing over cable eye sleeve.	



Notching of cable eyes and conductors with small cross section

Instruction Example 3.3. Notching of Cable Eyes and Conductors with a Cross Section Exceeding 0.75 mm

To practise the manufacture of a permanent joint between a conductor and cable eye by notching.

Material

Flexible plastic–sheated copper conductor 10 mm^2,
Length: depending on purpose of use,
Notch–type cable eyes number: 2 off

Working tools

Cable stripper (cable stripping knife) or stripping tool, wire brush, notching plier with adaptor for 2.5... 10.0 mm^2

Measuring and testing tools

Folding rule or steel rule

Necessary additional knowledge

Measuring, treatment of cables and lines

Sequence of operations	Comments
1. Preparation of workplace. Making available the working materials.	Check tools and materials for completeness.
2. Checking of initial lengths.	Cut conductor to length, if necessary.
3. Stripping of conductors.	The stripping length is determined by the length of the cable eye sleeve plus 1... 3 mm.
4. Cleaning of conductor by means of wire brush.	After cleaning twist wire ends.
5. Feeding conductor into sleeve of cable eye.	The conductor must fill the whole length of the sleeve. If a check hole is available, the conductor is to be fed in up to such hole.
6. Putting the cable eye into the notching plier.	Check position of the cable eye. The notching must be made in the centre of the sleeve.
7. Making the notched joint.	Press down notching plier up to the stop.
8. Inspection of proper execution.	The conductor must by firmly seated in the cable eye.

Instruction Example 3.4. Pressing of Cable Eyes and Multi−wire Conductors

To practise the manufacture of a permanent joint between a conductor and cable eye by pressing.

Material

Aluminium conductor.
Cross section and length depend on purpose of use.
Press−type cable eyes number: 2 off for Al conductors

Working tools

Cable stripper (cable stripping knife), wire brush, tube brush, pressing tool with adaptor for aluminium, flat file, side cutting plier

Measuring and testing tools

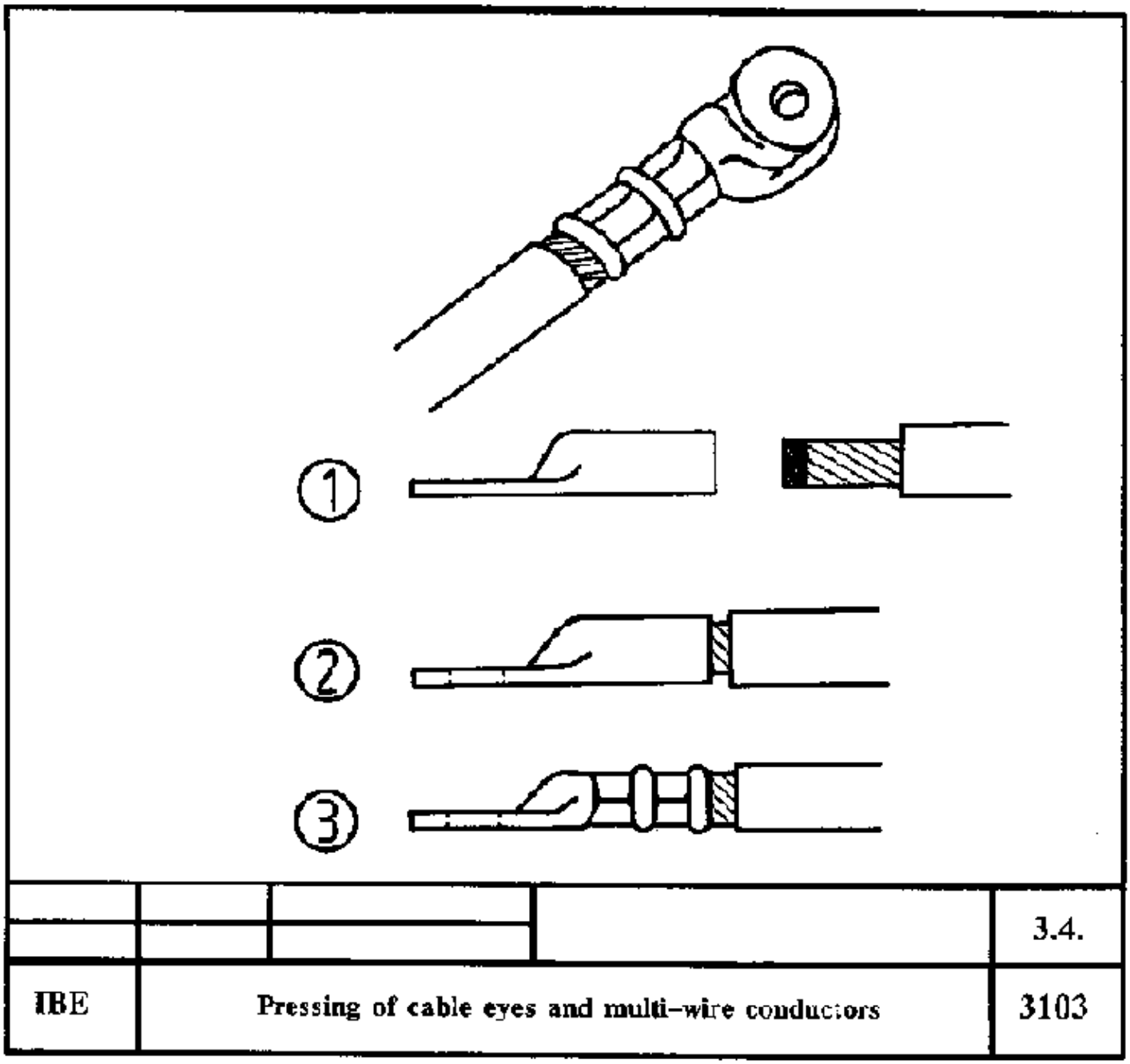
Folding rule or steel rule, reference gauges

Necessary additional knowledge

Measuring, treatment of cables and lines

Sequence of operations	Comments

1. Preparation of workplace. Making available the working materials.	Check tools and materials for completeness.
2. Checking of initial lengths.	Cut conductor to length, if necessary.
3. Stripping of conductors.	The stripping length is determined by the length of the cable eye sleeve plus 1 mm. (1)
4. Cleaning of conductor by means of wire brush.	The time period between cleaning and pressing must not exceed 10 minutes.
5. Cleaning of cable eye sleeve by means of tube brush.	
6. Feeding the conductor into the cable eye sleeve.	If necessary, chamfer the conductor by means of flat file or provide wire collar next to cut point; wire collar is to be removed after feeding in. The conductor must fill the length of the sleeve. (2)
7. Pressing.	The cable eye must lie in the pressing tool with the pressing mark. Start always with the pressing point next to the strap. Press only until the pressing jaws of the tool adaptor are closed. (3)
8. Removal of flash produced by means of side cutting plier or flat file.	
9. Inspection of pressed joint by means of reference gauges.	



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Pressing of cable eyes and multi–wire conductors