BS EN
61210 : 1995

Connecting devices — Flat quick-connect terminations for electrical copper conductors — Safety requirements

The European Standard EN 61210 : 1995 has the status of a British Standard

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee PEL/23 Electrical accessories, upon which the following bodies were represented:

ASTA Certification Services
Association of Control Manufacturers (TACMA (BEAMA Ltd.))
Association of Manufacturers of Domestic Electrical Appliances
British Cable Makers Confederation
British Electrical Systems Association (BEAMA Ltd.)
British Electrotechnical Approvals Board
British Radio and Electronic Equipment Manufacturers' Association
Consumer Policy Committee of BSI
Consumers' Association
Copper Development Association
Department of Trade and Industry (Consumer Safety Unit, CA Division)
ERA Technology Ltd.
Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd.)
Electricity Association
Federation of the Electronics Industry
Industry Council for Electronic Equipment Recycling
Institute of Trading Standards Administration
Institution of Electrical Engineers
Institution of Incorporated Executive Engineers
International Consumer Electronics Association (ICEA)
Lighting Association
Lighting Industry Federation Ltd.
National Inspection Council for Electrical Installation Contracting
National Standards Authority of Ireland
Royal Society for the Prevention of Accidents

The following body was also represented in the drafting of the standard, through subcommittees and panels:

British Gas plc

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on
15 July 1995

The following BSI references relate to the work on this standard:
Committee reference PEL/23
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Contents

National foreword

This British Standard has been prepared by Technical Committee PEL/23 and is the English language version of EN 61210 : 1995 *Connecting devices — Flat quick-connect terminations for electrical copper conductors — Safety requirements*, published by the European Committee for Electrotechnical Standardization (CENELEC). It was derived by CENELEC from IEC 1210 : 1993 published by the International Electrotechnical Commission (IEC).

The CENELEC common modifications have been implemented at the appropriate places in the text and are indicated by a side line in the margin. Parts of the original IEC text that have been modified by CENELEC have been quoted in national annex NA.

The following print types are used in this standard:

- requirements proper; in roman type;
- *test specifications: in italic type;*
- notes: in smaller roman type.

Cross-references

Publication referred to	Corresponding British Standard
EN 60068-1 : 1994	BS 2011 *Environmental testing*
(IEC 68-1 : 1988)	Part 1.1 : 1989 *General and guidance*
IEC 760 : 1989	BS 5057 : 1992 *Specification for flat, quick-connect terminations*

Compliance with a British Standard does not of itself confer immunity from legal obligations.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61210

January 1995

ICS 29.120.30

Descriptors: Electrical equipment, electric conductor, copper, connecting equipment, electric terminal, definition, characteristic, test, dimension, marking

English version

Connecting devices
Flat quick-connect terminations for electrical copper conductors
Safety requirements

(IEC 1210 : 1993, modified)

Dispositifs de connexion
Bornes plates á connexion rapide pour conducteurs électriques en cuivre
Prescriptions de sécurité
(CEI 1210 : 1993, modifiée)

Verbindungsmaterial
Flachsteckverbindungen für elektrische Kupferleiter
Sicherheitsanforderungen
(IEC 1210 : 1993, modifiziert)

This European Standard was approved by CENELEC on 1994-12-06. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

Foreword

The text of the International Standard IEC 1210 : 1993, prepared by SC 23F, Connecting devices, of IEC TC 23, Electrical accessories, together with common modifications prepared by Reporting Secretariat SR 23F, was submitted to the formal vote and was approved by CENELEC as EN 61210 on 1994-12-06.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1995-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1995-12-01

For products which have complied with the relevant national standard before 1995-12-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2000-12-01.

Annexes designated 'normative' are part of the body of the standard. Annexes designated 'informative' are given for information only. In this stanard, annex ZA is normative and annex A is informative. Annex ZA has been added by CENELEC.

CONTENTS

CONNECTING DEVICES – FLAT QUICK-CONNECT TERMINATIONS FOR ELECTRICAL COPPER CONDUCTORS – SAFETY REQUIREMENTS

1 Scope

This International Standard applies to flat quick-connect terminations consisting of a male tab of size 2,8, 4,8, 6,3 or 9,5 mm and a mating female connector for use as either an incorporated or an integrated part of an equipment or of a component, or as a separate entity, for connecting electrical copper conductors according to the manufacturer's instructions.

Said electrical copper conductors may be flexible or rigid stranded, having a cross-sectional area up to and including 6 mm^2 or rigid solid having a cross-sectional area up to and including 2,5 mm^2.

The rated voltage by which electrical energy is utilized, shall not exceed 1 000 V a.c. with a frequency up to and including 1 000 Hz, and 1 500 V d.c. and having the temperature limits applicable to materials used within this standard.

Requirements for insulated male tabs and female connectors are under consideration.

NOTES

1 This standard, where applicable, may be used for conductors made of material other than copper, but not including aluminium.

2 For reasons of safety, it is recommended that flat quick-connect terminations beyond the scope of this standard should not be interchangeable with those of this standard.

3 This standard does not apply to female connectors with positive locking means.

4 The flat quick-connect terminations covered by this standard are not intended to be disconnected by pulling the cable.

This standard does not apply to flat quick-connect terminations for data and signal circuits.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 68-1: 1988, *Environmental testing – Part 1: General and guidance*

IEC 760: 1989, *Flat, quick-connect terminations*

ISO 1456: 1988, *Metallic coatings – Electrodeposited coatings of nickel plus chromium and of copper plus nickel plus chromium*

ISO 2081: 1986, *Metallic coatings – Electroplated coatings of zinc on iron or steel*

ISO 2093: 1986, *Electroplated coatings of tin – Specification and test methods*

3 Definitions

For the purpose of this International Standard the following definitions apply:

3.1 flat quick-connect termination: Electrical connection consisting of a male tab and a female connector which can be inserted and withdrawn with or without the use of a tool.

3.2 male tab: That portion of a quick-connect termination which receives the female connector.

3.3 male test tab: Male tab manufactured to close tolerances with specific material without coating for the purpose of conducting mechanical tests on female connectors taken from the production line.

NOTE - In most cases a male tab from the production line (with or without coating) may be also suitable.

3.4 female connector: That portion of a quick-connect termination which is pushed onto the male tab.

3.5 detent: Dimple (depression) or hole in the male tab which engages a raised portion on the female connector to provide a latch for the mating parts.

3.6 maximum permissible temperature (maximum service temperature): Highest temperature which the quick-connect termination is allowed to attain in normal use as a result of ambient temperature, induced heat and heat caused by the connector itself.

4 General

Flat quick-connect terminations shall be so designed and constructed that in normal use their performance is reliable and without danger to the user or surroundings.

Compliance is checked by carrying out all tests specified.

5 General requirements for tests

5.1 Tests according to this standard are type tests.

5.2 Unless otherwise specified, the samples are tested as delivered and connected as for normal use, at an ambient temperature of (20 ± 5) °C.

In case of doubt, (for example between test laboratories, or between manufacturer and test laboratory) IEC 68-1 applies.

5.3 If samples are not delivered with conductors already assembled, the conductors shall be connected to the associated parts in accordance with the manufacturer's instructions and using an appropriate tool.

5.4 The tests are carried out on each set in the sequence as specified in table 1, according to the most onerous combination of the tab and the female connector as declared and documented in item 5 of 7.2.

Table 1 – Test sequences and sets of samples

Sets	Number of new samples per set		Clauses and subclauses	Test sequence
	Tabs	Female connectors		
A	12 (6 double ended tabs)	24	8.2 9.3 9.4 9.5	Measurement of dimensions Temperature-rise test Electrical overload test Elevated temperature test
B	10 (male test tabs)	10	8.2 9.1 9.6	Measurement of dimensions Insertion and withdrawal force Tensile strength test for crimped connections
C (in-line tabs)	10		8.2 9.6	Measurement of dimensions Tensile strength test for crimped connections
D (integral tabs and female connectors)	12	12	8.2 9.2	Measurement of dimensions Mechanical overload force
E (integral female connectors)	12 (male test tabs)	12	8.2 9.1 9.2	Measurement of dimensions Insertion/withdrawal force Mechanical overload force

Set A These tests have to confirm the electrical performance of the female connectors.

Set B These tests have to confirm the mechanical performance of the female connectors.

Set B + C The Tensile Strength Test has to confirm the lack of undue heat emission by the crimp connection of the tabs.

Set D + E These tests only apply to devices with incorporated and integrated tabs or female connectors. The tests have to confirm the dimensional and mechanical requirements of tabs and female connectors forming part of a device.

The necessary further requirements (i.e. the admissible max. temperatures, nominal current) have to be specified in the device standard.

6 Main characteristics

6.1 Flat quick-connect terminations are classified into groups according to the nominal width of the male tabs.

This standard covers the following groups:

- 2,8 mm series;
- 4,8 mm series;
- 6,3 mm series;
- 9,5 mm series.

The male tab and female connector dimensions shall be as indicated in tables 10-1 and 10-2 and in figures 1, 2, 3, 4 and 5.

NOTE - The shapes of the various parts may deviate from those given in the figures, provided that the specified dimensions are not influenced and the test requirements are complied with, for example: corrugated tabs, folded tabs, etc.

6.2 The preferred conductor cross-sectional areas shall be: 0,5, 0,75, 1,0, 1,5, 2,5, 4,0 and 6,0 mm^2.

6.3 Preferred relationship between the cross-sectional area of the connected conductors and the nominal width of male tabs are given in table 3.

Table 3 – Relationships between conductors and tabs

Cross-sectional area mm^2	Nominal width of male tabs	
	mm	
0,5	2,8/4,8/6,3	
0,75	2,8/4,8/6,3	
1,0	2,8/4,8/6,3	
1,5	4,8/6,3	
2,5	4,8/6,3	
4,0	6,3/9,5	
6,0	6,3/9,5	

7 Marking and Information

The manufacturer of male tabs and/or female connectors supplied separately and the manufacturer of the component with integral tabs and/or female connectors shall provide adequate information to ensure that the flat quick-connect termination can be applied in the intended manner and that the testing authority can perform the relevant tests in accordance with this standard.

7.1 This information shall be provided in the following ways, as detailed in 7.2:

- by marking (Ma)

The information shall be provided by marking clearly and indelibly on the male tab and on the female connector.

NOTE - In the case of integral tabs (e.g in switches for appliances) the marking can be positioned on the switch itself.

- by documentation (Do)

The information shall be provided by a separate document, which may consist of a leaflet, label or a specification sheet, supplied with the smallest package unit or separately supplied. The content of the document shall be available to the end user or to the component or equipment manufacturer and to the testing authority as appropriate, in any suitable format. The format in which this information is presented is not within the scope of this standard.

- by declaration (De)

This information shall be provided to the testing authority for the purpose of testing and in a manner agreed between the testing authority and the manufacturer.

In the case of a male tab or female connector which is an integral part of the equipment or of a component, the information is obtained by measurement or inspection (see note 1).

7.2 The minimum information required is to be supplied by the methods indicated in 7.1.

a) Manufacturer's name or trade mark ..... Ma

b) Type reference ..... Do (see note 2)

c) Nominal series ..... Do (see note 2)

d) Maximum permissible temperature if higher than 85 °C ..... Do

e) The most onerous combination of the tab and the female connector ..... Do, De

f) Type and size(s) of conductor(s) for which that part of the termination is suitable ..... Do

Warning

The insulation of the cable and of the contact-carrying plastic parts shall be compatible with the declared maximum permissible temperature.

g) The recommended method of attaching the conductor to the termination (i.e. tool, stripping length, any special preparation, etc.) ..... Do

h) The material(s) and type of plating ..... De

NOTES

1 The information for integrated tabs or female connectors may be given together with the equipment or component.

2 For this information an appropriate code may be used.

8 Constructional requirements

8.1 Male tabs and female connectors shall be of a metal having mechanical strength, electrical conductivity and resistance to corrosion adequate for their intended use.

Compliance is checked by inspection, by the tests of 9.1 to 9.6 and, if necessary, by chemical analysis.

Examples of suitable metals, when used within the permissible temperature range and under standard atmospheric conditions are:

- copper (for tabs only);
- an alloy containing at least 58 % copper for parts made from rolled sheet (in cold condition) or at least 50 % copper for other parts;
- stainless steel containing at least 13 % chromium and not more than 0,09 % carbon, for tabs only;
- steel provided with an electroplated coating of zinc (for earthing conductors only), according to ISO Standard 2081;
- steel provided with an electroplated coating of nickel, according to ISO Standard 1456;
- steel provided with an electroplated coating of tin, according to ISO Standard 2093.

NOTE - The choice of material and coating is left to the relevant product committees who should consider the pollution conditions occurring in the equipment or component where the flat quick-connect termination is mounted.

8.2 The dimensions of male tabs shall comply with those specified in tables 10-1 and 10-2 and figures 1, 2, 3 and 4 where the dimensions A, B, C, D, E, F, J, M, N and Q are mandatory.

The dimensions of female connectors shall comply with those specified in figure 5, where L2, B3 and 1,5 mm maximum are mandatory.

Compliance is checked by inspection and measurement.

8.3 Male tabs and female connectors shall be so designed and constructed as to allow the correct insertion and withdrawal of either the female connector or the tab without damage or loosening of other components.

Compliance is checked by the insertion and withdrawal force test of 9.1.

8.4 Male tabs and female connectors integral with equipment or components shall be securely retained.

Compliance is checked by the mechanical overload force test of 9.2.

8.5 Examples of maximum permissible temperatures of male tabs and female connectors, depending on materials and/or coating, are given as a guide in annex A.

8.6 Male tabs and female connectors shall be so designed and constructed that the temperature rise in normal use does not reach values likely to impair their further use.

Compliance is checked by the temperature-rise test of 9.3.

8.7 Male tabs and female connectors shall be so designed and constructed that in normal use their electrical performances are reliable and their further use is not impaired.

Compliance is checked by the electrical overload test of 9.4.

8.8 Male tabs and female connectors having a maximum permissible temperature higher than 85 °C shall be so designed and constructed that in normal use their electrical performances are reliable and their further use is not impaired.

Compliance is checked by the elevated temperature test of 9.5.

8.9 Crimped connections shall be such that they withstand the mechanical stresses likely to occur in normal use.

Compliance is checked by the tensile strength test of 9.6.

8.10 Male tabs and female connectors shall be so designed and constructed that any disturbance to solid conductors does not affect the crimped connection and their further use is not impaired.

Tests are under consideration.

9 Tests

9.1 Insertion and withdrawal force

Ten male tabs and ten female connectors are required. The male tabs shall be special male test tabs manufactured to close tolerances for the specific purpose of conducting this test.

Male test tabs shall be of half-hard brass, having a hardness of (62 ± 7) HR30T and shall conform to figures 1, 2, 3 and 4 and tables 10-1 and 10-2, except that the C dimension tolerance shall be as indicated in table 4 and any raised plateau around the detent shall be limited to a total of 0,025 mm over the stock thickness (see figure 1).

The male test tabs shall not be coated.

NOTE - In most cases a male tab from the production line may also be suitable.

Table 4 – Tolerances of test tab thickness

Nominal test tab thickness	C dimension maximum and minimum values of thickness
0,5 mm	0,516 mm 0,500 mm
0,8 mm	0,820 mm 0,805 mm
1,2 mm	1,201 mm 1,186 mm

A new male test tab shall be used for each female connector tested. For each combination of male tab and female connector, the tab shall be slowly and steadily inserted and withdrawn six times at a rate of travel of approximately 1 mm/s.

Insertion and withdrawal force measurements shall be made with any suitable testing device providing accurate alignment and being capable of holding the reading. An example of a suitable device is shown in appendix A of IEC 760.

Compliance is checked as follows:

The insertion and withdrawal forces shall be within the limits as specified in table 5.

Table 5 – Insertion and withdrawal forces

Size	Insertion force		Sixth withdrawal force	
	Maximum		Minimum	
	N		N	
2,8 mm (0,110 in)	53		5	
4,8 mm (0,187 in)	67		9	
6,3 mm (0,250 in)	80		18	
9,5 mm (0,375 in)	100		20	

9.2 Mechanical overload force (for integral tabs or female connectors)

An axial force, equal to that shown in the following table 6, is applied smoothly once only with a suitable test apparatus. No damage which could impair further use shall occur to the tab or to the female connector or to the equipment in which the tab is integrated.

Compliance is checked by inspection.

Table 6 – Retention force

Size	Retention force			
	Push		Pull	
	N		N	
2,8 mm (0,110 in)	64		58	
4,8 mm (0,187 in)	80		98*	
6,3 mm (0,250 in)	96		88	
9,5 mm (0,375 in)	120		110	

* This is higher than that of the next larger size, due to the existing design.

The relevant product committee may consider increasing these values to allow a safety margin in the construction of the flat quick-connect termination.

9.3 Temperature rise

The temperature-rise test shall be conducted using male tabs and female connectors of the same size connected to conductors of the type and of the smallest and largest cross-sectional area specified by the manufacturer.

Female connectors are tested with the largest conductors only.

For checking performances of female connectors, double-end male tabs shall be taken from the production line.

The tab material shall be:

- *uncoated half-hard brass having a hardness of (62 ± 7) HR30T for female connectors made from copper alloy (coated or bare);*
- *nickel coated steel for female connectors made of nickel coated steel or stainless steel.*

The tests shall be carried out with male tabs and female connectors as delivered. In no case shall the test samples be cleaned or otherwise prepared prior to test, unless explicitly required by the documentation.

Crimp terminations shall be crimped onto the associated conductors within one hour after the removal of the insulation with a crimping tool which has been adjusted in accordance with the manufacturer's instructions.

Twelve test samples are required for each tab size and each conductor size. All test samples are subjected to visual examination and dimensional measurement prior to connecting the conductor.

Test samples shall be connected on each end of 178 mm length of uncoated insulated copper conductors. The insulation of the conductor shall be as specified by the quick-connect termination manufacturer.

The test samples shall be fitted with fine wire thermocouples placed in such a way as not to influence the contact or the connection area of the test sample. An example of placement is shown in figure 7.

During the test, the samples shall be arranged and connected as shown in figures 6, 7 and 8.

The test current as specified in table 7 is passed through the samples until thermal equilibrium has been established. The temperature of the samples and the ambient temperature are measured and recorded.

Compliance is checked as follows:

The temperature rise of any individual connection is calculated as follows and shall not exceed 30 K.

Temperature rise = the difference between the connection temperature and the ambient temperature.

Table 7 – Test current for temperature rise test

mm^2	0,5	0,75	1	1,5	2,5	4	6
Test current A	4	5,5	7,5	12	15	18	20

9.4 Current loading, cyclic

The test shall be carried out on the samples already subjected to the temperature-rise test of 9.3.

Cross-sectional areas, insulation of conductors and the test arrangement shall be as for 9.3. The twelve samples are subjected to 500 cycles. Each cycle consists of 45 min under the overload test current as specified in table 8 and 15 min without current.

Table 8 – Overload test current for current loading, cyclic

mm^2	0,5	0,75	1	1,5	2,5	4	6
Test current A	8	11	15	24	30	36	40

Compliance is checked as follows:

The temperature rise $\Delta t1$ of any individual connection is measured after the 24th cycle and the temperature rise $\Delta t2$ of any individual connection is measured after the 500th cycle. The $\Delta t2$ value shall not exceed by 15 K the $\Delta t1$ value and neither rise shall exceed 85 K.

9.5 Elevated temperature test

The test shall be carried out in a heating cabinet at the declared maximum permissible temperature, decreased by 45 K, on samples having a maximum permissible temperature higher than 85 °C and already submitted to the tests of 9.3 and 9.4.

Cross-sectional areas, insulation of conductors and the test arrangement shall be as specified in 9.3.

Care shall be taken not to disturb the samples, the conductors or the test arrangement when placing them in the heating cabinet.

The samples are subjected to eight cycles of elevated temperature. Each cycle consists of 23 h applying the test current as specified in table 7 and 1 h without current. After the first hour the temperature of the heating cabinet is adjusted, if necessary, until the maximum permissible temperature is achieved.

The compliance is checked as follows:

After the last heating cycle samples are allowed to cool down to ambient temperature. The temperature-rise test of 9.3 is then repeated and the temperature rise for the test current shall not exceed 45 K.

9.6 Tensile strength test for crimped connections

The test shall be carried out on 10 new samples.

The crimping tool and the type of conductor shall be according to the manufacturer's instructions.

All declared cross-sectional areas of conductors shall be tested.

When an interconnection of two or more conductors is declared, each conductor shall be tested individually in turn and in accordance with the pull force value of its cross-sectional area.

The pull force as specified in table 9 shall be applied for 1 min without jerks, or applied with a tensile machine with the head travelling at a speed of between 25 mm and 50 mm per min.

Table 9 – Pull force for testing the crimped connection

mm^2	0,5	0,75	1	1,5	2,5	4	6
Pull force N	56	84	108	150	230	310	360

Compliance is checked as follows:

The force required to separate the crimping area from its attached conductor shall not be less than the pull force of table 9.

NOTES

1 For the purpose of this test, if the flat quick-connect termination has a conductor insulation support, it is first rendered mechanically ineffective.

2 Tensile strength values for other methods of connection of the conductor are under consideration.

3 For conductor connection means other than crimping, a special test may be agreed upon between manufacturers and testing stations.

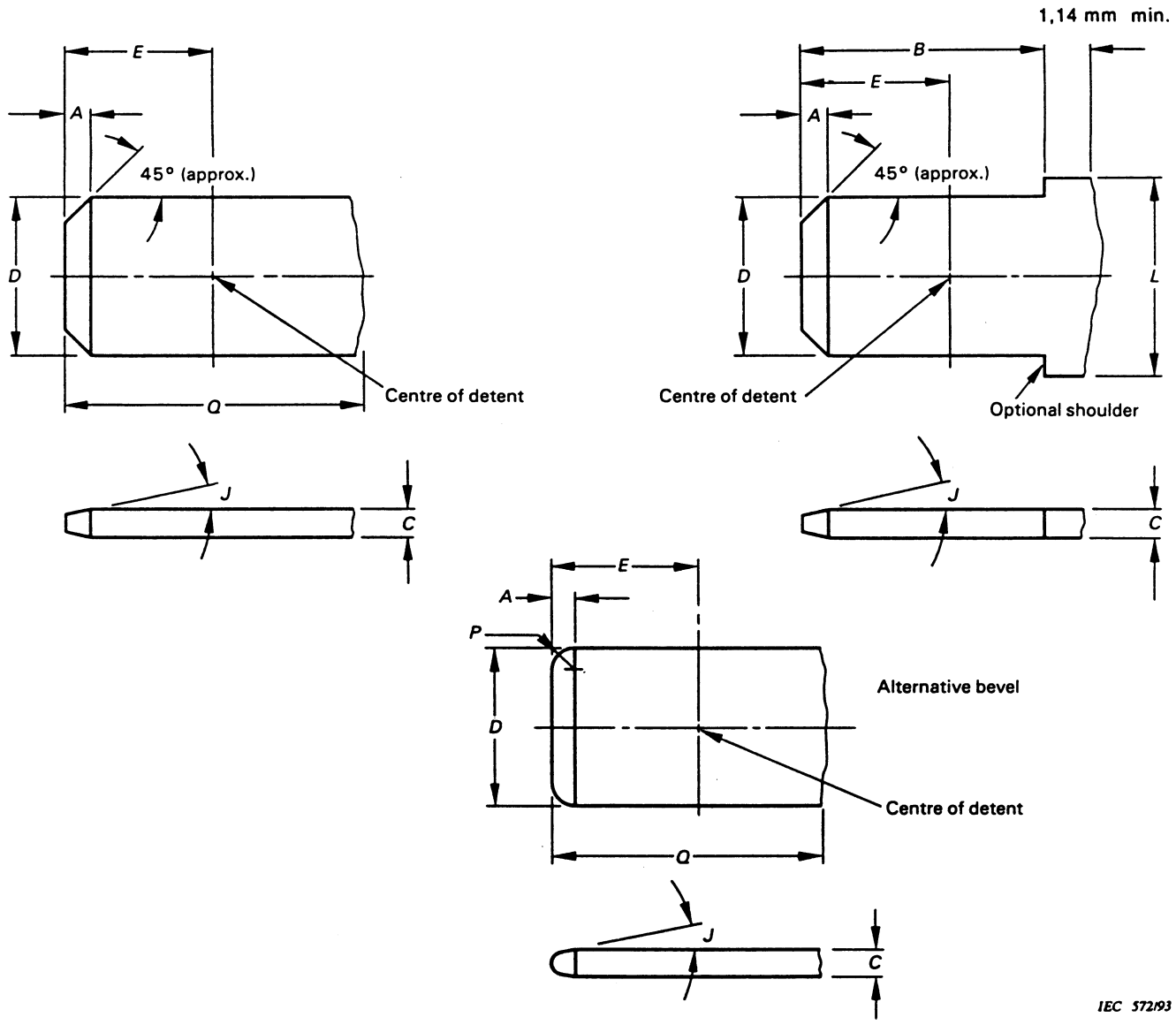
Tableau 10-1 – Dimensions des languettes en millimètres
Table 10-1 – Dimensions of tabs in millimetres

Dimensions nominales Nominal size		A	B min	C	D	E	F	J	M	N	P	Q min
2,8 x 0,5	empreinte dimple	0,6 0,3	7,0	0,54 0,47	2,90 2,70	1,8 1,3	1,3 1,1	12° 8°	1,7 1,4	1,4 1,0	1,4 0,3	8,1
	trou hole	0,6 0,3	7,0	0,54 0,47	2,90 2,70	1,8 1,3	1,3 1,1	12° 8°			1,4 0,3	8,1
2,8 x 0,8	empreinte dimple	0,6 0,3	7,0	0,84 0,77	2,90 2,70	1,8 1,3	1,3 1,1	12° 8°	1,7 1,4	1,4 1,0	1,4 0,3	8,1
	trou hole	0,6 0,3	7,0	0,84 0,77	2,90 2,70	1,8 1,3	1,3 1,1	12° 8°			1,4 0,3	8,1
4,8 x 0,5	empreinte dimple	0,9 0,6	6,2	0,54 0,47	4,80 4,60	2,8 2,3	1,5 1,3	12° 8°	1,7 1,4	1,5 1,2	1,7 0,6	7,3
	trou hole	0,9 0,6	6,2	0,54 0,47	4,90 4,67	3,4 3,0	1,5 1,3	12° 8°			1,7 0,6	7,3
4,8 x 0,8	empreinte dimple	1,0 0,7	6,2	0,84 0,77	4,80 4,60	2,8 2,3	1,5 1,3	12° 8°	1,7 1,4	1,5 1,2	1,8 0,7	7,3
	trou hole	1,0 0,6	6,2	0,84 0,77	4,90 4,67	3,4 3,0	1,5 1,3	12° 8°			1,8 0,7	7,3
6,3 x 0,8	empreinte dimple	1,0 0,7	7,8	0,84 0,77	6,40 6,20	4,1 3,6	2,0 1,6	12° 8°	2,5 2,2	2,0 1,8	1,8 0,7	8,9
	trou hole	1,0 0,5	7,8	0,84 0,77	6,40 6,20	4,7 4,3	2,0 1,6	12° 8°			1,8 0,7	8,9
9,5 x 1,2	trou hole	1,3 0,7	12,0	1,23 1,17	9,60 9,40	5,5 4,5	2,0 1,7	14° 6°			2,0 1,0	13,1

NOTES

1 Les dimensions de ce tableau sont en accord avec le document 48B(Sec)210/230.
Dimensions of this table comply with document 48B(Sec)210/230.

2 La soudure des fils sur la languette et les modifications dimensionnelles correspondantes, si nécessaire, sont à l'étude.
The soldering of wires to the tab and the relevant dimensional modifications, if necessary, are under consideration.



NOTES

1 **Bevel *A* of 45° need not be a straight line if it is within the confines shown.**

2 **Dimension *L* is not specified and may vary by the application (e.g. fixing).**

3 **Dimension *C* of tabs may be produced from more than one layer of material provided that the resulting tab complies in all respects with the requirements of this standard.**

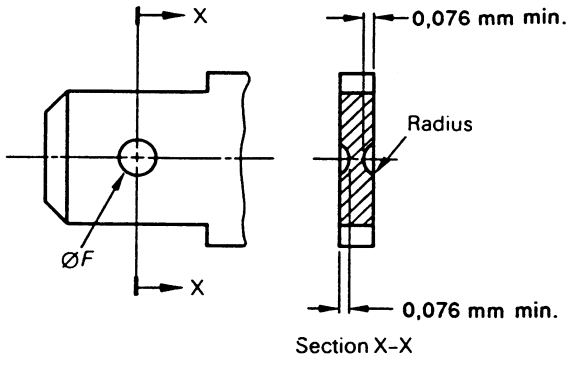
A radius on the longitudinal edge of the tab is permissible.

4 **The sketches are not intended to govern the design except with regard to the dimensions shown.**

5 Thickness *C* of the male tab may vary beyond *Q* or beyond *B* + 1,14 mm.

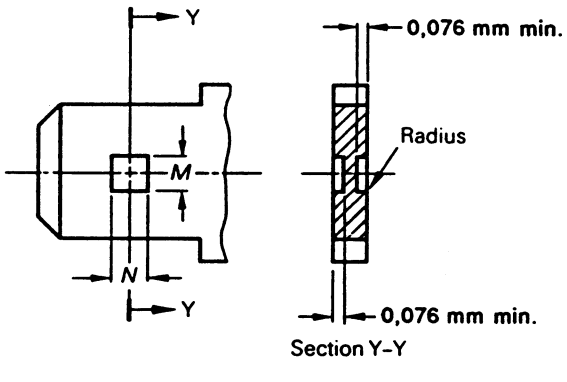
6 All portions of the tabs shall be flat and free of burrs or raised plateaux, except that there may be a raised plateau over the stock thickness of 0,025 mm per side, in an area defined by a line surrounding the detent and distant from it by 1,3 mm.

Figure 1 – Dimensions of male tabs



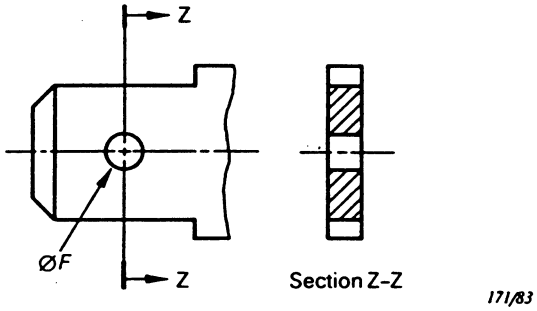
Detent shall be located within 0,076 mm of the centre-line of the tab.

Figure 2 – Dimensions of round dimple detents (see figure 1)



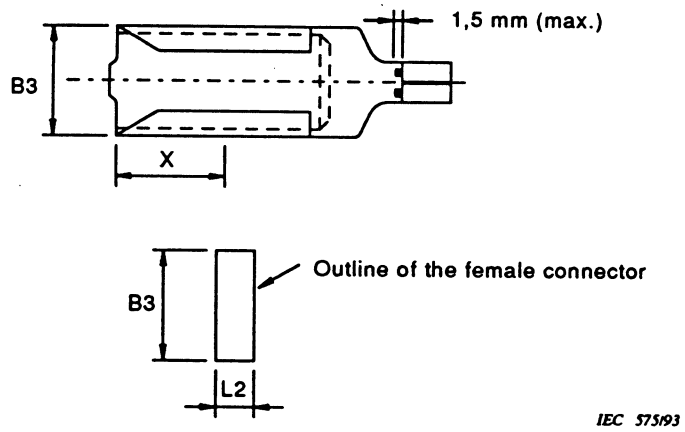
Detent shall be located within 0,13 mm of the centre-line of the tab.

Figure 3 – Dimensions of rectangular dimple detents (see figure 1)



Detent shall be located within 0,076 mm of the centre-line of the tab.

Figure 4 – Dimensions of hole detents



B3 and L2 mandatory

NOTES

1 For determining female connector dimensions varying from B3 and L2 it is necessary to refer to the tab dimensions in order to ensure that in the most onerous conditions the engagement (and detent if fitted) between tab and female connector is correct.

2 If a detent is provided, the dimension X is at the manufacturer's discretion in order to meet the requirements of the performance clauses.

3 Female connectors shall be so designed that undue insertion of the conductor into the crimping area is visible or prevented by a stop in order to avoid any interference between the conductor and a fully inserted tab.

4 The sketches are not intended to govern the design except as regards the dimensions shown.

Figure 5 – Dimensions of female connectors

Table 11 – Dimensions of female connectors

Tab size	mm			
	B3 max.	L2 max.		
2,8 x 0,5	3,8	2,3		
2,8 x 0,8	3,8	2,3		
4,8 x 0,5	6,2	2,9		
4,8 x 0,8	6,2	2,9		
6,3 x 0,8	7,8	3,5		
9,5 x 1,2	11,1	4,0		

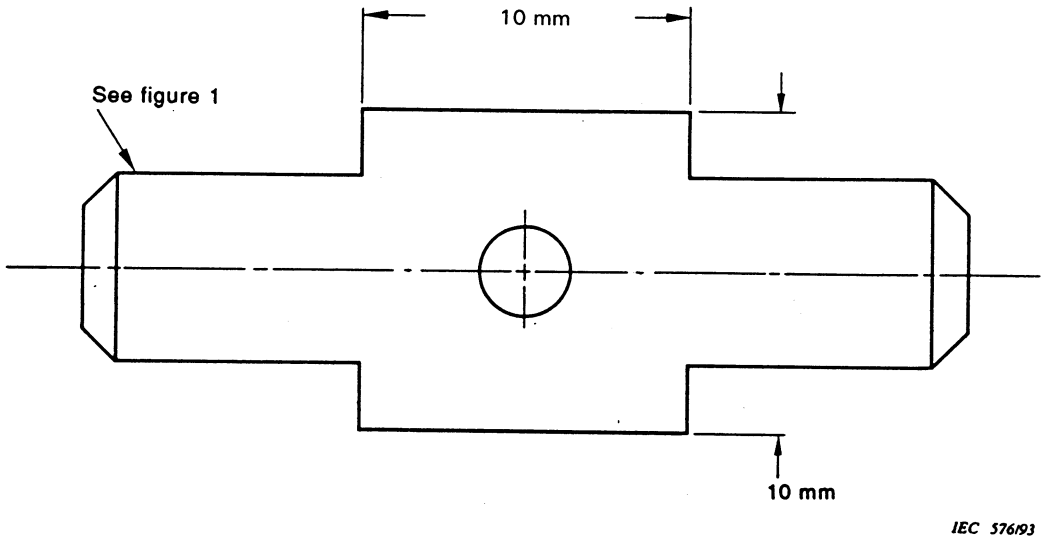


Figure 6 – Double-end tab

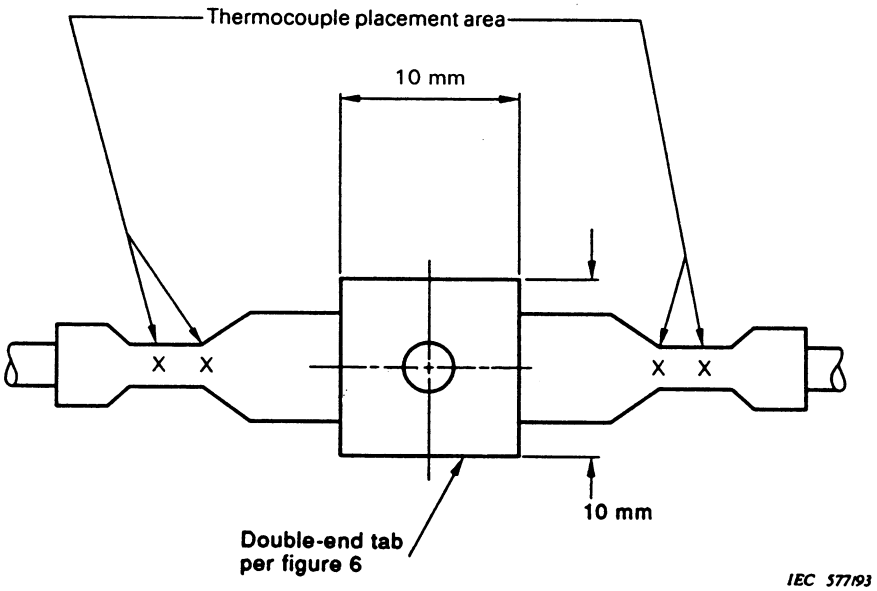


Figure 7 – Location of thermocouples

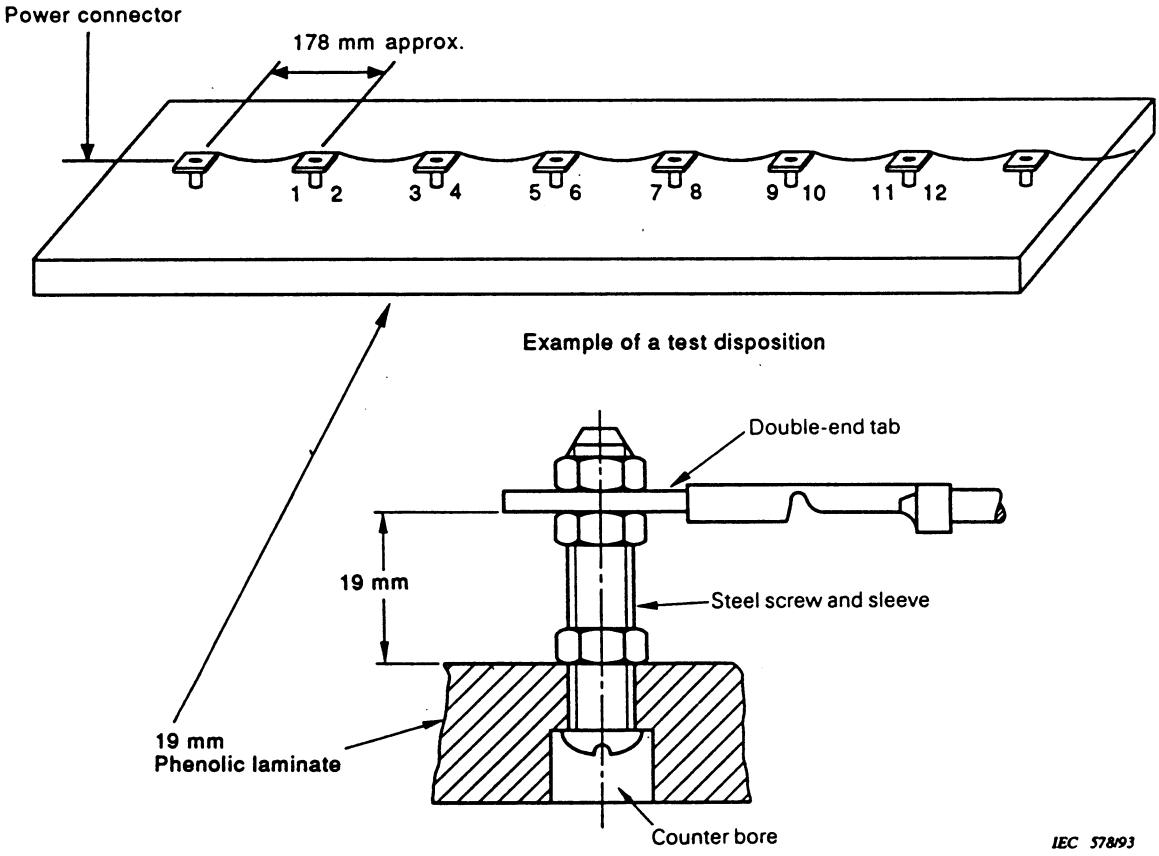


Figure 8 – Connections for electrical tests

Annex A
(normative)

Maximum permissible temperature (maximum service temperature)

Materials and coating	Tabs		Female connectors
	Integrated [1] °C	In-line [2] °C	°C
Bare brass [6]	210	145	110
Brass, tin coated	-	-	120
Bare tin-bronze [7]	-	-	120
Tin-bronze tin coated	-	-	130
Tin-bronze silver coated	-	-	150
Bare copper	155	-	-
Tin coated copper alloys and copper	160 [3]	160 [3]	150
Nickel coated copper alloys and copper	185	-	-
Silver coated copper alloys and copper	205	-	150
Steel, zinc coated	-	Only for earthing [4]	-
Steel, nickel-coated	400	-	300 [5]
Stainless steel	400	-	-

Other materials or coating may be used, provided the electrical and mechanical properties are not less reliable, particularly with regard to resistance to corrosion and to mechanical strength.

NOTES
1) Male tab integrated with the equipment
2) Tab crimped onto the conductor
3) Temperature not higher than 160°C because tin can melt at higher temperatures
4) Tabs as part of the frame or enclosure of equipment
5) May be used at 400°C for a limited period
6) Brass : . (range of composition to be defined)
7) Bronze : (range of composition to be defined)

NOTE - The temperature rise in normal use of flat quick-connect terminations designed and constructed under the guidance of this annex shall not make the temperature of their adjacent devices exceed their maximum permissible temperature.

Annex ZA (normative)

Other international publications quoted in this standard with the references of the relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publications referred to applies.

NOTE. When the international publication has been modified by CENELEC common modifications, indicated by (mod), the relevant EN/HD applies.

IEC publication	Date	Title	EN/HD	Date
68-1	1988	*Environmental testing — Part 1: General and guidance*	EN 60068-1*	1994
760	1989	*Flat, quick-connect terminations*	—	—

Other publications

ISO 1456 : 1988	*Metallic coatings — Electrodeposited coatings of nickel plus chromium and of copper pluc nickel plus chromium*
ISO 2081 : 1986	*Metallic coatings — Electroplated coatings of zinc on iron or steel*
ISO 2093 : 1986	*Electroplated coatings of tin — Specification and test methods*

* EN 60068-1 includes the corrigendum October 1988 and A1 : 1992 to IEC 68-1.

National annex NA (informative)

Original IEC text amended by CENELEC common modifications

General

All dimensions in inches, forces in lbf and conductor sizes in AWG are deleted.

Annex A

The original annex A read as follows.

Annex A
(informative)

Maximum permissible temperature (maximum service temperature)

Materials and coating		Maximum permissible temperature °C		
Tabs	Female connectors	Tabs		Female connectors
		Integrated 1)	In-line 2)	2)
Bare copper		155	–	–
Bare brass	Bare brass	210	145	145
Tin coated copper alloys and copper	Tin coated copper alloys	160 3)	160 3)	160 3)
Nickel coated copper alloys and copper		185	–	–
Silver coated copper alloys and copper	Silver coated copper alloys	205	–	205
Zinc coated steel		Only for earthing 4)	–	–
Nickel coated steel	Nickel coated steel	400	–	400
Stainless steel		400	–	400

Other materials or coatings may be used, provided the electrical and mechanical properties are not less reliable, particularly with regard to resistance to corrosion and to mechanical strength.

NOTES

1) Male tab integrated with the equipment.

2) Tab crimped onto the conductor.

3) Temperature not higher than 160 °C because tin can melt at higher temperatures.

4) Tabs as part of the frame or enclosure of equipment.

NOTE - The temperature rise in normal use of flat quick-connect terminations designed and constructed under the guidance of this annex shall not make the temperature of their adjacent devices exceed their maximum permissible temperature.

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List of references

See national foreword.

BS EN
61210 : 1995

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