
British Standard Specification for
**1.9/3.3 kV, 300 A bolted flameproof cable couplers
and adaptors (including 380/660 V and 640/1100 V,
300 A adaptors), primarily for use in mines**

Connecteurs de câbles boulonnés antidéflagrants 1,9/3,3 kV, sorties de câbles
300 A et raccords y compris 380/660 V et raccords 640/1100 V, pour
applications essentiellement minières — Spécifications

Nicht entflammbare 1,9/3,3 kV, 300 A-Kabelmuffen und -Adapter, einschließlich
380/660 V und 640/1100 V-Adapter, hauptsächlich zum Einsatz in Bergwerken

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Foreword

This revision of this British Standard, prepared under the direction of the Mining and Quarrying Requisites Standards Committee, was devised to rationalize the principal features of 1.9/3.3 kV, 300 A bolted flameproof cable couplers and associated adaptors designed primarily for equipment used in mines. The standard has been extended to make provision for special adaptors designed for operation on system voltages up to and including 3.3 kV. This revision provides the metric versions of the equipment specified in the 1962 edition of BS 3454, which is withdrawn, and additionally makes provision for special purpose items such as live line indicators.

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

drawn to the Health and Safety at Work etc. Act 1974, the Factories Act 1961, the Mines and Quarries Act 1954, the Regulations made under these Acts, and also any other appropriate statutory requirements or byelaws. These place responsibility for complying with certain specific safety requirements on the manufacturer and the user. The address of the recognized certification authority in the UK for Group 1 (coal mining) apparatus for flame-proof purposes is as follows:

Health and Safety Executive
HSE (M) Certification Service
Harpur Hill
Buxton
Derbyshire SK17 9JN

British Standard Specification for

1.9/3.3 kV, 300 A bolted flameproof cable couplers and adaptors (including 380/660 V and 640/1100 V, 300 A adaptors), primarily for use in mines

1. Scope

This British Standard specifies requirements for 300 A bolted flameproof cable couplers and adaptors of semi-screened 3-phase or 3-phase plus centre pilot tube with the following voltage ratings: 1.9/3.3 kV; 380/660 V and 640/1100 V. The couplers are designed to enable two cables to be coupled together or to enable a cable to be coupled to apparatus by use of adaptors, in both cases the electrical connections being made by separate connecting pins. Provision is also made for insulated end covers. The use of other forms of intermediate box, with coupling arrangements as specified in this standard, are not precluded provided that all other relevant requirements of this standard are met.

The semi-screened cable couplers are primarily intended for use with 3- or 4-core wire armoured cables (where the fourth conductor is earthed). The cable couplers incorporating a centre pilot are primarily intended for use with 3-core wire armoured cables having additional pilot cores.

Couplers and adaptors complying with this standard are not intended to be coupled or uncoupled while the circuit is energized. The dimensions necessary to provide for the connection of enclosures of different manufacture and some electrical and mechanical requirements are specified. This standard does not, however, purport to specify a fully detailed design.

Information to be supplied by the purchaser with his enquiry or order is given in appendix A.

NOTE. The titles of the publications referred to in this standard are listed on the inside back cover.

2. Definitions

For the purposes of this British Standard the following definitions apply.

2.1 cable coupling unit (flit plug). A detachable cable sealing box utilizing contact tubes and pins to facilitate ready connection to, or disconnection from, a similar unit or other apparatus.

2.2 bolted flameproof cable coupler. Two cable coupling units together with contact pins and a sealing ring, that, when bolted together to form a straight-through connecting box, complies with the relevant requirements of BS 4683 : Part 2.

2.3 cable gland. A device designed to secure the end of the cable to the cable sealing box, by means appropriate to the type of cable, including provision for making electrical connection to the armouring and lead sheath of the cable, where applicable.

2.4 cable sealing box. A device designed to receive and protect the end of the cable, with provision for sealing the

conductors and the insulating material of the cable with filling medium and having a cable gland for attaching the cable to the box, together with any terminals provided for connection to the conductors of the cable within the box. The box may form part of, or be detachable from, the apparatus with which it is associated.

2.5 adaptor. A device used to connect either a cable coupling unit or other types of cable terminations to apparatus. If used to connect a cable coupling unit, it may either be separate from or be integral with the enclosure of the apparatus.

2.6 intermediate box. A box that can be inserted between two cable coupling units or between a cable coupling unit and an adaptor, to perform a specific function, e.g. live line indication or metering.

2.7 insulated end cover. A metal cover, suitably insulated, that, when bolted to the coupling face of a cable coupling unit or adaptor (with a sealing ring interposed), completes the flameproof enclosure of the cable coupling unit or adaptor and enables full working voltage to be applied.

2.8 filling medium. A bituminous-based compound or cast resin that is suitable for the electrical stresses imposed in service and will prevent the ingress of moisture.

NOTE. For the purpose of certification in the UK, where other than bitumen-based compounds are used as a filling medium, the acceptance procedure will be administered by the Health and Safety Executive.

3. Design and construction

3.1 Temperature rise. The temperature rise of the cable coupling unit shall comply with 6.6.

3.2 Flameproof enclosure. All enclosures and insulated end covers used with couplers or adaptors shall be of a type that has been manufactured in accordance with BS 4683 : Part 2.

The external components shall either be of a corrosion resistant ferrous alloy or of non-ferrous metal except aluminium, magnesium or titanium, or any alloy containing aluminium and/or magnesium and/or titanium unless the total content of these three constituents does not exceed 15 % by mass and in which the content of magnesium and titanium together does not exceed 6 % by mass. No component part shall be painted or coated with preparations containing, in metallic form, aluminium, magnesium or titanium.

NOTE 1. These limits have been imposed to avoid the hazards of incendive sparking due to friction between rusted steel or iron and the metals in question.

NOTE 2. Where the body of an adaptor forms part of the main flameproof enclosure of other apparatus, it may be of the same metal as that of the main enclosure.

3.3 Cables. Bolted flameproof cable couplers shall be capable of receiving cables with conductors up to the following maximum sizes:

copper (stranded)	150 mm ²
aluminium (stranded)	185 mm ²
copper (flexible stranded)	120 mm ²

3.4 Insulation

3.4.1 Materials. Properties of materials for insulating components shall comply with the values given in table 1.

3.4.2 Insulators. Insulators shall be free from voids and other defects and each shall comply with 6.4.

3.4.3 Earthed metallic screen. Each insulator, whether for coupler or adaptor, shall have fitted to its front face an earthed metallic screen. The radial fins of the screen shall be located midway between the three contact spouts to provide earthed segregation.

The fins of the earthed metallic screen and its earth connections shall withstand a current of 300 A for 500 ms and the temperature rise shall not exceed 50 K.

3.5 External body features

3.5.1 Enclosure. The case of the cable coupling unit, adaptor, or insulated end cover shall be so designed that it does not readily admit water when properly assembled, i.e. with cable coupling units complete with cable. Castings shall comply with 6.2.

3.5.2 External earthing. Provision shall be made on the cable gland assemblies for the fixing of a copper earth bond.

3.5.3 Internal earthing

3.5.3.1 General. Provision shall be made within the cable sealing box for bonding to earth the earth core and/or any screens that may be incorporated in the cable as specified in 3.5.3.2 to 3.5.3.4.

Any support pillar or component used for bonding shall be capable of withstanding the short circuit requirements specified in 6.7.

3.5.3.2 Earth core. The earth core shall be terminated in either a brass or copper terminal (bored to accept the relevant core) with provision for attachment to either any support pillar or the box body.

3.5.3.3 Braided wire core screens. The braided wire core screens shall be terminated in one or more brass or copper terminals (bored to accept the tails formed by unpicking the braid screens) with provision for attachment to either any support pillar or the box body.

3.5.3.4 Copper tape core screens. The copper tape core screens shall be terminated on the face of the glandset or box body by use of a stud terminal.

3.6 Separate contact pins. Separate contact pins shall be provided to afford electrical connections between two mating cable couplers or cable coupler and adaptor.

The contact pin shall be as shown in figure 1. It shall be solid and manufactured from medium-hard copper of grade C101 or C102 complying with BS 1433 or grade C111 complying with BS 2874, having a hardness of not less than 70 HB when tested in accordance with BS 240 and a volume resistivity of not more than 1.7241 Ω·cm at a temperature of 20 °C.

3.7 Fixed contact tubes

3.7.1 General. Fixed contact tubes shall be provided to afford suitable terminations for the cable conductors and also as suitable mating contacts for the separate contact pins. The contact tubes shall comply with 6.1.

3.7.2 Contact tube for copper conductors

3.7.2.1 The contact tube shall be as shown in figure 2 or 3. It shall be manufactured from copper of grade C101 or C102 complying with BS 1433, having a hardness of not less than 70 HB when tested in accordance with BS 240 and a volume resistivity of not more than 1.7241 Ω·cm at a temperature of 20 °C.

3.7.2.2 The part of the fixed tube receiving the pin shall make good electrical connection by the provision of radial slits forming not less than four separate spring-leaf elements constrained by a circular spring arrangement and further diametrically constrained to a maximum clearance between the constraining device and the contact tube of 0.5 mm to prevent undue distortion of the tube when the mating pin is inserted.

3.7.2.3 The part of the fixed tube receiving the cable conductor shall be so manufactured as to permit compres-

Table 1. Properties of insulating materials

Property	Value	Test method
Electric strength (90 °C)	8 kV/mm (min.)	BS 2782 : Part 2 : Method 221A or 221G *
Volume resistivity	1 × 10 ¹³ Ω·cm (min.)	BS 2782 : Part 2 : Method 230A †
Tensile strength	34.5 N/mm ² (MPa) (min.)	BS 2782 : Part 3 : Method 320D
Flexural strength	60 N/mm ² (MPa) (min.)	BS 2782 : Part 3 : Method 335A
Impact strength	10 kJ/m ² (min.)	BS 2782 : Part 3 : Method 351A
Water absorption‡	50 mg (max.)	BS 2782 : Part 4 : Method 430A
Comparative tracking index‡	400 (min.)	BS 5901
Oxygen index	28 % (min.)	method 4 of BS 5734 : Part 1

*Published jointly with BS 903 : Part C4.

†Published jointly with BS 903 : Part C2.

‡Preparatory to any testing for these properties, remove not less than 0.5 mm by machining from all the surfaces of the test specimen and then smoothly finish.

sion jointing of the copper cable conductor onto the contact tube. The dimensions and tolerances of the tube shall be in accordance with the compression tool manufacturer's recommendations. Markings shall be provided to assist in the location of the compression dies. These markings shall not remove or displace material such as could affect the efficacy of the completed compression joint.

3.7.2.4 The contact tube shall have:

- (a) a seal to prevent migration of the filling medium from one side of the insulating block to the other side;
- (b) a locking ring that effectively retains the contact tube in its correct location in the insulator block; and
- (c) a device that locates and prevents rotation of the contact tube in the insulator block.

3.7.3 *Contact tube for aluminium conductors*

3.7.3.1 The contact tube shall be as shown in figure 2. It shall be formed by the friction welding of a copper billet onto an aluminium billet. The copper section shall be manufactured from copper of grade C101 or C102 complying with BS 1433 and shall comply with **3.7.2.2** and **3.7.2.3**. The aluminium section shall be manufactured from aluminium of grade 1050A complying with BS 1474. The weld shall comply with **6.3**.

3.7.3.2 The part of the fixed tube receiving the pin shall make good electrical connection by the provision of radial slits forming not less than four separate spring-leaf elements constrained by a circular spring arrangement and further diametrically constrained to a maximum clearance between the constraining device and the contact tube of 0.5 mm to prevent undue distortion of the tube when the mating pin is inserted.

3.7.3.3 The part of the fixed tube receiving the conductor shall be so manufactured as to permit compression jointing

of the cable conductor onto the contact tube. The dimensions and tolerances of the tube shall be in accordance with the compression tool manufacturer's recommendations. Markings shall be provided to assist in the location of the compression dies. These markings shall not remove or displace material such as could affect the efficacy of the completed compression joint.

3.7.3.4 The contact tube shall have:

- (a) a seal to prevent migration of the filling medium from one side of the insulating block to the other side;
- (b) a locking ring that effectively retains the contact tube in its correct location in the insulator block;
- (c) a device that locates and prevents rotation of the contact tube in the insulator block; and
- (d) the internal bore of the aluminium sector free from any surface irregularities.

NOTE. The development of compression jointing for the termination of cables having aluminium conductors has created the need to provide bi-metallic terminal/contact tubes. The accepted method of producing the bi-metallic (aluminium compression ferrule to copper contact tube) joint is by friction welding.

3.8 **Sealing ring.** When any two cable coupling units are bolted together, the coupling faces of the material forming the respective contact tube housings, or contact tube housing and insulated end cover, shall be sealed by the interposition of a ring of resilient insulating material that shall conform to the dimensions shown in figure 4. The properties of the material of the sealing ring shall comply with the values given in table 2.

3.9 **Conductor terminations.** Conductor terminations shall be integral with the adaptor pins or contact tubes (see figure 8 for an example). Conductor terminations shall provide for a clamped connection or a crimped connection.

NOTE. In some circumstances, soldering is used for conductor terminations.

Table 2. Properties of sealing ring

Property	Value	Test method
Electric strength	100 kV/cm (min.)	BS 2918
Volume resistivity	$1 \times 10^{13} \Omega \cdot \text{cm}$ (min.)	BS 2782 : Part 2 : Method 230A*
Relative permittivity	5.0 (max.)	BS 2782 : Part 2 : Methods 240A and 240B†
Comparative tracking index	CTI 400 (min.)	BS 5901
Water absorption (after 14 days at $23 \pm 2^\circ \text{C}$)	1 % (max.)	BS 2782 : Part 4 : Method 430A
Resistance to liquids (after immersion for 7 days at $23 \pm 2^\circ \text{C}$ in transformer oil complying with BS 148)		BS 903 : Part A16
Tensile strength	7.5 N/mm ² (MPa) (min.)	
Ultimate elongation	250 % (min.)	
Accelerated ageing (168 h at 120°C)		BS 903 : Part A19
Tensile strength	10 N/mm ² (MPa) (min.)	
Ultimate elongation	300 % (min.)	
Compression set (70°C for 24 h)	15 % (max.)	BS 903 : Part A6
Hardness	55 to 65 IRHD	BS 903 : Part A26

*Published jointly with BS 903 : Part C2.

†Published jointly with BS 903 : Part C3.

Where screws are used as the clamping device not less than four shall be provided and they shall be hexagon socket screws complying with BS 4168. Each terminal shall provide for the entry of the conductor to a depth of at least 25 mm.

All connections shall be designed to resist loosening by vibration or temperature variation.

3.10 Adaptors. Dimensions of adaptors shall be as shown in figures 5, 6 and 7. If plug-in cable adaptor connections are required, the dimensions of the adaptor pin shall be as shown in figure 8; the tubular shroud shall be a push fit over the insulation.

3.11 Filling holes. Enclosures that are to be filled with a filling medium shall have a minimum of two orifices of not less than 30 mm diameter sited in the same plane and provided with suitable covers, or threaded to receive screwed plugs.

Where angled adaptors are designed to be filled in situ, they shall be provided with at least two filling orifices of not less than 30 mm diameter and provided with suitable covers, or threaded to receive screwed plugs. (See figure 2.)

3.12 Insulated end covers. Insulated end covers shall be as shown in figure 9 and shall comply with 6.5.

4. Dimensions

4.1 Components. The dimensions of the components of cable coupling units, adaptors and insulated end covers shall be as shown in figures 1 to 9. The relative positions of the contact tubes and of the flange bolt holes shall be as shown in figure 2.

4.2 Electrical clearances. The clearance and creepage distances shown in figures 10, 11 and 12 shall be not less than those given in table 3.

4.3 Fasteners. All bolts, screws and studs used for attaching parts of the enclosure shall have a strength grade designation of 8.8, as specified for bolts and screws in BS 3692 and for studs in BS 4439, with grade 8 nuts as specified in BS 3692. Coupling screws shall be size M8 of length 50 mm. If bolts are used, the threaded length shall be not less than 25 mm.

5. Cable glands and cable sealing boxes

Cable glands and cable sealing boxes forming part of a cable coupling unit shall be so constructed as to comply with the relevant requirements of BS 542 and be in accordance with the dimensions given in table 4. Provision shall be made on the cable gland for the fixing of an earth bond.

Table 3. Minimum creepage distances and clearances

Description	In air			In filling medium*		
	Ref. letter (see figures 10 and/or 11)	Nominal system voltage up to and including		Ref. letter (see figures 10 and/or 11)	Nominal system voltage up to and including	
		1100 V	3300 V		1100 V	3300 V
Clearance phase to phase direct	<i>A</i>	mm 25	mm 51	<i>E</i>	mm 13	mm 19
Clearance phase to earth direct	<i>B</i>	25	51	<i>F</i>	13	13
Creepage phase to phase over insulation	<i>C</i>	32	76	<i>G</i>	19	38
Creepage phase to earth over insulation	<i>D</i>	32	51	<i>H</i>	19	25
Creepage phase to earth over cable surface				<i>J</i>	25	32

*The values relate to clearances for bituminous compound only.

Table 4. Details of coupler glandsets

Type or armour	Cable sheath	Minimum dimensions (see figures 13 and 14)	
		Support length A	Penetration B
Pliable wire armour (PWA)	Polychloroprene (PCP)	mm	
		30	1.25 times the outside diameter of the cable (90 mm minimum)
Single wire armour (SWA) and double wire armour (DWA)	Polyvinylchloride (PVC)	20	0.67 times the outside diameter of the cable (30 mm minimum)

Cable glands shall be so designed and constructed that when the armour wires of the cable are clamped with a maximum torque of 95 N·m applied to each of the armour clamp adjusting studs or bolts the distortion of the gland mounting flange when measured against the coupler mounting flange shall not exceed 0.5 mm.

At 95 N·m torque the bow in the armour clamp shall not exceed 2 mm and no damage shall occur to the gland components or the threads of the adjusting studs or bolts.

Cable glands shall, in all other respects, comply with the relevant requirements of BS 542.

6. Test requirements

6.1 Contact tube withdrawal force test

6.1.1 Requirement. When tested as described in 6.1.2, the contact tube shall meet the minimum withdrawal force declared by the manufacturer. The tests shall be routine tests applied on the manufacturer's premises.

6.1.2 Method. Into each contact tube, insert and withdraw a hardened, ground steel pin of diameter equal to that of the minimum size of contact pin.

6.2 Pressure test for cable coupler and adaptor

6.2.1 Requirement. When tested as described in 6.2.2 or 6.2.3, no escape of air or water shall be observed to occur from any part of the body casting of cable couplers or adaptors.

NOTE. Marking is required to indicate that the body casting complies with this requirement (see clause 7(h)).

6.2.2 Pneumatic method. Immerse the body with suitable gaskets, blanking devices and pneumatic connections in a suitably guarded water tank. Pressurize the body casting internally using compressed air, slowly building up the pneumatic pressure to a test pressure of 10.3 bar. Hold the test pressure for 1 min.

6.2.3 Hydraulic method. Place the body with suitable gaskets, blanking devices and hydraulic connections in a test rig that allows full visual inspection of the casting. Check that the external faces of the prepared casting are clean and dry. Pressurize the body casting internally using water, slowly building up to a test pressure of 10.3 bar. Hold the test pressure for 1 min.

6.2.4 Percentage testing. For new or modified foundries, alterations to existing casting techniques or introduction of new or modified metals or alloys; 20 % of each of the first five batches of body castings shall be tested in accordance with 6.2.2 or 6.2.3. If after testing the rejection rate is zero, then the percentage tested may be reduced to 2 % of each batch and remain at that level.

Should any casting fail when being tested as part of the 2 % previously specified, then all the body castings from that batch shall be tested and the test percentage increased back to 20 % until five reject free batches have been obtained.

6.2.5 Vacuum impregnation

6.2.5.1 If castings showing porosity in the area of the body other than flameproof faces are recovered by vacuum impregnation, they shall all be pressure tested and marked accordingly.

6.2.5.2 Castings that are vacuum impregnated as a normal production routine prior to machining shall be tested as specified in 6.2.4. In the event of failure due to porosity

these castings shall not be recovered by further impregnation as specified in 6.2.5.1.

6.3 Bend test for friction welded connectors

6.3.1 Requirement. When tested as described in 6.3.2, all friction welded, bi-metallic terminal/contact tubes shall reveal no signs of cracks at the weld line visible to the naked eye. All connectors that are not straight within 0.5 mm diameter or concentric within 1.5 mm shall be rectified or rejected.

6.3.2 Method. Remove the welding flash at the friction weld interface. Locate the connector in a suitable device so that diametrically opposed mandrels acting, in turn, at right angles to the main axis of the connector can be caused to impose a bending and shearing force on the friction welded joint. The mandrels shall be so designed that small indentations are created on the connector to indicate that the test has been carried out.

Impose the force given in table 5 at a point on the aluminium portion of the connector, 25 mm from the interface of the two materials forming the connector.

After this test, measure all connectors for straightness and concentricity.

Table 5. Bending forces

Connectors for cable size	Force
mm ²	N
70	2220
95	2890
150	3110
185	3550

6.3.3 Batch testing. A batch shall be a quantity not less than 100 or greater than 1000 connectors of any one size produced at any one time.

From every batch so produced there shall be selected at random 1 % of the batch or three connectors whichever is the greater and these shall be tested to destruction.

The test to destruction shall consist of bending the aluminium section through 90 ° at the weld line; there shall be no cracks at the weld line visible to the naked eye.

If one or more connections show evidence of failure a further set of samples shall be selected at random and tested.

Failure of any of the second set of connectors shall result in the entire batch being rejected.

6.4 Heat test for insulators

6.4.1 Requirement. When tested as described in 6.4.2, the dimensions of each insulator shall not depart from the original dimensions by more than 0.2 % and there shall be no form of surface cracking or scaling on the insulator.

6.4.2 Method. Heat the insulator in an oven at 120 ± 5 °C for a period of 24 h and then allow to cool to ambient temperature. Examine the insulator for surface cracking or scaling.

6.5 High voltage tests

6.5.1 Requirement. When each assembly of insulator and contact tubes and each insulated end cover is tested

as described in **6.5.2**, no breakdown shall occur. The tests shall be routine tests applied on the manufacturer's premises.

Where couplers are connected to cables, the tests described in appropriate standards shall be applied.

For live line indicators a test shall be applied, at line voltage, to each completed assembly to ensure correct indication.

6.5.2 Method. Apply an alternating test voltage as shown in table 6 of any frequency between 40 Hz and 62 Hz and of approximately sine-wave form:

- (a) between each contact tube and each of the other contact tubes, unless screens are provided, and
- (b) between each contact tube and the body of an associated enclosure including the insulated end cover.

NOTE 1. For (b) a simulated enclosure may be used.

NOTE 2. Where live line indicators are fitted, these should be removed before commencing the test.

Commence the tests at a voltage of about one third of the test voltage and increase to the test voltage in a period not exceeding 10 s. Maintain the full test voltage for 1 min. During the test to earth, connect one pole of the testing transformer to earth and to the body of the cable coupling unit, adaptor or insulated end cover.

Table 6. Test voltages

Rated voltage (up to and including)	Test voltage (r.m.s.)
V	kV
1100 (adaptors to figure 11)	4
3300	7.6

6.6 Temperature rise test

6.6.1 Requirement. When tested as described in **6.6.2**, the temperature rise of the components within the cable coupling units shall not exceed 45 °C in a maximum ambient temperature of 25 °C as measured in **6.6.2.1(d)**. The temperature deviation of the components within the cable coupling units shall be equal to, or less than, that of the average temperature of the cable conductor.

NOTE. Because of the nature of this test, if a bad reading occurs, the parties concerned might need to reach agreement on, for example, whether to continue the test.

The tests shall be type tests that shall be conducted, under draught-free conditions, on two filled cable coupling units, bolted together, and complete with three contact pins and a sealing ring that all comply with the requirements of this standard.

6.6.2 Method

6.6.2.1 General. Attach each cable coupling unit to a 2 m length of 3-core 150 mm² stranded copper, or 3-core 185 mm² solid or stranded aluminium PVC-insulated, single or double wire-armoured cable complying with BS 6346 for 6.6 kV working.

Determine the temperature rise of the components within the cable coupling units and the temperature deviation of

the same components from that of the cable core using thermocouples placed as follows:

- (a) Attach one thermocouple to the conductor socket of each contact tube, adjacent to the conductor.
- (b) Attach one thermocouple to the end of each contact tube, adjacent to the contact pin.
- (c) Attach one thermocouple to each of the cable conductors in a separate 2 m length of uncut cable at a distance of 1 m from the end of the cable. Insert the thermocouples through holes in the cable sheath and insulation. Connect this cable in series with the cable coupling units.
- (d) To measure the ambient temperature, attach one thermocouple to the body of one of two cable coupling units, bolted together, and not included in the test loop.

6.6.2.2 Continuous loading sequence. Conduct this test on two units as initially assembled. Pass a three-phase current of 300 A, 40 Hz to 62 Hz through the cables and cable coupling units for a period of 30 days. Record the temperature of the selected components at intervals not greater than 24 h.

6.6.2.3 Intermittent loading sequence. On completion of the continuous loading sequence, switch off the test current for a period of 24 h and then switch on for a further period of 24 h. Repeat this on/off sequence so that ten such sequences are completed. Record the temperature of the selected components just prior to the end of each on-load period.

6.6.2.4 Load cycling sequence. On completion of the intermittent loading sequence, carry out the following load cycling sequence:

- (a) 390 A for 40 min;
- (b) 130 A for 10 min;
- (c) 195 A for 20 min;
- (d) 130 A for 10 min.

Repeat this sequence 33 times without interruption followed by a continuous load of 300 A for a minimum period of 10 h. Record the temperature of the selected components just prior to the end of the test period. Repeat the test sequence (a), (b), (c), (d) and the 10 h continuous loading period a further 30 times making a total cycling sequence of 990 (nominally 1000) cycles.

6.7 Through fault current test

6.7.1 Requirement. When tested as described in **6.7.2**, there shall be no visible signs of disturbance to a properly assembled cable coupling unit with each type of adaptor.

6.7.2 Method. Apply a current of 13.1 kA, r.m.s. symmetrical, for 1 s, with an asymmetrical peak value of not less than 33.4 kA to a properly assembled cable coupling unit with each type of adaptor at any suitable voltage up to the rated voltage. If light welding of the contacts occurs, check that they can be separated by normal means. If any burning is visible, repeat the temperature rise test described in **6.6** without reconditioning.

NOTE. The tests on live line indicators may be applied with the indicating devices removed.