Technical Construction File

EN IEC 60709:2019,IEC 60884-1:2022,EN 60947-7-1:2009

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Applicant..... :	Wenzhou Weituo Precision Mould Co.Ltd
Address..... :	No. 3, Yongxing 2nd Road, Chengdong Subdistrict, Yueqing City, Zhejiang Province, China
Manufacturer..... :	Wenzhou Weituo Precision Mould Co.Ltd
Address..... :	No. 3, Yongxing 2nd Road, Chengdong Subdistrict, Yueqing City, Zhejiang Province, China
Factory..... :	The same as manufacturer
Address..... :	The same as manufacturer
Standard..... :	☒ EN IEC 60709:2019,IEC 60884-1:2022,EN 60947-7-1:2009
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Trademark..... :	/
Model/type reference..... :	PCT Series,R2601 Series,D2 Series,QC01 Series,L20 Series
Main Model..... :	PCT Series
Rating..... :	10A-300A 250V-1500V

Possible review case verdicts:

- review case does not apply to the test object..... : N(.A.)

- review object does meet the requirement..... : P(ass)

- review object does not meet the requirement.....: F(ail)

General remarks:

”(see remark #)” refers to a remark appended to the report.

”(see appended table)” refers to a table appended to the report.

Throughout this report a comma is used as the decimal separator.

The review results presented in this report relate only to the object reviewed.

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Testing:	
Date of receipt of review item:	March 21,2025
Date(s) of performance of review:	March 21,2025 to April 1, 2025

General product information:

Terminals

Summary of reviewing:

This review report includes:

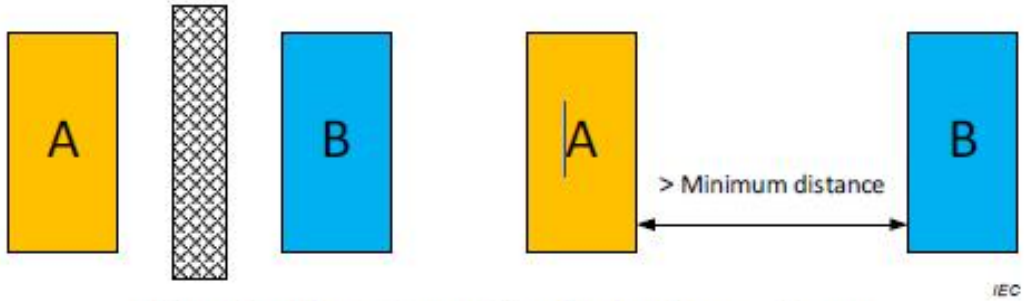
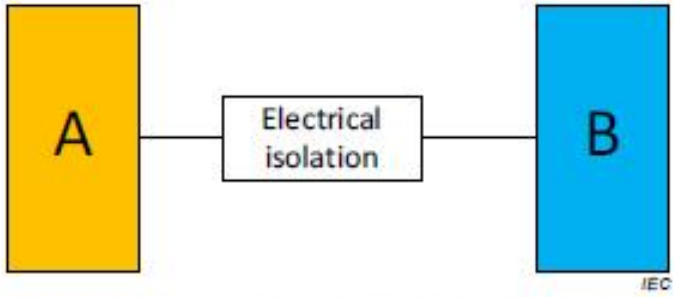
Annex I: 1 page(s) of photo documentation.

Copy of marking plate

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
5	Principles and requirements for separation		
5.1	Principles		
5.1.1	General		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	According to IAEA SSR-2/1 Requirement 21, interference between safety systems or between redundant elements of a system shall be prevented by separation means, such as: • physical separation; • electrical isolation; • functional independence; • independence of communication. A combination of one or more of these measures shall be implemented to achieve the required degree of separation based upon the potential hazards (threats) to the independence. Note that as stated in Clause 1, functional independence and independence of communication are out of the scope of this document, including the threats to be considered which should be identified by the I&C cyber security programme. For details refer to IAEA SSG-39, IEC 61500 and IEC 61513:2011,5.4.2.4 and 5.4.3. Although out of scope of this document, measures already taken to address functional independence shall be considered when assessing the need for additional separation measures to meet the requirements of this document. More details referring to functional independence, independence from control systems and independence of communication are given in Annex D. The separation of safety class 1 from other classes, as used in this document, is only an example of the application of the requirements of the document.		
5.1.2	5.1.2 Separation reasoning and boundaries		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
5.1.2	Separation reasoning and boundaries		
	Separation is a principal means of preventing: a) propagation of failures from system to system; b) propagation of failures between redundant parts within safety systems; c) common cause failures due to internal hazards and some external hazards; d) propagation of failure between different DiD levels, when it is required by the safety principles of the project or national nuclear standards. The types of possible failure-initiating events shall be taken into consideration (i.e. identified, documented and justified). Adequate provisions shall be made in I&C and electrical systems important to safety to limit the possible effects of these events to an acceptable level.Consideration should be given to the effects of a combination of failure events. Failures and hazards to be considered as a basis for the elaboration of the separation principles shall be defined by every project individually. Hazards to be considered are given in6.2. Design errors and I&C and electrical failure events are given in Annex C. Dependencies between I&C and electrical systems could be on physical interfaces (e.g. power supply, signal exchange), layout design within a room or between buildings, support systems (e.g. HVAC) or the spreading of failures (e.g. fire, airplane crash). During I&C and electrical architecture design, plant design constraints according to IEC 61513 and IEC 63046 shall be identified. Depending on the results appropriate design measures shall be specified.		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
The principle of physical separation by structure or distance is shown in Figure 1.			
 Figure 1 – Physical separation by structure or distance			
The principle of separation by electrical isolation is shown in Figure 2.			
 Figure 2 – Separation by electrical isolation NOTE Common cause failure due to hazard may occur, combined hazard too.			
5.1.3	Plant safety principles and requirements		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	The general principles for separation are mainly influenced by the specific requirements from nuclear facilities and general requirements. These principles are: • independence requirements; • hazard analyses and protection rules (including fire); • deterministic safety rules; • electrical fault propagation; • requirements from non-nuclear industrial rules and standards (e.g. escape routes and layout constraints); • requirements from EMC/EMI; • requirements referring to cable laying distances due to heat dissipation. In this document, mainly the specific requirements for nuclear facilities and some aspects of electrical fault propagation are treated; the other requirements are mentioned to cover the complete subject. The separation principles and the means chosen to achieve them shall be described in a dedicated project document (separation concept). A verification activity shall be performed to ensure that separation requirements have been met (see Clause 9).		
5.2	Safety class separation requirements		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	IEC 61226 defines how safety functions are categorized and SSCs are classified according to their significance to safety, and requires physical separation to provide protection against propagation of failures due to physical effects, and against jeopardising redundant systems simultaneously. BS EN IEC 60709:2019 – 18 – IEC 60709:2018 IEC 2018 As a design basis for I&C and electrical systems that fulfil and/or contribute or support systems important to safety, the following general principles shall be applied to maintain the independence of redundant systems and between different systems, and to ensure that the redundancy and diversity (provided to achieve high reliability of systems important to safety) are effective. The grouping and separation criteria between the different safety classes shall be defined at the beginning of the project. – Systems which are classified to safety class 1 shall be protected from consequential effects caused by faults and normal actions within: a) redundant parts of those systems; b) systems of a lower classification; c) in some cases, between different systems classified to safety class 1 where independence is required. The faults considered shall include those internal to the I&C or electrical systems as well as those that occur as a result of events external to the I&C or electrical systems. – Systems classified to safety class 2 shall be protected from consequential effects caused by faults and normal actions within: d) redundant parts of those systems; and e) systems of a lower classification.		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	The faults considered shall include those internal to I&C or electrical systems, but may exclude those that occur as a result of events external to the I&C or electrical systems. In cases where systems classified in safety class 2 are claimed to provide protection in the event of specific hazards, then those systems shall follow the principles of safety class 1. For example, in some countries, all systems required to achieve and maintain long-term shutdown shall be protected against fire hazard regardless of their classification. Certain systems classified in safety class 3 may need to be protected from the influences of faults in other systems. This should be determined on a case-by-case basis. Class 3 systems used to control and monitor during DEC should be protected from the influence or faults in other systems. Unclassified systems do not need to be protected from influences of faults in other systems. For the electrical power supply circuit of lower classified components, the separation requirements of the power supply circuit unit (e.g. the unit in the switchboard) do not have to be fulfilled in the following cases: 1) where a power supply of lower classified systems or components is fed from a higher classified power source, due to power supply requirements, justifies the use of higher classified power supply circuits. 2) where dependence between a lower safety classified system (e.g. emergency lighting) and higher safety classified system (e.g. Emergency Power Supply System) justifies the use of a supply from the higher classified source		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	In these cases the impact on the higher classified power supply system shall be justified including accounting for the power demand and electrical transient.		
5.3	Associated circuits		
5.3.1	General		
	When functions are categorized according to the requirements of IEC 61226 and systems are classified according to standards such as IAEA SSG-30, IEC 61513, or IEC 63046 it will often be the case that a given system or set of equipment will perform functions of different categories. Additionally, certain functions of a lower category may have a very close relationship to category A function, for example process monitoring based on the same measurements as safety functions. The requirements stated earlier in this document generally indicate that circuits of lower safety class should be separated from those of safety class 1. However, as an alternative, the circuits of the lower safety class can be declared to be “associated circuits”, and the separation requirements are determined from this subclause. In the clauses of the document that follow only separation or association with safety class 1 will be considered. This principle may be extended to other classes depending on the project.		
5.3.2	Criteria		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	Components and/or cables not classified in safety class 1 become associated circuits in one or more of the following ways: a) electrical connection to a safety class 1 power supply without the use of an isolation device; b) electrical connection to an associated power supply of safety class 1 systems without the use of an isolation device; c) proximity to safety class 1 circuits and equipment without the required separation (physical distance or barriers); d) proximity to associated circuits and equipment without the required separation (physical distance or barriers); e) sharing a safety class 1 or associated signal without the use of an isolation device.Associated circuits shall comply with one of the following requirements: f) they shall be uniquely identified as such or as safety class 1 and shall remain (traceable to the associated safety class 1 division), or be physically separated to the same extent as, those safety class 1 circuits with which they are associated. They shall be subject to the requirements placed on safety class 1 circuits. g) they shall be in accordance with f) above from the safety class 1 systems up to and including an isolation device. Beyond the isolation device, such a circuit does not belong to safety class 1 provided that it does not again become associated with a safety class 1 system. h) they shall be analysed or tested to demonstrate that safety class 1 circuits are not degraded below an acceptable level.		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	qualification shall show that the higher classified circuits will perform correctly when the associated circuit or isolation device and its cables are subjected to electrical conditions for which the higher classified circuit should function correctly. Where an associated circuit is connected to a device/system not belonging to safety class 1 without isolation, that device/system not belonging to safety class 1 shall also be subject to this appropriate qualification. Associated circuits need not be qualified for performance of function, since their function does not belong to category A/components do not belong to safety class 1. Isolation devices for I&C circuits shall be in accordance with IEC 62808. Application of the associated circuit concept on a wide scale may lead to a broad combination of circuits of different safety classes provided that the general safety principles of physical separation are maintained. For example, cabling of differing safety classes need not be separated from each other within a safety group if the safety functions of the higher category can be performed by a redundant safety group that is separated from the safety group that contains the associated circuits. Separation inside the electrical or I&C cabinets should not be necessary if the components belonging to the lower classified circuits are qualified following the rules for the qualification of the higher classified circuits.		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
5.4	Separation issues at existing plants		
5.4.1	General		
	The separation of I&C and electrical systems important to safety in existing nuclear power plants is often incomplete because SSCs that had initially no safety classification may need to be classified as important to safety and because design standards have changed. When upgrading existing plants, the potential consequences of not following this document in all aspects due to practical considerations should be justified against the added safety gained through the upgrade taken as a whole.		
5.4.2	Criteria		
	Separation issues shall be particularly addressed in the implementation strategy of the plant upgrades. Issues which shall be considered include: – separation in intermediate configurations when new I&C and/or electrical systems are installed through a phased programme; – identification of subsystems, which can be separated without the need for intermediate interfaces; – suitability of the existing separation to the new I&C and/or electrical technology (mainly sensitivity of digital I&C to EMI, power semiconductors, special temperature requirements and susceptibility to radiation); – cable routing limits and an evaluation of the needs coming from new technologies for special cable trays, e.g. for fibre optic cables, bus cables and requirements for separation. Guidance for the decision on upgrading and modernisation of I&C can be found in IEC 62096.		

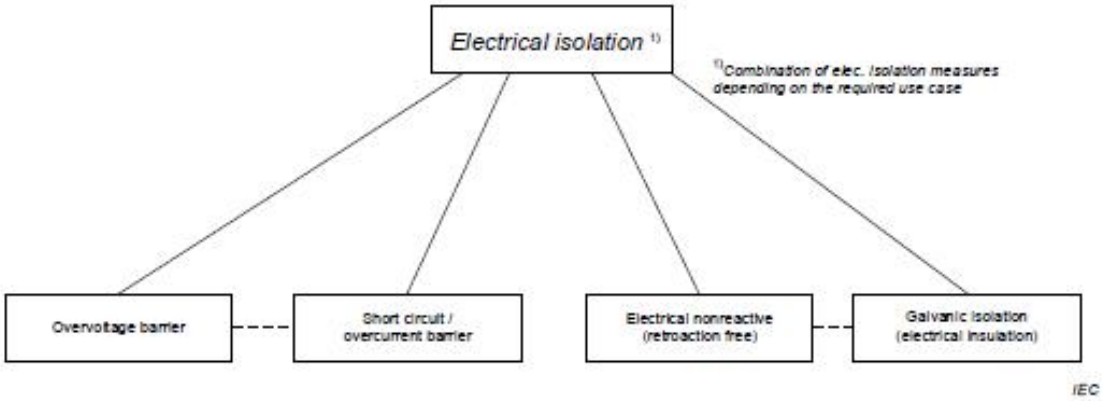
EN IEC 60709:2019			
Clause		Result - Remark	Verdict
6	Separation design basis		
6.1	Design inputs		
	The requirement to be considered for separation, as shown in the following, shall be summarized in a project document which should contain the requirements about separation induced from: • the design constrains for divisional separation and defence in depth concept from the overall plant design; • the consideration of the external and internal hazards (including fire) and combination of hazards; • the EMC plan; • the electrical faults; • the other technical requirements Note that requirements induced by special operating conditions such as commissioning or maintenance and repair should also be considered. • which hazards had to be mitigated by zone; • the distance for protection against each hazard or ambient condition; • the characteristics of the barriers by hazard; • the separation requirement between safety classes or defence in depth levels. The electrical fault types and boundaries have also to be considered in a project document.		
6.2	Environmental conditions and hazards		
6.2.1	General I&C and electrical system equipment shall be designed, specified, qualified and installed in such a manner as to assure its functional capability under and following the expected environmental conditions and hazards.		
6.2.2	Environmental conditions		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	Variation of environmental conditions such as radiation, temperature, pressure and humidity during normal operation and under accident conditions shall be considered		
6.2.3	External hazards		
	The construction of a NPP consists of several defence levels to withstand external hazards such as airplane crash, hurricanes, earthquakes or flooding. These constructional defence lines provide the prerequisite for I&C and electrical systems to manage operational states and accident conditions. These external hazards, such as earthquake, could be without influence on the separation requirements, or with possible influence on the separation requirements, such as air plane crash. Natural external hazards could be: • meteorological; • hydrological; • geological; • seismic. Human induced external hazards could be: • nearby industries; • transportation routes (on air, water or land). Natural and human induced external events that have been identified in the site evaluation process shall be considered. The results of the external hazard analysis shall be considered in the project separation concept.		
6.2.4	Internal hazards		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	Internal hazards have a significant influence on the separation requirements. For the design of I&C and electrical architecture the impact of internal hazards shall be considered by means of physical separation of the different divisions in combination with electrical isolation. Possible internal hazards include: • fire; • explosion; • flooding; • missile generation; • collapse of structures and falling objects; • high energy pipe breaks leading to pipe whip and jet impact; • release of fluid from failed systems. The results of the internal hazard analysis shall be considered in the separation concept. Consequences of external hazards or events shall be considered when identifying possible internal hazard.		
6.2.5	Fire protection		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	Fire protection requirements derived from applicable standards shall be followed. Flame-retardant cables should be used, wherever practical. The IEC 60332 series provides guidance for the testing of electric cables to demonstrate their flame-retardant properties. Cable tray and conduit penetrations of fire barriers (vertical and horizontal) shall be sealed with non-combustible materials to give protection at least equivalent to that required of the fire barrier. Non-combustible materials shall be used for cable trays and conduits. NOTE The separation of I&C and electrical systems important to safety and also the fire protection measures in existing nuclear power plants reflect the initial design. The SSCs safety classification, design standards and also fire protection requirements may have continuously evolved to more constraining requirements, therefore the existing design is often not compliant to modern standards.		
6.3	EMI/EMC		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	EMC is a system engineering issue dealing with the balance of immunity and emissions at the interfaces between the various sub-systems. Separation is one approach to guard against the potential CCF impact of EMI. International EMC standards on industrial environments, IEC 61000 series and the dedicated standard for NPPs IEC 62003 should serve as the basis for the definition of the EMC requirements. These should be supplemented, where necessary, to cover the EMC environments of generating power plant components, which might be more demanding.		
6.4	Electrical fault		
	The I&C or electrical system shall be either protected or be able to tolerate the faulty insertion of a systems own internal voltage and any credible external voltage, current (overvoltage barrier, short circuit / overcurrent barrier) and ensure the autonomy (electrical nonreactive, electrical insulation) of signal multiplication and transmission.		
6.5	Requirements from non-nuclear technical standards		
	Requirements induced by other technical topics such as heat dissipation of components and cables (acceptable thermal loading) and escape route ways, etc., should also be considered in the project separation concept.		
6.6	Requirements from special operating conditions		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	Requirements from special operating conditions such as commissioning, modification, maintenance and repair, design and administrative control procedures, shall be considered during design and construction.		
7	Electrical isolation		
7.1	Principles		
7.1.1	General		
	Electrical isolation is described in IAEA SSG-34 and IAEA SSG-39. The selection and combination of electrical isolation measures are illustrated in Figure 3.		
	 **Figure 3 – Electrical Isolation measures and selection of components**		
	Depending on the required use case a combination of measures shall be specified in the design. The omission of a single measure could lead to the consequence that the complete electrical isolation is ineffective.		
7.1.2	Overvoltage barrier		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	An overvoltage barrier either physically separates or prevents the propagation of overvoltage or current transient in a given direction (depending on use case). Overvoltage is the existence of voltage (AC or DC), issued from a source, exceeding design voltage, between one electrical segment and any other electrical segment, including ground. Generally infeed of overvoltage in a system has to be taken into account if it is a realistic failure mode from a physical point of view. Foreign voltage shall be limited to a non-hazardous degree by implementation of dedicated electrical isolation devices for the system to be protected. Depending on the use case a combination of electrical devices shall be identified to consider the postulated maximum voltage transients and exposure time for the components to be protected. Measures for overvoltage barrier could include deliberate destruction of a complete or limited part of the components. A physical destruction could be initiated by melting, combusting or bursting of components. The impacts of the triggered overvoltage barrier to further components of the signal chain shall be considered in the design of I&C and electrical systems by physical separation (see Clause 8).		
7.1.3	Short circuit / Overcurrent protection		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	For short circuit protection, devices such as fuses or circuit breakers are used to interrupt the supply to the short circuit fault. Overcurrent is detected by dedicated devices, if installed, and interrupted by devices such as contactors or breakers. The protection equipment in the emergency power system is generally designed such that defects or failures are reliably detected, the necessary disconnections are performed and erroneous actuations from operational transients are prevented. Operational issues such as inrush current peaks or successive starting cycles of motors shall not actuate protection devices. Generally overcurrent protective features shall be selected and adjusted to such values that the minimum short-circuit currents are detected; however, no current transients from operating procedures shall cause any disconnections.		
7.1.4	Electrical nonreactive (retroaction free)		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	Electrical retroaction is an effect that a source of an electrical signal may be falsified by a failure in the receiver of the signal. Retroaction free (or nonreactive) is a feature of an interface to ensure that failures in the target system will not degrade the source system. For a nonreactive signal exchange (or signal multiplication) the output of a retroaction free component could be stressed by a low- or high signal level (system voltage) without any impact on the source of the signal. This signal level shall have no impact (retroaction free) on the input signal of the electrical isolation component. Retroaction freeness is a characteristic of a component which ensures the following: When a source of an electrical signal supplies several components, in case of failure in one of the supplied components or interfaces, this failure will not degrade the source signal for the remaining components or the source itself.		
7.1.5	Galvanic isolation (electrical insulation)		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	In addition to retroaction free signal transmission, high-impedance insulation devices shall protect (separate) signal interchange between I&C systems (including interfaces between different I&C systems). Electrical insulation is in principle to prevent current flow between electric circuits even if power or signals are exchanged. Electrical insulation is needed to exchange information between I&C systems belonging to: • different system voltage levels (e.g. 110 V (AC) 24 V (DC)), • different ground loops, • different rooms (building constructions) if electrical interference is to be avoided, or • long cable run distances (depending on voltage drop over cable distance). The characteristic of the chosen electrical insulation measures has to be taken into account in I&C and electrical architecture design. An electrical insulated interface may be nonreactive and may protect against overvoltage on I&C side. For electrical systems generally an inductive separation via transformers produces the galvanic isolation. A galvanic isolation on the electrical side is generally not a sufficient protection against overvoltage.		
7.2	Isolation devices		
7.2.1	General		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	Requirements referring the safety class of an isolation device depend on the safety class of the electrical circuit to be separated. The isolation device shall be such that failures or conditions at their output terminals (which are connected to the lower classified system) cannot prevent the safety action of the safety class 1 system or sub-system to which the isolation device is connected. As an example for I&C, a circuit at safety class 1 may be monitored for alarms by a relay in that circuit at that safety class whose contacts provide alarms at a lower safety class. Temporary connections for maintenance to the safety class 1 systems without isolation devices shall be permitted provided that they are connected to only a single redundancy at any given time, that they are disconnected after use, and that the system is capable of withstanding a fault introduced through failure or use of the connection. Failures and mal-operations in the systems not belonging to safety class 1 shall cause no change in system performance, e.g. for the I&C topics such as response, drift, accuracy, sensitivity to noise, or other characteristics of the safety class 1 system which might impair the ability of the system to perform its safety functions.		
7.2.2	Isolation characteristics		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	The properties of an isolation device shall include: – tolerance and isolation for EMI defined in IEC 62003; – simple barriers between close or adjacent terminals or contact groups on relay equipment used for electrical isolation; – prevention of transmission of excessively high or damaging voltages; – prevention of effects of short circuits; – prevention of retroaction. For electrical devices general rules are given in IEC 61439-1. If the I&C or electrical equipment does not have sufficient characteristics for electrical isolation, an isolation device shall be added. The design and qualification of isolation devices for I&C systems important to safety are described in IEC 62808. For the design of electrical protection, the time behaviour of possible failure also has to be considered. In this context, an assessment should be done of the maximum voltage and current that could be envisaged under normal and faulted conditions, and its potential effects on the equipment important to safety when applied to the isolation device terminals of the circuit of lesser importance to safety. Precautions should also be taken to minimise the possibility for the I&C, that failure in a system not belonging to safety class 1 causes spurious or premature actuation of a safety class 1 system.		
7.2.3	Actuation priority		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	Where plant equipment that is controlled by a safety class 1 system is also controlled by signals from a lower safety classified system, isolation devices shall be provided which ensure priority of the safety class 1 system actions over those of the lower safety classified system. Failures of, or normal actions by, the lower safety classified system shall not interfere with the safety class 1 system under plant conditions requiring success of those safety class 1 actions. The priority isolation devices shall be classified as part of the safety class 1 system. Where signals are extracted from safety class 3 systems for use in non-safety classified systems, isolation devices may not be required; however, good engineering practices should be followed to prevent the propagation of faults. In cases where systems (e.g. safety class 2) performing category B functions need to take on the aspects of safety class 1 systems due to the functions performed, isolation shall be applied. For a system of class 2, failures and mal-operations in the class 3 or unclassified systems shall cause no significant change in system performance, e.g. maximum response time, maximum usage of resources shall be respected, drift, accuracy, or other characteristics of the safety class 2 systems which might impair the ability of the system to perform its safety functions. For I&C systems fiber optic communications provide a very effective means of achieving electrical isolation/decoupling, and should be applied wherever practical.		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
8	Physical separation		
8.1	Principles		
8.1.1	General		
	Where physical separation is required, prevention of failure propagation shall be considered for failures which could occur: - simultaneously to multiple system components as a consequence of PIEs; - between systems of the same safety class; - between redundant safety groups of the same I&C system important to safety, and; - from systems of lower safety class to systems of higher safety class and in some specific cases from systems of higher safety class to systems of lower safety class. Physical separation is a means to cope with mechanical or environmental impacts. Physical separation may be achieved through separation by distance, structural separation or a combination of the two, and is a means to reduce the likelihood of dependent failures (common cause failures) resulting from failures as consequences of PIEs (such as fire, missile and flooding or high energy pipe break). The choice depends on the postulated initiating events and may differ from location to location within the NPP. It will depend on the need to provide protection against all the PIEs considered in the design basis.		
8.1.2	Separation by distance		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	Physical separation does not explicitly require installing structural barriers between two components but may be achieved by applying appropriately distance or geographical separation to cope with underlying PIEs (e.g. direct effect of airplane crash). The measured distance is the space that has no interposing structures, equipment, or materials that could aid in the propagation of effects induced by hazards (e.g. fire, air plane crash, etc.) or that could otherwise disable I&C or electrical systems.		
8.1.3	Structural separation		
	In the context for I&C and electrical systems, a physical structural barrier is a physical separation of two independent areas by means of constructional measures. These measures shall prevent the spreading of postulated initiating events and internal hazards. Depending on the relevant PIEs a structural barrier could be a wall as a fire barrier or dedicated shielding to protect against conditions imposed by accidents.		
8.2	Separation of cables and cable support structures		
8.2.1	General		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	The separation provision for cable should be defined based on tests performed to determine the flame retardant characteristics (IEC 60332) of the proposed cable installation considering features such as insulation and jacket materials, raceway fill, raceway types, and arrangements. In hazardous areas, the severity of the hazards, such as the size of the fire or pipe break, and mitigating measures such as sprinklers should be considered. Additionally, the minimum distance for power cable may consider industrial standards, such as e.g. IEC 60364-5-52.		
8.2.2	Divisional separation of redundant cables and cable support structures		
	For redundant cables within an I&C or electrical system important to safety, generally a divisional separation shall be introduced. The following applies: – each redundancy shall be provided with physically separate cable routes, trays, conduits, ducts, vertical ducts and penetrations; – any given route, tray, conduit, duct, vertical duct or penetration shall carry or contain only cables of the same redundancy; – for the I&C and electrical system failure-initiating events that have their cause in the cabling system, such as arcing or overheating due to short circuits, overloads, voltage transients, etc., a low degree of physical separation may be sufficient; – for plant failure and external failure events (see 6.2), such as fire or structural collapse, adequate physical separation including barriers and/or safety structures shall be applied, as defined by the hazard analysis.		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
8.2.3	Separation of system cables and cable supporting structures of different safety classes		
	The separation of circuits not important to safety from circuits important to safety or associated circuits shall be achieved by complying with the following requirements. a) circuits not belonging to safety class 1 shall be physically separated from safety class 1 circuits and associated circuits generally by distance, by metal divider or if applicable physical barriers except as permitted in item d), or the non- safety class 1 circuits shall be associated circuits; the minimum distances for horizontal and vertical separation of system cables of different safety classes should be established following all the defined criteria in the project separation concept. b) circuits not belonging to safety class 1 shall be electrically isolated from safety class 1 circuits and associated circuits by the use of isolation devices, shielding, and wiring techniques or separation distance, except as permitted in item d), or the circuits not belonging to safety class 1 shall be associated circuits. c) the effects of less than minimum separation or the absence of electrical isolation between the circuits not belonging to safety class 1 and the safety class 1 circuits or associated circuits shall be analysed to demonstrate that safety class 1 circuits are not degraded below an acceptable level or the non- safety class 1 circuits shall be associated circuits.		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	d) instrumentation signal and control circuits not belonging to safety class 1 are not required to be physically separated or electrically isolated from associated circuits provided that firstly the circuits not belonging to safety class 1 are not routed with associated cables of a redundant division and secondly the circuits not belonging to safety class 1 are analysed to demonstrate that safety class 1 circuits are not degraded below an acceptable level. As part of the analysis, consideration shall be given to potential energy and identification of the circuits involved. e) fiber-optic circuits not belonging to safety class 1 are not required to be physically separated from safety class 1 and associated circuits. Electrical isolation is an inherent characteristic of fiber-optic circuits. Since fiber-optic circuits have no potential to degrade safety class 1 circuits, they can be considered safety class 1 associated circuits. Note that cabinet internal separation criteria shall be derived from physical constrains, such as voltage levels/EMC requirements. Cabinet internal physical separation based on different safety classes is not required.		
8.2.4	Separation of signal cables from power cables		
	Cables carrying analogue and other low-level electrical signals should be separated from power cables. Exceptions shall be justified. Depending on the technology, switchgear control cables may be low or high level and shall be subjected to this requirement accordingly. Fibre optic cables may be run together with power cables if their mechanical protection is ensured.		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	The separation of signal cables from power cables depends on EMC and on voltage isolation. The separation between signal cables and power cables shall be sufficient concerning both of these aspects.		
8.2.5	Reduced separation distances		
	Separation distances reduced from those defined in the cabling concept at the beginning of a project may be established by analysis of the proposed cable installation.		
8.2.6	Associated circuits		
	Regarding associated cable circuits the requirements of 5.3 shall be applied		
8.2.7	Separation of cables from tubes or pipes		
	Cables should not be placed adjacent to, or in, trays, trunks or conduits with tubes or pipes carrying fluids under pressure and/or temperature such as oil, steam, water, liquid metals or other fluids which may damage the cables in case of leakage or bursting, with justified exceptions, e.g. where the proximity of a sensor or actuator cable to the process piping is unavoidable due to the need to connect the sensor or actuator to the process.		
8.2.8	General routing considerations		
	As far as possible all cables of the system important to safety should be routed along nonhazardous routes and in a manner to preserve their integrity.		
8.2.9	Identification		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	I&C and electrical cables shall be identified and marked following the applicable identification code. To facilitate commissioning and modification and to reduce the chance of errors, cables and cable routes which contain system cables important to safety shall be marked to identify their redundant safety group and safety classification. This marking should be: a) at the beginning and at the end of the cables and at the penetrations of fire barriers; b) on the cable trays, ducts and conduits.		
8.3	Separation of components inside the I&C and electrical system important to safety		
8.3.1	Divisional separation of redundant components inside the I&C and electrical system important to safety		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	For redundant components within an I&C or electrical system important to safety, in general a divisional separation shall be introduced. Divisional separation is fulfilled in most cases by physical barriers. If separation by physical barriers is not possible, also separation by distance and/or additional fire protection measures should be implemented. The minimum distances for horizontal and vertical separation should be established in a separate project document, e.g. layout concept, following the rules recommended in Clause 5 and Clause 6. Where the minimum separation distance cannot be maintained, specific rules shall be defined. This could be that specific barriers are installed or a justification of lower distances shall be provided. For plant failure and external failure events, such as fire or structure collapse, adequate physical separation including barriers and/or safety structures shall be applied.		
8.3.2	Separation of components of different safety classes		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	The separation of components not important to safety from components important to safety or associated components should be achieved by complying with the following requirements. a) components not belonging to safety class 1 shall be physically separated from safety class 1 components and associated circuits generally if the qualification of the non-safety-class-1-components is lower than the qualification of the safety-class-1-components. This shall be by distance or, if applicable, physical barriers. b) circuits not belonging to safety class 1 shall be electrically isolated from safety class 1 circuits and associated circuits by the use of isolation devices, shielding, and wiring techniques or separation distance, or the circuits not belonging to safety class 1 shall be associated circuits. c) the absence of electrical isolation between the circuits not belonging to safety class 1 and the safety class 1 circuits or associated circuits shall be analysed to demonstrate that safety class 1 circuits are not degraded below an acceptable level or the non- safety class 1 circuits shall be associated circuits. In the case of the supply of an associated circuit the complete power supply unit of this associated circuit is considered as higher safety classified if the component, e.g. switchboard, is higher safety classified. The power supply unit shall fulfil in this case all safety and qualification requirements for the higher safety classified component. Separation of associated circuits (electrical or signals) from the safety classified circuits inside the components or equipment, e.g. switchboards, is not required by this document.		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
8.3.3	Installation of equipment of different voltage levels		
	Equipment of different voltage levels shall be installed following industrial requirements, e.g. separation between medium voltage switchboards, low voltage switchboards, DC switchboards and I&C cabinets. Referring to this topic, the EMC plan and normal industrial standard requirements should be followed. Exceptions from this rule may be possible if: • justified by technical reasons (for example for low energies); • no product standard is available. In this case the applicable basic standard shall be applied in a reasonable way.		
8.3.4	Reduced separation distances		
	Separation distances reduced from those specified in the separate project document required in Clause 5 may be established by analysis of the proposed installations. The analysis should be based on tests performed and calculations. For lesser separation distances in hazardous areas, the severity of hazards (such as size of the fire or pipe break) and mitigating measures should be considered.		
8.3.5	Associated circuits		
	Regarding associated cable circuits the requirements of 5.3 shall be applied.		
8.3.6	Separation of components from sources of hazards		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	I&C or electrical components important to safety should not be placed in areas were hazards could arise due to existing tubes or pipes carrying media under pressure and/or temperature such as oil, steam, water, liquid metals or other media which may damage the components in case of leakage or bursting. There may be some cases where proximity between process piping and I&C and electrical component is unavoidable; in this case protection measures shall be provided.		
8.4	Control room cabinets, desks, panels and related cables		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	Although the probability of fire in the control room and its immediate area is low, its consequences could be very severe. There are major problems in maintaining physical separation or barriers in the control room areas and its panels and desks, where many cables are brought together. Therefore, plants are designed so that fire is not likely in the control room area, and so that any fire which might start is restricted, will spread slowly and will not cause loss of safety control before other control can be established. The methods for this can be complex and they interact strongly with the station cable design, and the layout of the control panels, which are governed by human factors considerations.The control panel layout should allow for human factors consideration (see IEC 60964), such that information and controls of redundant safety plant are grouped suitably for minimisation of the possibility of human errors. The expected frequency of human errors may be high, whereas that of fire in the control room will be low. This requirement can therefore conflict with the requirement for separation by space, barriers or isolation devices given elsewhere in this document, since the human factors requirement for the front-of-panel layout may be required to take priority over convenience or simplicity of cable and connecting wiring design.Methods to control the potential for fire, for detection of fire and for fire suppression shall be identified and applied in the control room and its cabinets, desks and panels, and the relevant cables to and within those items. Methods of retaining physical separation or providing resistance to the spread of fire which may be used include:		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	– full separation of the safety plant controls and indications of different safety groups, which is preferred; – internal metal trunking for the connections to the front of panel devices controlling redundant safety plant; – the provision of heat detectors or automatic fire suppression within control room cabinets; – the fire tolerance of the cabinet structure and any fire barriers between sections of the cabinets. Factors which may be considered include the following: – the control room is always staffed and fire will therefore be rapidly detected and extinguished; – the control room is a controlled access area, in which accumulation of flammable material will be prevented and sabotage is unlikely; – the detection of fire within any compartment of the control room cabinets, panels and desks will be rapid, and the potential rate of spread of fire from one compartment to another is slow enough to allow fires to be extinguished before control is lost; – the availability of redundant controls over safety plant, where one panel section provides individual control of safety plant items and another and separated section provides an alternative and possible grouped control over the safety plant; – the ignition of fire within a panel section is of very low frequency, within the design basis of the plant, by control of the use of flammable material and heat sources within the panel sections; – provision of an alternate, supplementary control room from which the necessary safety control actions can be taken. Suitable means shall be provided to isolate the effects of fires in either control room.		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	Means of ensuring that a fire does not cause short circuits, open circuits or hot shorts such that control is degraded should be included in the I&C system designs. These include physical separation of power and control or indication wires in different cables, application of fibre optic cables and optical isolators, the use of multiplexed systems of control, and VDU soft control.		
9	Verification		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	The project organization shall specify the verification of the implemented separation based on the project separation concept. The project separation concept shall be verified referring to the fulfilment of the requirements mentioned in this document and additional applicable standards, specific national nuclear standard and specific project requirements. Two main topics shall be considered: • electrical isolation; • physical separation. Referring to electrical isolation: Design verification shall be undertaken referring to: – overvoltage protection (Insulation coordination study) following e.g. IEC 60071; – short circuit/overcurrent protection – following e.g. IEC 60909 for AC and IEC 61660 for DC; – electrical non-reactive (retroaction-free) following e.g. IEC 60364-5-56; – galvanic isolation following e.g. IEC 60364-4-41. Implementation verification shall be performed based on a project specific verification plan. Implementation verification referring to electrical isolation should be completed in the frame of the commissioning tests Referring to physical separation: Design verifications shall be undertaken referring to the implementation of the following requirements: – divisional separation; – hazard analysis; – personnel protection; – safety class separation;		

EN IEC 60709:2019			
Clause		Result - Remark	Verdict
	- DiD level separation; - additional technical requirements. Implementation verification referring to physical separation should be completed in the frame of the installation tests.		

IEC 60884-1			
Clause		Result - Remark	Verdict
8	**MARKING**		-
8.1	Accessories marked as follows:		P
	Rated current(A)	/	P
	rated voltage (V)		P
	symbol for nature of supply	~	P
	manufacturer's or responsible vendor's name	Ningbo Homegu Industry and Trade Co., Ltd.	P
	type reference ..... :		P
	symbol for degree of protection (first digit)		N
	symbol for degree of protection (second digit)		N
	SOCKET-outlets with screwless terminals marked with the following:		N
	the length of insulation to be removed ..... :		N
	an indication of the suitability to accept rigid conductors only (if any)		N
	SOCKET-outlets for appliances: provided with flat, quick-connect terminations and screw-type or screwless terminals supplied with an instruction sheet, attached to the smallest packaging unit, informing the user that flat, quick-connect terminations shall not be used for fixed installations (See IEC 60884-2-2 sub-clause 7.1)		N
8.2	Symbols used: as required in the standard		P
	Marking for the nature of supply placed next to the marking for rated current and rated voltage		P
8.3	Marking of fixed SOCKET-outlets placed on the main part:		N
	- rated current, rated voltage and nature of supply		N
	- identification mark of the manufacturer or of the responsible vendor		N
	- length of insulation to be removed, if any		N
	- type reference		N
	Cover plates necessary for safety purposes and intended to be sold separately: marked with the manufacturer's or responsible vendor's name and type reference		N

	IP code, if applicable: marked so as to be easily discernible		N
	Fixed SOCKET-outlets classified according to item b) of 7.2.5: identified by a triangle visible after installation unless they have an interface configuration different from that used in normal circuits ..... :		N
8.4	Plugs and portable SOCKET-outlets: marking specified in 8.1, other than the type reference, easily discernible	Easily discernible	P
	Plugs and portable SOCKET-outlets for equipment of class II not marked with the symbol for class II construction	Class II 	P
8.5	Neutral terminals: N ..... :		N
	Earthing terminals: [earth symbol]		N
	Markings not placed on screws or other easily removable parts		N
	Terminals for conductors not forming part of the main function of the SOCKET-outlet:		N
	clearly identified unless their purpose is self evident, or		N
	indicated in a wiring diagram fixed to the accessory		N
	Identification of such terminals may be achieved by:		N
	their being marked with graphical symbols according to IEC 60417-2 or colours and/or alphanumeric system, or		N
	their being marked with their physical dimensions or relative location		N
8.6	Surface-type mounting boxes forming an integral part of SOCKET-outlets having IP>20: IP code marked on the outside of its associated enclosure so as to be easily discernible		N
8.7	Indication of which position or with which special provision the declared IP of flush-type and semi-flush-type fixed SOCKET-outlets having IP>X0 is ensured		N
8.8	Marking durable and easily legible. Test: 15 s with water and 15 s with petroleum spirit	Easily legible and durable	P
9	**CHECKING OF DIMENSIONS**		-
9.1	Accessories and surface-type mounting boxes	Accord with requirement of	P

	comply with the appropriate standard sheets	standard	
	Insertion of plugs into fixed or portable SOCKET-outlets ensured by their compliance with the relevant standard sheets	Pass muster	P
	Compliance checked by measurement and by means of gauges with manufacturing tolerances as shown in table 2	Comply with the requirements	P
9.2	It is not possible to engage a plug with:		-
	a SOCKET-outlet having a higher voltage rating or a lower current rating		N
	a SOCKET-outlet with a different number of live poles (exception admitted provided that no dangerous situation can arise)		N
	a SOCKET-outlet with earthing contact (plug for class 0 equipment)		N
	Engagement of a plug for class 0 or class I equipment with a SOCKET-outlet designed to accept plugs for class II equipment, not possible		N
	Impossibility of insertion checked by applying a gauge, for 1 min, with a force of:		N
	150 N (rated current ≤ 16A)		P
	250 N (rated current > 16A)		N
	Accessories with elastomeric or thermoplastic material: test carried out at (35 ± 2) °C		P
9.3	Deviations from standard sheets made only if they provide technical advantage and do not affect the purpose and safety of accessories complying with standard sheet		P
10	**PROTECTION AGAINST ELECTRIC SHOCK**		
10.1	SOCKET-outlets: live parts not accessible		P
	Live parts of plugs: not accessible when the plug is in partial or complete engagement with a SOCKET-outlet	Pass muster	P
	Test with test probe B of IEC 61032	Comply with the requirements	P
	Accessories with elastomeric or thermoplastic material: additional test carried out at (35 ± 2) °C with test probe 11 of IEC 61032 (75 N for 1 min)	Pass muster Comply with the requirements	P
	During the test: accessories not deform and no live parts accessible	Don’t deform and don’t be accessible	P
	Plugs and portable SOCKET-outlets pressed with a force of 150 N for 5 min as shown in figure 8: specimens not show deformation	No danger Pass muster	P
10.2	Accessible parts (with exception of small screws		P

	and the like for fixing bases and covers or cover plates): made of insulating material		
	Cover or cover plates of fixed SOCKET-outlets and accessible parts of plugs and portable SOCKET-outlets: made of metal if the requirements of 10.2.1 or 10.2.2 are fulfilled		N
10.2.1	Metal covers or cover plates protected by supplementary insulation made by insulating linings or insulating barriers		N
	Insulating linings or insulating barriers cannot be removed without being permanently damaged		N
	Insulating linings or insulating barriers cannot be replaced in an incorrect position and, if they are omitted, accessories are rendered inoperable or manifestly incomplete		N
	There is no risk of accidental contact between live		N
	parts and metal covers or cover plates		
10.2.2	Metal covers or cover plates automatically connected, through a low-resistance connection, to the earth during fixing		N
10.3	Contact between a pin of a plug and a live SOCKET-contact of a SOCKET-outlet not possible while any other pin is accessible		P
	Compliance checked by manual test and by means of gauges with tolerances as specified in table 2		P
	Accessories with elastomeric or thermoplastic	Pass muster	P
	material: test carried out at (35 ± 2) °C		
	SOCKET-outlets with enclosure or bodies of rubber or	Pass muster	P
	polyvinyl chloride: test carried out with a force of 75 N for 1 min		
	Fixed SOCKET-outlets provided with metal covers or cover plates: clearance of at least 2 mm required between a pin and a SOCKET-contact when another pin(s) is (are) in contact with the metal covers or cover plates		N
10.4	External parts of plugs made of insulating material		P
	Overall dimensions of rings around pins not exceed 8 mm concentric with respect to the pin		P
10.5	Shuttered SOCKET-outlets: live parts not		N

	accessible, without a plug in engagement, with the gauges shown in figure 9 and 10		
	Live contacts automatically screened when the plug is withdrawn		N
	Means cannot easily be operated by anything other than a plug and not depend upon parts which are liable to be lost		N
	Gauge of figure 9, applied to the entry holes corresponding to live contacts with a force of 20 N, for approximately 5 s, successively in three directions, does not touch live parts		N
	Steel gauge of figure 10, applied to the entry holes corresponding to live contacts with a force of 1 N for approximately 5 s, in three directions, does not touch live parts		N
	Accessories with elastomeric or thermoplastic material: test carried out at (35 ± 2) °C		N
10.6	Earthing contacts of a SOCKET-outlet designed that they cannot be deformed by the insertion of a plug		N
	Test plug inserted into the SOCKET-outlet with a force of 150 N for 1 min		N
	After this test: SOCKET-outlet still comply with the requirements of clause 9		N
10.7	SOCKET-outlet with increased protection: live parts not accessible		P
	Test wire of 1 mm diameter (figure 10) applied with a force of 1 N on all accessible surfaces does not touch live parts		P
	Accessories with elastomeric or thermoplastic material: test carried out at (35 ± 2) °C		P
11	**PROVISION FOR EARTHING**		
11.1	Earth connection made before the current-carrying contacts of the plug become live		N
	Current-carrying pins are separated before the earth connection is broken		N
11.2	Earthing terminals of rewirable accessories comply with clause 12		N
	Earthing terminals of the same size as the corresponding terminals for the supply conductors		N
	Earthing terminals of rewirable accessories: internal		N
	Additional external earthing terminal of fixed		N

	SOCKET-outlets of size suitable for conductors of at least 6 mm^2 .....:		
	Earthing terminals of fixed SOCKET-outlets: fixed to the base or to a part reliably fixed to the base		N
	Earthing contacts of fixed SOCKET-outlets:		N
	- fixed to the base, or		N
	- fixed to the cover (reliably connected to the earthing terminals; contact pieces silver plated or with adequate protection)		N
	Parts of earthing circuit in one piece or reliably connected by riveting, welding, or the like		N
11.4	SOCKET-outlets, having an IP>X0, with enclosure of insulating material and more than one cable inlet, provided with:		N
	- an internal fixed earthing terminal, or		N
	adequate space for a floating terminal (test connection using the type of terminal specified by the manufacturer), unless		N
	earthing terminal of SOCKET-outlet itself allows the connection of an incoming and an outgoing earthing conductor		N
11.5	Connection between earthing terminal and accessible metal parts: of low resistance		N
	Test:		N
	Test current equal to 1,5 times the rated current or 25 A (A) ..... :		N
	Resistance not exceed 0,05 Ω (Ω)		N
11.6	Fixed SOCKET-outlets according to item b) of 7.2.5: earthing SOCKET contact and its terminal electrically separated from any metal mounting means or other exposed conductive parts which may be connected to the protective earthing circuit of the installation		N
12	**TERMINALS AND TERMINATIONS**		**P**
	All the test on terminals, with the exception of the tests of 12.3 11 and 12.3.12, made after the test of clause 16	Pass muster Comply with the requirements	P
12.1	General		P
12.1.1	Rewirable fixed SOCKET-outlets provided with screw-type terminals or with screwless terminals ..... :		N

	SOCKET-outlets for appliances provided with screw-type terminals, screwless terminals and/or male tabs of flat, quick-connect terminations (See IEC 60884-2-2 sub-clause 11.1.1)		N
	Rewirable plugs and portable SOCKET-outlets provided with terminals with screw clamping ..... :		N
	Pre-soldered flexible conductors used: pre-soldered area outside the clamp area of screw-type terminals		N
	Clamping means of terminals: not serve to fix any other components		N
12.1.2	Non-rewirable accessories provided with soldered, welded, crimped or equally effective permanent connections (termination)		N
	Screwed or snap-on connections not used		N
	Connections made by crimping a pre-soldered flexible conductor not permitted		N
12.2	Terminals with screw clamping for external copper conductors		N
12.2.1	Accessories provided with terminals which allows the proper connection of copper conductors as shows in table 3		N
	Rated current (A); Type of accessories ..... :		-
	Type of conductor (rigid / flexible) ..... :		-
	Smallest / largest cross-sectional area (mm2) ..... :		-
	Diameter of the largest conductor (mm) ..... :		-
	Figure of terminal ..... :		-
	Minimum diameter D (minimum dimensions) of conductor space: required (mm); measured (mm).. :		N
12.2.2	Terminals allow the conductor to be connected without special preparation		N
12.2.3	Terminals have adequate mechanical strength		N
	Screws and nut for clamping the conductors have metric ISO thread or a comparable thread		N

	Screws not of soft metal such as zinc or aluminium		N
12.2.4	Terminals resistant to corrosion		N
12.2.5	Terminals clamp the conductor(s) without undue damage		N
	Test with apparatus shown in figure 11:		N
	type of conductors ..... :	rigid solid / rigid stranded / flexible	-
	number of conductors..... :		-
	smallest cross-sectional area (mm2) (table 3); diameter of bushing hole (mm); height H (mm); mass (kg)		N
	largest cross-sectional area (mm2) (table 3); diameter of bushing hole (mm); height H (mm); mass (kg)		N
	nominal diameter of thread (mm); torque according to table 6 (Nm) ..... :		-
	During the test: conductor not slip out, no break near clamping unit and no damage		N
12.2.6	Terminals clamp the conductor reliably between metal surfaces		N
	Pull test (1 min):		N
	type of conductors ..... :	rigid solid / rigid stranded / flexible	-
	number of conductors ..... :		-
	smallest cross-sectional area (mm2) (table 3); pull (N) ..... :		N
	largest cross-sectional area (mm2) (table 3); pull (N)		N
	torque (Nm) (2/3 table 6) ..... :		-
	During the test: conductor not move noticeably		N
12.2.7	Terminals designed or placed that the conductor cannot slip out while the clamping screws or nuts are tightened		N
	largest cross-sectional area (mm2) (table 3) ..... :		-
	number of wires and nominal diameter of wires (table 5):		N

	Fixed SOCKET-outlets: rigid solid conductors / rigid stranded conductors ..... :		-
	Plugs and portable SOCKET-outlets: flexible conductors ..... :		-
	terminals intended for looping-in 2 or 3 conductors: permissible number of conductors ..... :		-
	torque (Nm) (2/3 table 6) ..... :		-
	After the test: no wire of the conductor escaped from the clamping unit		N
12.2.8	Terminals not work loose from their fixing to accessories		N
	Torque test:		N
	rigid solid copper conductor of the largest cross-sectional area (mm2) (table 3) ..... :		-
	torque (Nm) (table 6 or appropriate figures 2, 3 or 4)....		-
	Screws and nuts tightened and loosened 5 times. During the test: terminals not work loose and show no damage		N
12.2.9	Clamping screws or nuts of earthing terminals: adequately locked against accidental loosening, not possible to loosen them without the aid of a tool		N
12.2.10	Earthing terminals: no risk of corrosion		N
	Body of brass or other metal no less resistant to corrosion		N
	The body is a part of a frame or enclosure of aluminium alloy: precautions are taken to avoid the risk of corrosion		N
12.2.11	Pillar terminals: distance g no less than the value specified in figure 2: required (mm); measured (mm) ..... :		N
	Mantle terminals: distance g no less than the value specified in figure 5: required (mm); measured (mm)		N
12.3	Screwless terminals for external copper conductors		N
12.3.1	Screwless terminals of the type suitable for:		N

	for rigid copper conductors only, or		N
	for both rigid and flexible copper conductors (tests carried out with rigid and then repeated with flexible conductors)		N
12.3.2	Screwless terminals provided with two clamping units each allowing the proper connection of rigid or of rigid and flexible conductors having nominal cross-sectional areas from 1,5 up to 2,5 mm 2 (table 7)		N
	Two conductors to be connected: each conductor introduced in a separate clamping unit		N
12.3.3	Screwless terminals allow the conductor to be connected without special preparation		N
12.3.4	Parts of screwless terminals intended for carrying current of materials as specified in 26.5		N
12.3.5	Screwless terminals clamp specified conductors with sufficient contact pressure without undue damage to the conductor		N
	Conductor clamped between metal surfaces		N
12.3.6	It is clear how the connection and disconnection of the conductors is to be made		N
	Disconnection of a conductor require an operation, other than a pull, so that can be made manually with or without a general-purpose tool		N
	It is not possible to confuse the opening intended for the use of a tool with the opening intended for the conductor		N
12.3.7	Screwless terminals intended for the interconnection of two or more conductors:		N
	during insertion, operation of clamping means of one of the conductors is independent of operation of that for the other conductor(s)		N
	during disconnection, conductors can be disconnected either at the same time or separately		N
	each conductor introduced in a separate clamping unit		N
	it is possible to clamp securely any number of conductors up to the maximum as designed. Number of conductors; Nominal cross-sectional area (mm2)		N
12.3.8	Screwless terminals of fixed SOCKET-outlets: adequate insertion obvious and over-insertion		N

	prevented		
12.3.9	Screwless terminals properly fixed to the SOCKET-outlets		N
	Not work loose when conductors are connected or disconnected		N
	Self-hardening resins used to fix terminals not subject to mechanical stress		N
12.3.10	Screwless terminals withstand mechanical stresses occurring in normal use		N
	Test:		N
	Connection / disconnection 5 times: rigid solid conductor 2,5 mm2		N
	Connection / disconnection 5 times: rigid solid conductor 1,5 mm2		N
	Conductor subjected to a pull of 30 N for 1 min after each connection. During application of the pull conductor not come out of the terminal		N
	Connection / disconnection 1 time: rigid stranded conductor 2,5 mm2		N
	Connection / disconnection 1 time: rigid stranded conductor 1,5 mm2		N
	Conductor subjected to a pull of 30 N for 1 min after connection. During application of the pull conductor not come out of the terminal		N
	Additional test on terminals intended for both rigid and flexible conductors:		N
	Connection / disconnection 5 times: flexible conductor 2,5 mm2		N
	Connection / disconnection 5 times: flexible conductor 1,5 mm2		N
	Conductor subjected to a pull of 30 N for 1 min after each connection. During application of the pull conductor not come out of the terminal		N
	Additional test with apparatus shown in figure 11:		N
	type of conductors	rigid solid / rigid stranded / flexible	-
	number of conductors		-
	1,5 mm2; diameter of bushing hole 6,5 mm; height H 260 mm; mass 0,4 kg		N
	2,5 mm2; diameter of bushing hole 9,5 mm; height H 280 mm; mass 0,7 kg		N
	During the test: conductors not move noticeably in the clamping unit		N

	After these tests: neither terminals nor clamping means have worked loose and conductors show no deterioration		N
12.3.11	Screwless terminals withstand electrical and thermal stresses occurring in normal use		N
	Test a) carried out for 1 h connecting rigid solid conductors:		N
	test current (A) (table 10) ..... :		-
	nominal cross-sectional area (mm2) ..... :		-

	screwless terminal number ..... :	1	2	3	4	5	-
	voltage drop measured (mV) (requirement: ≤ 15 mV) ..... :						N

	Test b) (temperature cycles test) carried out on terminals subjected to Test a):		N
	test current (A) (table 10) ..... :		-
	cross-sectional area (mm2) ..... :		-

	screwless terminal number ..... :	1	2	3	4	5	-
	voltage drop measured after the 24 cycle (requirement: ≤ 22,5 mV) ..... :						N
	voltage drop measured (mV) after 48th cycle ..... :						N
	voltage drop measured (mV) after 72th cycle ..... :						N
	voltage drop measured (mV) after 96th cycle ..... :						N
	voltage drop measured (mV) after 120th cycle ..... :						N
	voltage drop measured (mV) after 144th cycle ..... :						N
	voltage drop measured (mV) after 168th cycle ..... :						N
	voltage drop measured (mV) after 192th cycle ..... :						N
	requirement: ≤ 22,5 mV or twice the value measured after the 24th cycle (mV) ..... :						N

	After this test: inspection show no changes		N
	Mechanical strength test according 12.3.10:		N
	Connection / disconnection 5 times: rigid solid conductor 2,5 mm2		N
	Connection / disconnection 5 times: rigid solid conductor 1,5 mm2		N
	Conductor subjected to a pull of 30 N for 1 min after		N

	each connection. During application of the pull conductor not come out of the terminal		
	Connection / disconnection 1 time: rigid stranded conductor 2,5 mm2		N
	Connection / disconnection 1 time: rigid stranded conductor 1,5 mm2		N
	Conductor subjected to a pull of 30 N for 1 min after connection. During application of the pull conductor not come out of the terminal		N
	Additional test on terminals intended for both rigid and flexible conductors:		N
	Connection / disconnection 5 times: flexible conductor 2,5 mm2		N
	Connection / disconnection 5 times: flexible conductor 1,5 mm2		N
	Conductor subjected to a pull of 30 N for 1 min after each connection. During application of the pull conductor not come out of the terminal		N
	Additional test with apparatus shown in figure 11:		N
	type of conductors	rigid solid / rigid stranded / flexible	-
	number of conductors		-
	1,5 mm2; diameter of bushing hole 6,5 mm; height H 260 mm; mass 0,4 kg		N
	2,5 mm2; diameter of bushing hole 9,5 mm; height H 280 mm; mass 0,7 kg		N
	During the test: conductors not move noticeably in the clamping unit		N
	After these tests: neither terminals nor clamping means have worked loose and conductors show no deterioration		N
12.3.12	Screwless terminals: connected rigid solid conductor remains clamped, even when deflected during normal installation		N
	Deflection test (principle of test apparatus shown in figure 12a):		N
	test current (A) (equal rated current)		-
	Smallest cross-sectional area (mm2) (table 11)		-
	Force (N) (table 12)		-

	screwless terminal number	1	2	3	-
	starting point (X = deflection original point).....	X	X+10°	X+20°	-
	voltage drop measured (mV) (1st deflection)				N

	voltage drop measured (mV) (2nd deflection)				N
	- voltage drop measured (mV) (3rd deflection)				N
	- voltage drop measured (mV) (4th deflection)				N
	- voltage drop measured (mV) (5th deflection)				N
	- voltage drop measured (mV) (6th deflection)				N
	- voltage drop measured (mV) (7th deflection)				N
	voltage drop measured (mV) (8th deflection)				N
	voltage drop measured (mV) (9th deflection)				N
	voltage drop measured (mV) (10th deflection)				N
	voltage drop measured (mV) (11th deflection)				N
	voltage drop measured (mV) (12th deflection)				N

	requirement: ≤ 25 mV		N
	Largest cross-sectional area (mm2) (table 11)		-
	Force (N) (table 12)		-

	screwless terminal number	1	2	3	-
	starting point (X = deflection original point).....	X	X+10°	X+20°	-
	voltage drop measured (mV) (1st deflection)				N
	voltage drop measured (mV) (2nd deflection)				N
	voltage drop measured (mV) (3rd deflection)				N
	voltage drop measured (mV) (4th deflection)				N
	voltage drop measured (mV) (5th deflection)				N
	voltage drop measured (mV) (6th deflection)				N
	voltage drop measured (mV) (7th deflection)				N
	voltage drop measured (mV) (8th deflection)				N
	voltage drop measured (mV) (9th deflection)				N
	voltage drop measured (mV) (10th deflection)				N
	voltage drop measured (mV) (11th deflection)				N
	voltage drop measured (mV) (12th deflection)				N
	requirement: ≤ 25 mV				N

12.101	Flat, quick-connect terminals (See IEC 60884-2-2 sub-cl. 11.101)		N
	Male tabs and female connectors to be used for test purposes comply with IEC Publication 760		N
12.101.1	Constructional requirements		N
12.101.1.1	Nominal sizes of male tabs		N
	- 2.8mm×0.8mm		N

	- 4.8mm×0.8mm		N
	- 6.8mm×0.8mm		N
	Male tabs of other dimensions and shapes used provided it is not possible to insert them into female connectors intended to fit the above male tab sizes		N
	Round dimple indents, rectangular dimple indents, hole indents or provisions for non-reversible flat quick-connect terminations, also comply with IEC Publication 760		N
12.101.1.2	Male tabs made from copper or copper alloy (bare or tin plated)		N
	Materials or coatings other than those specified used, provided that their electrical and mechanical characteristics are no less reliable, particularly with regard to resistance to corrosion, stability of contact resistance and mechanical strength		N
12.101.1.3	Male tabs have adequate strength to allow the applications and removal of female connectors without damage to the SOCKET-outlet so as to impair compliance with this standard		N
	push force (N)		-
	pull force (N)		-
	No displacement or damage occur which might impair further use		N

12.101.1.4	Male tabs adequately spaced to allow the connection of the appropriate female connectors		N
	Applying an appropriate female connector to each male tab; during this operation no strain or distortion occur to any of the tabs or to their adjacent parts, nor the creepage distance or clearance be reduced below those specified in Clause 26		N
12.101.2	Electrical requirements		N
12.101.2.1	Male tab sizes related to the rated current of the SOCKET-outlet as shown in table 102		N
	Relationship between tab size and rated current:		N
	2.8mm×0.8mm: 6A		N
	4.8mm×0.8mm: 10A		N
	6.8mm×0.8mm: 16A		N
13	**CONSTRUCTION OF FIXED SOCKET-OUTLETS**		-
13.1	SOCKET-contact assembly: sufficient resilience		N
13.2	SOCKET-contact and pins of SOCKET-outlets: resistant to corrosion		N
13.3	Insulating linings, barriers and the like: adequate		N

	mechanical strength		
13.4	SOCKET-outlets constructed as to permit		N
	easy fixing of the base to a wall or in a mounting box		N
	easy introduction and connection of the conductors in the terminals		N
	easy fixing of the base to a wall or in a mounting box		N
	easy fixing of the base to a wall or in a mounting box		N
	correct positioning of the conductors		N
	adequate space between the underside of the base and the surface on which the base is mounted		N
	adequate space between the underside of the base and the sides of the base and the enclosure (cover or box)		N
	SOCKET-outlets classified as design A: permit easy positioning and removal of the cover or cover plate, without displacing the conductors		N
13.5	SOCKET-outlets designed that full engagement of associated plugs is not prevented by any projection from their engagement face		N
	Gap between the engagement face of the SOCKET-outlet and the plug: not exceed 1 mm		N
13.6	Covers provided with bushings for the entry holes for the pins: not possible to remove them from the outside or for them to become detached inadvertently from the inside when the cover is removed		N
13.7	Covers, cover-plates or parts of them intended to ensure protection against electric shock:		N
	held in place at two or more points by effective fixings		N
	fixed by means of a single fixing, for example, by a screw, provided that they are located by another means (for example, by a shoulder)		N
	Fixings of covers or cover-plates of SOCKET-outlets of design A serve to fix the base: there are means to maintain the base in position, even after removal of the covers or cover-plates		N
13.7.1	Covers or cover-plates whose fixings are of the screw-type:		N
	Compliance checked by inspection only		N
13.7.2	Covers or cover-plates whose fixing is not dependent on screws and whose removal is obtained by applying a force in a direction approximately perpendicular to the mounting/supporting surface:		N
	Compliance checked, when their removal may give access, with the standard test finger:		N

	to live parts: by the test of 24.14 (verification of the non-removal and the removal)		N
	to non-earthed metal parts separated from live parts in such a way that creepage distances and clearances have the values shown in table 23: by the test of 24.15 (verification of the non-removal and the removal)		N
	only to parts of insulating material, or earthed metal parts, or metal parts separated from live parts in such a way that creepage distances and clearances have twice the values shown in table 23, or live parts of SEL V circuits not greater than 25 V a.c.: by the test of 24.16 (verification of the non-removal and the removal)		N
13.7.3	Covers or cover-plates the fixing of which is not dependent on screws and whose removal is obtained by using a tool, in accordance with the manufacturer's instructions given in an instruction sheet or in other documentation:		N
	Compliance checked, when their removal may give access, with the standard test finger:		N
	to live parts: by the test of 24.14 (verification of the non-removal only)		N
	to non-earthed metal parts separated from live parts in such a way that creepage distances and clearances have the values shown in table 23: by the test of 24.15 (verification of the non-removal only)		N
	only to parts of insulating material, or earthed metal parts, or metal parts separated from live parts in such a way that creepage distances and clearances have twice the values shown in table 23, or live parts of SEL V circuits not greater than 25 V a.c.: by the test of 24.16 (verification of the non-removal only)		N
13.8	Cover-plate intended for a SOCKET-outlet with earthing contact: not interchangeable with a cover-plate intended for a SOCKET-outlet without earthing contact		N
13.9	Surface-type SOCKET-outlets: no free openings in their enclosures		N
13.10	Screws or other means for mounting the SOCKET-outlet on a surface in a box or enclosure: easily accessible from the front.		N
	Fixing means not serve any other fixing purpose		N
13.11	Multiple SOCKET-outlets with a common base: provided with fixed links for the interconnection of the		N

	contacts in parallel		
	Fixing of the links independent from the connection of the supply wires		N
13.12	Multiple SOCKET-outlets, comprising separate bases: correct position of each base ensured		N
	Fixing of each base independent of the fixing of the combination to the mounting surface		N
13.13	Mounting plate of surface-type SOCKET-outlets: adequate mechanical strength		N
13.14	SOCKET-outlets withstand the lateral strain imposed by equipment likely to be introduced into them		N
	SOCKET-outlets 16A 220-240V: test made 4 times with the SOCKET-outlet turned through 90°, 5 N for 1 min (device shown in fig. 13)		N
	During the test: device not become disengaged from the SOCKET-outlet		N
	After the test:		N
	no damage		N
	SOCKET-outlets comply with clause 22		N
13.15	SOCKET-outlets are not an integral part of lampholders		N
13.16	Surface-type SOCKET-outlets having IP>20 are according to their IP classification when fitted with conduits or with sheathed cables and without a plug in engagement		N
	Surface-type SOCKET-outlets having IPX4 and IPX5 have provision for opening a drain hole		N
	SOCKET-outlets with a drain hole: drain hole is not less than 5 mm in diameter, or 20 mm2 in area with a width and a length of not less than 3mm ..... :		N
	Drain hole: effective		N
	Lid springs (if any): of corrosion-resistant material (bronze or stainless steel)		N
13.17	Earthing pins: adequate mechanical strength		N
	Not solid pins: compliance checked by inspection and by the test of 14.2 made after the tests of clause 21		N
13.18	Earthing contacts and neutral contacts: locked against rotation and removable only with the aid of a tool, after dismantling the SOCKET-outlet		N
13.19	Metal strips of the earthing circuit: no burrs which might damage the insulation of the supply conductors		N
13.20	SOCKET-outlets for appliances be so designed that the assembling of their component parts is not affected by the fixation of the SOCKET-outlet to the		N

	appliance (See IEC 60884-2-2 sub-clause 12.21)		
	The method of fixing be such that the SOCKET-outlet cannot turn and cannot be detached from the appliance without the aid of a tool (See IEC 60884-2-2 sub-clause 12.21)		N
13.21	Inlet openings: allow the introduction of the conduit or the sheath of the cable		N
	Surface-type SOCKET-outlets:		N
	the conduit or sheath of the cable can enter at least I mm into the enclosure		N
	inlet opening for conduit entries, or at least two of them if there are more than one, capable of accepting conduit sizes of 16, 20, 25 or 32 according to IEC 60423 or a combination of at least two of any of these sizes		N
	inlet opening for cable entries capable of accepting cables having the dimensions specified in table 14 or be as specified by the manufacturer: rated current (A); Limits of external dimensions of cable min/max (mm)		N
13.22	Membranes (grommets) in inlet openings: reliably fixed and not displaced by the mechanical and thermal stresses occurring in normal use		N
	Test on membranes subjected to the ageing treatment specified in 16.1 and assembled in the accessories		N

	Accessories placed at (40 ± 2) °C for 2 h. Force of 30 N applied for 5 s by test probe 11 of IEC 61032. During the test: no deformation		N
	Membranes likely to be subjected to an axial pull: axial pull of 30 N applied for 5 s. During the test: membranes not become detached		N
	After the test: no harmful deformation, cracks or similar damage		N
	Test repeated with membranes not subjected to any treatment		N
13.23	Membranes in inlet openings: introduction of the cables into the accessory permitted when the ambient temperature is low		N
	Test on membranes not subjected to the ageing treatment specified in 16.1 and assembled in the accessories		N
	Accessories kept at (-15 ± 2) °C for 2 h: possibility to introduce cables of the largest diameter through		N

	membranes		
	After the test: no harmful deformation, cracks or similar damage		N
14	**CONSTRUCTION OF PLUGS AND PORTABLE SOCKET-OTLETS**		**P**
14.1	Non-rewirable portable accessories:		P
	flexible cable cannot be separated from the accessory without making it permanently useless		N
	Accessory cannot be opened by hand or by using a general purpose tool, for example a screwdriver used as such		P
14.2	Pins of portable accessories: adequate mechanical strength		P
	Test for pins not solid (made after clause 21): force of 100 N exerted on the pin, according to figure 14, for 1 min by means of a steel rod Ø 4,8 mm		P

	During the application of the force: reduction of the dimension of the pin not exceed 0,15 mm	Pass muster Not exceed 0.15mm	P
	After removal of the rod: dimensions of the pin not changed by more than 0,06 mm	Pass muster	P
14.3	Pins of plugs:		P
	locked against rotation		P
	not removable without dismantling the plug		P
	adequately fixed in the body of the plug when the plug is wired and assembled as in normal use		P
	Earthing or neutral pins or contacts of plugs: not possible to arrange in an incorrect position		N
14.4	Earthing contacts and neutral contacts of portable SOCKET-outlets:		N
	locked against rotation		
	removable only with the aid of a tool, after dismantling the SOCKET-outlet	Need the aid of a tool	P
14.5	SOCKET-contact assemblies: sufficient resilience		P
14.6	Pins and SOCKET-contacts: resistant to corrosion and abrasion		P
14.7	Enclosures of rewirable portable accessories: completely enclose terminals and ends of flexible cable		N
	Construction of rewirable accessories:		N
	conductors can be properly connected		N
	cores not pressed against each other		N
	cores of live conductor not pressed against accessible metal parts		N

	core of earthing conductor not pressed against live parts		N
14.8	Rewirable portable accessories: terminal screws or nuts cannot become loose and fall out of position and establish an electrical connection between live parts and earthing terminal or metal parts		N
14.9	Rewirable portable accessories with earthing contact: ample space for slack of earthing (test)		N
	Non-rewirable non-moulded-on accessories with earthing contact: current-carrying conductors stressed before the earthing conductor if the flexible cable slips in its anchorage		N
14.10	Terminals of rewirable portable accessories and terminations of non-rewirable portable accessories: located and shielded that loose wires not present a risk of electric shock		N
	Non-rewirable moulded-on portable accessories: provided with means to prevent loose wires of a conductor from reducing the minimum isolation distance requirements		N

14.10.1	Rewirable accessories: test with 6 mm free wire		N
	free wire of a conductor connected to a live terminal not touch any accessible metal part or able to emerge from the enclosure		N
	free wire of a conductor connected to an earthing terminal not touch a live part		N
14.10.2	Non-rewirable, non-moulded-on accessories: test with a free wire of length equivalent to the maximum designed stripping length declared by the manufacturer plus 2 mm		N
	free wire of a conductor connected to a live termination not touch any accessible metal part or reduce creepage distance and clearance below 1,5 mm to the external surface		N
	free wire of a conductor connected to an earth termination not touch any live part		N
14.10.3	Non-rewirable, moulded-on accessories:		N
	Verification of means to prevent stray wires reducing the minimum distance through insulation to external accessible surface below 1,5 mm		N
14.11	Rewirable portable accessories:		N
	clear how relief from strain and prevention of twisting is intended to be effected		N

	cord anchorage, or at least part of it, integral with or fixed to one of the component parts of the plug or portable SOCKET-outlet		N
	makeshift methods not used		N
	cord anchorage suitable for the different types of flexible cable which may be connected to it; screws, if any: not serve to fix any other component		N
	cord anchorages: of insulating material or provided with an insulating lining fixed to the metal parts		N
	metal parts of cord anchorages, including clamping screws: insulated from the earthing circuit		N
14.12	Rewirable portable accessories and non-rewirable non-moulded on portable accessories: it is not possible to remove covers, cover-plates or parts of them intended to ensure protection against electric shock without the use of a tool	Pass muster	P
14.13	Covers of portable SOCKET-outlets: bushings for entry holes for the pins not removable from the outside or detachable inadvertently from the inside	Pass muster	P
14.14	Screws intended to allow access to interior of the accessory: captive	Pass muster	P
14.15	Engagement face of plugs: no projections		P
14.16	Engagement face of portable SOCKET-outlets: no projection		P
14.17	Portable accessories of IP>20: enclosed according to their IP classification		N
	Plugs having IP>20: adequately enclosed with the exception of the engagement face		N
	Portable SOCKET-outlets having IP>20: adequately enclosed without a plug in engagement		N
	Lid springs (if any): of corrosion-resistant material (bronze or stainless steel)		N
14.18	Portable SOCKET-outlets: means for suspension from a wall or other mounting surfaces not allow access to live parts		P
	No free openings between space intended for suspension means by which the SOCKET-outlet is fixed to the wall, or other mounting surface and live parts		P
14.19	Combinations of portable accessories and switches, circuit-breakers or other devices comply with relevant individual IEC standards, if relevant combined product standard does not exist:		P
14.20	Portable accessories: not integral part of		N

	lampholders		
14.21	Plugs for equipment of class II:		P
	rewirable or non-rewirable	on-rewirable	P
	if part of a cord set: provided with a connector for equipment of class II		N
	if part of a cord extension set: provided with a portable SOCKET-outlet for equipment of class II		N
14.22	Components (switches and fuses) incorporated in accessories: comply with the relevant IEC standard	switch	P
14.23	Plug-in equipment: not cause overheating of the pins or impose undue strain		N
	Plugs with rating above 16 A and 250 V: not integral part of other equipment		N
	Tests for two-pole plugs, with or without earthing contact, with rating up to and including 16 A and 250 V (plug of equipment inserted into a fixed SOCKET-outlet complying with this standard):		N
14.23.1	SOCKET-outlet connected to a supply voltage equal to 1,1 times the highest rated voltage of the equipment (V) ..... :		-
	Temperature rise of the pins after 1 h not exceed 45 K (K) ..... :		N
14.23.2	Additional torque applied to the SOCKET-outlet in order to maintain the engagement face in the vertical plane not exceed 0,25 Nm (Nm) ..... :		N
14.24	Plugs: can easily withdrawn by hand from the relevant SOCKET-outlet		N
	Gripping surfaces: so designed that the plug can be withdrawn without pull on the flexible cable		N
14.25	Membranes in inlet openings of portable accessory: meet the requirements of 13.22 and 13.23		N
15	**INTERLOCKED SOCKET-OUTLETS**		**N**
	SOCKET-outlet interlocked with a switch:		N
	plug cannot be inserted into or completely withdrawn from the SOCKET-outlet while the SOCKET-contacts are live		N
	SOCKET-contacts cannot be made live until a plug is almost completely in engagement		N
16	**RESISTANCE TO AGEING, PROTECTION PROVIDED BY ENCLOSURES, AND RESISTANCE TO HUMIDITY**		N
16.1	Resistance to ageing		N
	Accessories are resistant to ageing		N

	Accessories subjected to a test in a heating cabinet at (70 ± 2) °C for seven days (168 h)		N
	After the tests, the specimens show:		N
	no crack visible with normal or corrected vision without additional magnification		N
	no sticky or greasy material		N
	no trace of cloth (forefinger pressed with 5 N)		N
	no damage		N

16.2	Protection provided by enclosures		N
	Enclosures provide a degree of protection in accordance with the IP designation of the accessory		N
16.2.1	Protection against access to hazardous parts and against harmful effects due to ingress of solid foreign objects		N
	Accessories and their enclosures provide a degree of protection against access to hazardous parts and against harmful effects due to ingress of solid foreign objects		N
	Fixed SOCKET-outlets: mounted as in normal use on a vertical surface		N
	Flush-type and semi-flush type SOCKET-outlets: mounted in an appropriate box according to the manufacturer’s instructions		N
	Accessories with screwed glands or membranes fitted with flexible cables within the range specified in table 3:		N
	- largest cross-sectional area (mm2); type of cable (table 17)		-
	- smallest cross-sectional area (mm2); type of cable (table 17)		-
	Glands tightened with a torque equal to 2/3 of the torque applied during the test of 24.6 (Nm)		-
	Screws of the enclosure tightened with a torque equal to 2/3 of the torque given in table 6 (Nm)		-
16.2.1.1	Protection against access to hazardous parts		P
	Appropriate test performed as specified in IEC 60529 (see also clause 10)		P
16.2.1.2	Protection against harmful effects due to ingress of solid foreign objects		N
	Appropriate test performed as specified in IEC 60529		N
	Test on accessories with IP5X (considered to be of category 2): dust not penetrated in a quantity to interfere with satisfactory operation or to impair safety		N

16.2.2	Protection against harmful effects due to ingress of water		P
	Accessories and their enclosures provide a degree of protection against harmful effects due to ingress of water in accordance with their IP classification	Pass muster IP44	P
	Appropriate test performed as specified in IEC 60529 under the following conditions:		N
	Flush-type and semi-flush type SOCKET-outlets: fixed in a vertical test wall using an appropriate box according to the manufacturer's instructions		N
	Accessory suitable to be installed on a rough wall: test wall according to figure 15 is used		
	Surface-type SOCKET-outlets mounted as for normal use in a vertical position and fitted with cables (having conductors of the largest and smallest nominal cross-sectional area given in table 3) or conduits or both in accordance with the manufacturer's instructions:		N
	largest cross-sectional area (mm2); type of cable (table 17) ...		-
	smallest cross-sectional area (mm2); type of cable (table 17) ..... :		-
	Portable SOCKET-outlets tested on a plain, horizontal surface in a position as in normal use and fitted with flexible cables (having conductors of the largest and smallest nominal cross-sectional area given in table 3) according to table 17:		N
	- largest cross-sectional area (mm2); type of cable (table 17) ..... :		-
	smallest cross-sectional area (mm2); type of cable (table 17) ..... :		-
	Screws of enclosure tightened with a torque equal to 2/3 of the torque given in table 6 (Nm) ..... :		-
	Glands tightened with a torque equal to 2/3 of the torque applied during the test of 24.6 (Nm) ..... :		-
	Accessory with drain holes opened during the test: any accumulation of water proved by inspection		N
	SOCKET-outlets tested without a plug in engagement		N
	Plugs tested when in full engagement with:		N
	a fixed SOCKET-outlets		N
	a portable SOCKET-outlets		N
	of the same system and with the same degree of protection against harmful effects due to ingress of water		-

	Specimens withstand an electric strength test specified in 17.2 which is started within 5 min of completion of the IP test		N
16.3	Resistance to humidity		N
	Accessories proof against humidity which may occur in normal use		N
	Compliance checked by a humidity treatment carried out in a humidity cabinet containing air with relative humidity maintained between 91 % and 95 %		N
	Specimens kept in the cabinet for:		N
	- two days (48 h) for accessories having IPX0		N
	- seven days (168 h) for accessories having IP>X0		N
	After this treatment the specimens show no damage		N
	Surface-type SOCKET-outlets mounted as for normal use in a vertical position and fitted with cables (having conductors of the largest and smallest nominal cross-sectional area given in table 3) or conduits or both in accordance with the manufacturer's instructions:		N
	largest cross-sectional area (mm^2); type of cable (table 17) ..... :		-
	Portable SOCKET-outlets tested on a plain, horizontal surface in a position as in normal use and fitted with flexible cables (having conductors of the largest and smallest nominal cross-sectional area given in table 3) according to table 17:		N
	largest cross-sectional area (mm^2); type of cable (table 17) ..... :		-
	smallest cross-sectional area (mm^2); type of cable (table 17)		-
	Screws of enclosure tightened with a torque equal to 2/3 of the torque given in table 6 (Nm) ..... :		-
	Glands tightened with a torque equal to 2/3 of the torque applied during the test of 24.6 (Nm) ..... :		-
	Accessory with drain holes opened during the test: any accumulation of water proved by inspection		N
	SOCKET-outlets tested without a plug in engagement		N
	Plugs tested when in full engagement with:		N
	a fixed SOCKET-outlets		N
	a portable SOCKET-outlets		N
	of the same system and with the same degree of protection against harmful effects due to ingress of water		-

	Specimens withstand an electric strength test specified in 17.2 which is started within 5 min of completion of the IP test		N
16.3	Resistance to humidity		N
	Accessories proof against humidity which may occur in normal use		
	Compliance checked by a humidity treatment carried out in a humidity cabinet containing air with relative humidity maintained between 91 % and 95 %		N
	Specimens kept in the cabinet for:		N
	two days (48 h) for accessories having IPX0		N
	seven days (168 h) for accessories having IP>X0		N
	After this treatment the specimens show no damage		N
	During the test no flashover or breakdown		N
18	**OPERATION OF EARTHING CONTACTS**		N
	Earthing contacts provide adequate contact pressure and not deteriorate in normal use		N
	Compliance checked by the tests of clauses 19 and 21		N
	Force exerted measured in side earthing contacts not less than 5 N (CEE 7 clause 18) ..... :		N
19	**TEMPERATURE RISE**		-
	Non-rewirable accessories tested as delivered:		N
	- type of flexible cable; number of conductors and nominal cross-sectional area (mm2) ..... :		-
	Rewirable accessories fitted with polyvinyl chloride insulated conductors having a nominal cross-sectional area as show in table 15:		N
	- rated current of accessory ..... :		-
	- nominal cross-sectional area (mm^2) ..... :		-
	- type of conductors ..... :		-
	Terminal screws or nuts tightened with a torque equal to 2/3 of that specified in 12.2.8 (Nm) ..... :		-
	SOCKET-outlets tested using a test plug with brass pins having the minimum specified dimensions		N
	Plugs tested using a fixed SOCKET-outlet complying with the standard and having as near to average characteristics, but with minimum size of the earthing pin, if any		N
	Test current as specified in table 20 passed for 1 h (A) ..... :		-
	Temperature rise of terminals not exceed 45 K (K) :		N
	Separate tests made passing the current through:		N
	- the neutral contact, if any, and the adjacent phase		N

	contact (K) ..... :		
	- the earthing contact, if any, and the nearest phase contact (K) ..... :		N
	Temperature rise of external parts of insulating material not necessary to retain current-carrying parts and parts of the earthing circuit in position (K):		N
20	**BREAKING CAPACITY**		N
	Accessories have adequate breaking capacity		N
	Compliance checked by testing:		N
	SOCKET-outlets		N
	plugs with pins which are not solid		N
	Test conditions:		N
	100 strokes; rate of operation ..... :		-
	test voltage (1,1 Vn) ..... :		-
	test current (1,25 In) (power factor 0,6) ..... :		-
	Multiple SOCKET-outlets: test carried out on one SOCKET-outlet of each type and current rating		N
	During the test: no sustained arcing occur		N
	After the test:		N
	specimens show no damage impairing their further use		N
	entry holes for the pins not show any damage which may impair the safety		N
21	**NORMAL OPERATION**		**P**
	Accessories withstand without excessive wear or other harmful effect, the mechanical, electrical and thermal stresses occurring in normal use		P
	Compliance checked by testing:		P
	SOCKET-outlets		P
	plugs with resilient earthing SOCKET-contacts		N
	plugs with pins which are not solid		N
	Test performed on:		N
	complete shuttered SOCKET-outlets		N
	specimens prepared by the manufacturer without shutters (with current flowing). Number of strokes . :		N
	specimens with shutters (without current flowing)		N
	complete shuttered SOCKET-outlets with operations made by hand as in normal use		P
	Test conditions:		P
	10000 strokes; rate of operation ..... :		-
	test voltage Vn (V) ..... :		-
	test current (as specified in table 20) (A) (power factor 0,8) ..... :		-

	Test current passed:		N
	during each insertion and withdrawal of the plug (In ≤ 16A)		N
	during alternate insertion and withdrawal, the other insertion and withdrawal being made without current flowing (In > 16A)		N
	Multiple SOCKET-outlets: test carried out on one SOCKET-outlet of each type and current rating		N
	During the test: no sustained arcing occur		N
	After the test the specimens do not show:		N
	wear impairing their further use		N
	deterioration of enclosures, insulating lining or barriers		N
	damage to the entry holes for the pins, that might impair proper working		N
	loosening of electrical or mechanical connections		N
	seepage of sealing compound		N
	Shuttered SOCKET-outlets: the following gauges applied to the entry holes corresponding to live contacts do not touch live parts when they remain under the relevant forces:		N
	Gauge of figure 9, applied with a force of 20 N, for approximately 5 s, successively in three directions		N
	Steel gauge of figure 10, applied with a force of 1 N for approximately 5 s, in three directions		N
	Temperature-rise test (requirements of clause 19):		P
	Test current as required for the normal operation test, given in table 20, passed for 1 h (A) ..... :		N
	Temperature rise of terminals not exceed 45 K (K) :		N
	Separate tests made passing the current through:		N
	the neutral contact, if any, and the adjacent phase contact (K) ..... :		N
	the earthing contact, if any, and the nearest phase contact (K) ..... :		N
	SOCKET-outlets: electric strength (sub-clause 17.2), test voltage (a.c., for 1 min):		N
	a) test voltage (V)..... :		N
	b) test voltage (V)..... :		N
	c) test voltage (V)..... :		N
	d) test voltage (V)..... :		N
	e) test voltage (V)..... :		N
	Plugs: electric strength (sub-clause 17.2), test voltage (a.c., for 1 min):		N
	a) test voltage (V)..... :		N

	b) test voltage (V)..... :		N
	c) test voltage (V)..... :		N
	d) test voltage (V)..... :		N
	During the test: no flashover or breakdown		N
	Fixed SOCKET-outlets: test according to 13.1		N
	Pins of plugs and portable SOCKET-outlets: test according to 14.2		N
	Force exerted measured in side earthing contacts not less than 60 % or 5 N (CEE 7 clause 18) ..... :		N
22	**FORCE NECESSARY TO WITHDRAW THE PLUG**		**P**
	Construction of accessory does allow the easy insertion and withdrawal of the plug, and prevent the plug from working out of the SOCKET-outlet in normal use		P
	Rated current (A) ..... :		P
	Number of poles ..... :	3	P
22.1	Verification of the maximum withdrawal force (multi-pin gauge)		N
	- Maximum withdrawal force (N) ..... :		-
	The plug not remain in the SOCKET-outlet		N
22.2	Verification of the minimum withdrawal force (single-pin gauge)		P
	Minimum withdrawal force (N) ..... :		-
	The plug not fall from each individual contact-assembly within 30 s		P

23	**FLEXIBLE CABLES AND THEIR CONNECTION**		N
23.1	Plugs and portable SOCKET-outlets provided with a cord anchorage such that the conductors are relieved from strain and that their covering is protected from abrasion		N
	Sheath of flexible cable clamped within the cord anchorage		N
23.2	Pull and torque test		N
	Non-rewirable accessories:		N
	rating of accessory ..... :		N
	type of flexible cable; number of conductors and nominal cross-sectional area (mm2) ..... :		N
	pull (100 times) (N) ..... :		N
	torque (1 min) as specified in table 18 (Nm) ..... :		N
	After the test:		N
	Displacement ≤ 2 mm ..... :		N
	No break in the electrical connections		N

	Rewirable accessories:		N
	rating of accessory ..... :		-
	clamping screws, if any, tightened with a torque equal to 2/3 of that specified in table 6 (Nm) ..... :		-
	type of flexible cable; number of conductors and smallest nominal cross-sectional area (mm2) as show in table 17 ..... :		-
	pull (100 times) (N) ..... :		N
	torque (1 min) as specified in table 18 (Nm) ..... :		N
	After the test:		N
	Displacement ≤ 2 mm ..... :		N
	End of conductors not have moved noticeably in the terminals		N
	type of flexible cable; number of conductors and largest nominal cross-sectional area (mm2) as show in table 17 ..... :		-
	pull (100 times) (N) ..... :		N
	torque (1 min) as specified in table 18 (Nm) ..... :		N
	After the test:		N
	Displacement ≤ 2 mm ..... :		N
	End of conductors not have moved noticeably in the terminals		N
	Rewirable accessories having rated current up to and including 16 A:		N
	Suitable for fitting with the appropriate cable as shown in table 19		N
	Type of flexible cable; number of conductors and nominal cross-sectional area (mm2) ..... :		-
23.3	Non-rewirable plugs and non-rewirable portable SOCKET-outlets: provided with a flexible cable complying with IEC 60227 or IEC 60245		N
	Flexible cables have the same number of conductors as there are poles in the plug or SOCKET-outlet		N
	Conductor connected to the earthing contact: identified by the colour combination green/yellow		N
23.4	Non-rewirable plugs and non-rewirable portable SOCKET-outlets: designed that the flexible cable is protected against excessive bending		N
	Guards of insulating material and fixed in reliable manner		N
	Flexing test (10.000 flexings):		N
	type of flexible cable and nominal cross-sectional area (mm2) ..... :		-
	test current (A) ..... :		-

	mass (N) ..... :		-
	During the test: no interruption of the test current and no short-circuit between conductors		N
	After the test: guard no separated from the body, insulation shows no sign of abrasion or wear, broken strands become no accessible		N
24	**MECHANICAL STRENGTH**		N
	Accessories, surface mounting boxes and screwed glands have adequate mechanical strength		N
24.1	Fixed SOCKET-outlets, portable multiple SOCKET-outlets and surface-type mounting boxes: impact test (apparatus shown in fig. 22, 23, 24 and 25)		N
	After the test: no damage, live parts no become accessible		N
24.2	Portable single SOCKET-outlets and plugs: subjected to test Ed: Free fall, procedure 2 of IEC 60068-2-32 (tumbling barrel); number of falls ..... :		N
	After the test:		N
	no part become detached or loosened		N
	pins no become so deformed that the plug cannot be introduced into a SOCKET-outlet and also fails to comply with the requirements of 9.1 and 10.3		N
	pins no turn when a torque of 0,4 Nm is applied for 1 min in each direction		N
24.3	Bases of surface-type SOCKET-outlets: first fixed to a cylinder of rigid steel sheet and then fixed to a flat steel sheet		N
	During and after the tests: no damage		N
24.4	Portable single SOCKET-outlets, multiple SOCKET-outlets and plugs (elastomeric or thermoplastic material): impact test, weight (1000 ± 2) g, height 100 mm (apparatus shown in fig. 27)		N
	Specimens placed in a freezer at (-15 °C ± 2) °C for at least 16 h. After the test: no damage		N
24.5	Portable single SOCKET-outlets and plugs (elastomeric or thermoplastic material): compression test, 300 N for 1 min, position a) and b) (apparatus shown in fig. 8)		N
	After the test: no damage		N
24.6	Screwed glands of accessories having IP>20: torque test (1 min)		N
	diameter of test rod (mm) ..... :		-
	type of material ..... :	metal / moulded material	-
	torque (Nm) ..... :		-

	type of material ..... :		-
	After the test: no damage of glands and enclosures of the specimens		N
24.7	Plug pins provided with insulating sleeves: 20000 movements, 4 N (apparatus shown in fig. 28)		N
	After the test: no damage of pins, insulating sleeve not have punctured or rucked up		N
24.8	Shuttered SOCKET-outlets: mechanical test carried out on specimens submitted to the normal operation test according to clause 21		N
	Force applied for 1 min against the shutter of an entry hole by means of one pin ..... :		-
	Pin not come in contact with live parts		N
	After the test: no damage		N
24.9	Multiple portable SOCKET-outlet: mechanical test		P
	Rewirable multiple SOCKET-outlets: flexible cable of the smallest cross-sectional area specified in table 3:		-
	8 falls on concrete floor with the specimens arranged as shown in figure 29		P
	After the test: no damage, no part have become detached or loosened		P
	Accessories having IP>X0 submitted again to the tests as specified in 16.2		P
24.10	Plugs: pull test to verify the fixation of pins in the body of the plug (new specimens)		N
	Maximum withdrawal force (table 16) applied for 1 min on each pin in turn, after the specimen has been placed at (70 ± 2) °C for 1 h ..... :		-
	After the test: displacement of pins in the body of the plug ≤ 1 mm ..... :		N
24.11	Barriers of portable SOCKET-outlets having means for suspension on a mounting surface:		N
	Force applied for 10 s against the barrier by means of a cylindrical steel rod (1,5 times the maximum plug withdrawal force specified in 22.1, table 16) (N):		-
	Rod not pierce the barrier		N
24.12	Portable SOCKET-outlets having means for suspension on a mounting surface (pull test):		N
	Pull applied to the supply flexible cable for 10 s (force prescribed in 23.2 for checking the flexible cable anchorage) (N) ..... :		-
	During the test: no break of the means for suspension on a mounting surface		N
24.13	Portable SOCKET-outlets having means for		N

	suspension on a mounting surface (pull test):		
	Pull applied to the engagement face of the SOCKET-outlet for 10 s (maximum withdrawal force specified, for the corresponding plug, in table 16) (N) ..... :		-
	During the test: no break of the means for suspension on a mounting surface		N
24.14	Forces necessary to retain or remove covers, cover-plates or parts of them (accessibility with the test finger to live parts)		N
24.14.1	Verification of the retention of covers or cover-plates (fixed SOCKET-outlets)		N
	Force applied for 1 min perpendicular to the mounting surface ..... :		-
	Covers or cover-plates not come off		N
	Test repeated on new specimens with a sheet of hard material, (1 ± 0,1) mm thick, fitted around the supporting frame (fig. 31). Covers or cover-plates not come off		N
	After the test: no damage		N
24.14.2	Verification of the removal of covers or cover-plates (fixed SOCKET-outlets)		N
	Force not exceeding 120 N applied 10 times perpendicular to the mounting / supporting surface: covers or cover-plates come off		N
	Test repeated on new specimens with a sheet of hard material, (1 ± 0,1) mm thick, fitted around the supporting frame (fig. 31). Covers or cover-plates come off		N
	After the test: no damage		N
24.14.3	Verification of the retention of covers or cover-plates (plugs and portable SOCKET-outlets)		N
	Force 80 N applied for 1 min perpendicular to the mounting surface. Covers, cover-plates or parts of them not come off		N
	Test repeated with a force of 120 N:		N
	Rewirable plugs and rewirable portable SOCKET-outlets: covers, cover-plates or parts of them may come off but the specimen shows no damage		N
	Non-rewirable, non moulded-on accessories: covers, cover-plates or parts of them may come off but the accessories is permanently useless according to 14.1		N
24.15	Force necessary for covers or cover-plates to come		N

	off or not to come off (accessibility with the test finger to non-earthed metal parts separated from live parts by creepage distances and clearances according to table 23)		
24.14.1	Verification of the non-removal of covers or cover-plates		N
	Force applied for 1 min in direction perpendicular to the mounting surface ..... :		-
	Covers or cover-plates not come off		N
	Test repeated on new specimens with a sheet of hard material, 1 mm ± 0,1 mm thick, fitted around the supporting frame (fig. 8)		N
	Covers or cover-plates not come off		N
	After the test: no damage		N
24.14.2	Verification of the removal of covers or cover-plates		N
	Force not exceeding 120 N applied 10 times in direction perpendicular to the mounting / supporting surface: covers or cover-plates come off		N
	Test repeated on new specimens with a sheet of hard material, 1 mm ± 0,1 mm thick, fitted around the supporting frame (fig. 8)		N
	Covers or cover-plates come off		N
	After the test: no damage		N
24.16	Force necessary for covers or cover-plates to come off or not to come off (accessibility to insulating parts, earthed metal parts, live parts of SELV ≤ 25 V a.c. or metal parts separated from live parts by creepage distances twice those according to table 23)		N

24.14.1	Verification of the non-removal of covers or cover-plates		N
	Force 10 N applied for 1 min in direction perpendicular to the mounting surface: covers or cover-plates not come off		N
	Test repeated on new specimens with a sheet of hard material, 1 mm ± 0,1 mm thick, fitted around the supporting frame (fig. 8)		N
	Covers or cover-plates not come off		N
	After the test: no damage		N
24.14.2	Verification of the removal of covers or cover-plates		N
	Force not exceeding 120 N applied 10 times in direction perpendicular to the mounting / supporting surface: covers or cover-plates come off		N
	Test repeated on new specimens with a sheet of hard		N

	material, 1 mm ± 0,1 mm thick, fitted around the supporting frame (fig. 8)		
	Covers or cover-plates come off		N
	After the test: no damage		N
24.17	Test with gauge of figure 7 applied according to figure 9 for verification of the outline of covers or cover-plates: distances between face C of gauge and outline of side under test, not decrease ..... :	complying / not complying	-
24.18	Test with gauge according to figure 5 applied as shown in figure 11 (1 N): gauge not enter more than 1mm ..... :	complying / not complying	-
24.101	SOCKET-outlets for appliance: impact test (9 blows) (See IEC 60884-2-2 sub-clause 23.101)		P
	Pendulum: height of fall (cm) ..... :		-
	Spring hammer: energy (J) ..... :		-
	After the test: no damage	No damage	P
	Live parts not become accessible to the standard test finger		P
25	**RESISTANCE TO HEAT**		**N**
25.1	Fixed and portable accessories: heating cabinet at (100 ± 2)°C for 1 h		N
	During the test: no change impairing their further use and sealing compound, if any, not flow		N
	After the test:		N
	no access to live parts with probe B of IEC 61032 applied with a force not exceeding 5 N		N
	markings still legible		N
25.2	Parts of insulating material of fixed SOCKET-outlets necessary to retain current-carrying parts and parts of the earthing circuit in position, as well as parts of the front surface zone of 2 mm wide surrounding the phase and neutral pin entry holes: ball-pressure test at (125 ± 2)°C for 1 h		N
	After the test: diameter of impression ≤ 2 mm		N
25.3	For parts not necessary to retain current-carrying parts and parts of the earthing circuit in position, even though in contact with them: ball-pressure test (1 h)		N
	Test temperature (°C) ..... :		N
	After the test: diameter of impression ≤ 2 mm ..... :		N
25.4	Portable accessories: compression test (20 N) at (80 ± 2)°C for 1 h by means of the apparatus shown in figure 38		N
	After the test: no damage		N

26	**SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS**		
26.1	Connections withstand mechanical stresses		
	Thread-forming or thread-cutting screws used only if supplied together with the piece in which they are intended to be inserted		N
	Thread-cutting screws intended to be used during installation: captive		N
	Screws and nuts which transmit contact pressure: in engagement with a metal thread		N
	Test:		N
	10 times for screws in engagement with a thread of insulating material and for screws of insulating material		N
	5 times for all other cases		N
	terminals: screw diameter (mm); torque (Nm); times		-
	earthing terminals: screw diameter (mm); torque (Nm); times ..... :		-
	assembly screws: screw diameter (mm); torque (Nm); times ..... :		-
	cord anchorage: screw diameter (mm); torque (Nm); times ..... :		-
	other screws or nuts: diameter (mm); torque (Nm); times ..... :		-
	During the test: no damage impairing the further use of the screwed connectons		N
26.2	Screws in engagement with a thread of insulating material: correct introduction into the screw hole or nut ensured		N
26.3	Contact pressure: not transmitted through insulating material other than ceramic, pure mica or other material no less suitable unless there is sufficient resiliency in metallic parts		N
	Connections made by insulation piercing of tinsel cord reliable		N
26.4	Screws and rivets locked against loosening and/or turning		N
26.5	Current-carrying parts (including earthing terminals) have mechanical strength, electrical conductivity and resistance to corrosion adequate:		N
	copper		N
	alloy with at least 58 % copper for parts made from cold-rolled sheet or with at least 50 % copper for other parts		N

	stainless steel with at least 13 % chromium and not more than 0,09 % carbon		N
	steel with electroplated coating of zinc (ISO 2081), with thickness of at least:		N
	5 µm, service condition ISO no. 1 (IPX0)		N
	12 µm, service condition ISO no. 2, (IPX4)		N
	25 µm, service condition ISO no. 3, (IPX5)		N
	steel with electroplated coating of nickel and chromium (ISO 1456), with thickness of at least:		N
	20 µm, service condition ISO no. 2, (IPX0)		N
	30 µm, service condition ISO no. 3, (IPX4)		N
	40 µm, service condition ISO no. 4, (IPX5)		N
	steel with electroplated coating of tin (ISO 2093), with thickness of at least:		N
	12 µm, service condition ISO no. 2, (IPX0)		N
	20 µm, service condition ISO no. 3, (IPX4)		N
	30 µm, service condition ISO no. 4, (IPX5)		N
	Current-carrying parts subjected to mechanical wear: not of steel with electroplated coating		N
	Metals having a great difference of electrochemical potential: not used in contact with each other		N
26.6	Contacts subjected to a sliding action: of metal resistant to corrosion		P
26.7	Thread-forming screws and thread-cutting screws not used for the connection of current-carrying parts		N
	Thread-forming screws and thread-cutting screws used to provide earthing connection: not necessary to disturb the connection and at least two screws are used for each connection		N

27	**CREEPAGE DISTANCES, CLEARANCES AND DISTANCES THROUGH SEALING COMPOUND**		**P**
27.1	Creepage distances, clearances and distances through sealing compound no less than the values shown in table 23		P
	Creepage distances (cr):		P
	1) between live parts of different polarity ≥ 4(3) mm:		P
	2) between live parts and:		P
	accessible surface of parts of insulating material ≥ 3 mm ..... :		P
	earthed metal parts including parts of earthing circuit ≥ 3 mm ..... :		N
	metal frames supporting the base of flush-type SOCKET-outlets ≥ 3		N

	mm ..... :		
	screws or devices for fixing bases, covers or cover-plates of fixed SOCKET-outlets ≥ 3 mm ..... :		P
	external assembly screws, other than screws which are on the engagement face of plugs and are isolated from the earthing circuit ≥ 3 mm ..... :		N
	3) between pins of plugs and metal parts connected to them, when fully engaged, and a SOCKET-outlet of the same system having accessible unearthed metal parts ≥ 6(4,5) mm ..... :		N
	4) between the accessible unearthed metal parts of a SOCKET-outlet and a fully engaged plug of the same system having pins and metal parts connected to them ≥ 6(4,5) mm ..... :		N
	5) between live parts of a SOCKET-outlet (without a plug) or of a plug and their accessible unearthed or functional earthed metal parts ≥ 6(4,5) mm ..... :		N
	6) between live parts of different polarity ≥ 3 mm ... :	>3 mm	P
	7) between live parts and:		P
	accessible surface of parts of insulating material ≥ 3 mm ..... :	>3 mm	P
	earthed metal parts not mentioned under 8 and 9 including parts of earthing circuit ≥ 3 mm ..... :		N
	metal frames supporting the base of flush-type SOCKET-outlets ≥ 3 mm ..... :		N
	screws or devices for fixing bases, covers or cover-plates of fixed SOCKET-outlets ≥ 3 mm ..... :	>3 mm	P
	external assembly screws, other than screws which are on the engagement face of plugs and are isolated from the earthing circuit ≥ 3 mm ..... :		N
	8) between live parts and:		P
	exclusively earthed metal boxes ≥ 3 mm ..... :	>3 mm	P
	unearthed metal boxes, without insulating lining ≥ 4,5 mm		N
	accessible unearthed or functional earthed metal parts of SOCKET-outlets and plugs ≥ 6 mm		N
	9) between live parts and the surfaces on which the base of a SOCKET-outlet for surface mounting is mounted ≥ 6 mm.....	>6 mm	P
	10) between live parts and the bottom of any conductor recess, if any, in the base of a	>3 mm	P

	SOCKET-outlet for surface mounting ≥ 3 mm.....		
	Distance through insulating sealing compound:		P
	11) between live parts covered with at least 2 mm of sealing compound and the surfaces on which the base of a SOCKET-outlet for surface mounting is mounted ≥ 4(3) mm ..... :		
	12) between live parts covered with at least 2 mm of sealing compound and the bottom of any conductor recess, if any, in the base of a SOCKET-outlet for surface mounting ≥ 2,5 mm..... :		N
27.2	Insulating sealing compound: not protrude above the edge of the cavity in which it is contained		N
27.3	Surface-type SOCKET-outlets: no bare current-carrying strips at the back		N
28	**RESISTANCE OF INSULATING MATERIAL TO ABNORMAL HEAT, TO FIRE AND TO TRACKING**		N
28.1	Resistance to abnormal heat and to fire		N
28.1.1	Glow-wire test		N
	For parts of fixed accessories necessary to retain current-carrying parts and parts of the earthing circuit in position: test temperature 850 °C		N
	No visible flame and no sustained glowing		N
	Flame and glowing extinguish within 30 s ..... :		N
	No ignition of the tissue paper		N
	For parts of fixed accessories needed to retain the earth terminal in position in a box: test temperature 650 °C		N
	No visible flame and no sustained glowing	No visible flame and no sustained glowing	N
	Flame and glowing extinguish within 30 s ..... :		N
	No ignition of the tissue paper		N
	For parts of portable accessories necessary to retain current-carrying parts and parts of the earthing circuit in position: test temperature 750 °C		N
	No visible flame and no sustained glowing		N
	Flame and glowing extinguish within 30 s ..... :		N
	No ignition of the tissue paper		N
	For parts not necessary to retain current-carrying parts and parts of the earthing circuit in position, even though in contact with them: test temperature 650 °C		N
	No visible flame and no sustained glowing		N
	Flame and glowing extinguish within 30 s ..... :		N
	No ignition of the tissue paper		N
28.1.2	Plugs with pins provided with insulating sleeves:		N

	Test temperature maintained for 3 h by means of the apparatus shown in figure 40 at (120 ± 5) °C / (180 ± 5) °C ..... :		-
	Impact test according to sub-clause 30.4 (mass 100 g, height 100 mm, 4 impacts): no cracks of the insulating sleeves		N
28.2	Resistance to tracking		N
	Parts of insulating material retaining live parts in position of accessories having IP>X0: test voltage 175 V, 50 drops, solution A of IEC 60112		N
	No flashover or breakdown		N
29	**RESISTANCE TO RUSTING**		**N**
	Ferrous parts protected against rusting		N
	Test made after having removed all grease using a suitable degreasing agent: 10 min 10 % solution of ammonium chloride, 10 min in a box with air saturated with moisture and 10 min at (100 ± 5) °C. No signs of rust		N

30	**ADDITIONAL TESTS ON PINS PROVIDED WITH INSULATING SLEEVES**		**N**
30.1	Pressure test at high temperature		N
	Apparatus shown in figure 41, with the test specimen in position, maintained for 2 h at (200 ± 5) °C. Force applied through the blade: 2,5 N		N
	Thickness of insulation measured: before the test (mm); after the test (mm) ..... :		-
	Thickness within the area of impression ≥ 50 % of the thickness measured before the test: percent value (%) ..... :		N
30.2	Static damp heat test		N
	Set of 3 specimens submitted to two damp heat cycles in accordance with IEC 60068-2-30		N
	After the test:		N
	Insulation resistance and electric strength test (clause 17)		N
	Abrasion test (sub-clause 24.7)		N
30.3	Test at low temperature		N
	Set of 3 specimens maintained at (-15 °C ± 2) °C for 24 h		N
	After the test:		N
	Insulation resistance and electric strength test (clause 17)		N
	Abrasion test (sub-clause 24.7)		N

30.4	Impact test at low temperature		N
	Specimens maintained at (-15 °C ± 2) °C for 24 h subjected to 4 impacts (mass 100 g, height 100 mm) by means of the apparatus shown in figure 42 rotating the specimen through 90° between impacts		N
	After the test: no crack of the insulating sleeves		N

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Clause		Result - Remark	Verdict

5	**Product information**		**P**
5.1	**Marking**		P
	A Terminal blocks block shall be marked in a durable and legible manner with the following:		P
	a) the name of the manufacturer or a trade mark by which the manufacturer can be readily identified;	Wenzhou Yinuo Electric Co., Ltd.	P
	b) a type reference permitting its identification in order to obtain relevant information from the manufacturer or his catalogue.		P
5.2	**Additional information**		P
	The following information shall be stated by the manufacturer, if applicable, e.g. in the manufacturer's data sheet or his catalogue or on the packing unit:		P
	a) IEC 60947-7-1, if the manufacturer claims compliance with this standard;		P
	b) the rated cross-section;		P
	c) the rated connecting capacity, if different from table 2, including the number of conductors simultaneously connectable;		P
	d) the rated insulation voltage;		P
	e) the rated impulse withstand voltage, when determined;		P
	f) service conditions, if different from those of clause 6.		P
6	**Normal service, mounting and transport conditions**		P
6.1	**Normal service conditions**		P
	Equipment complying with this standard shall be capable of operating under the following standard conditions		P
	NOTE For non-standard conditions in service, see Annex B. These may require agreement between manufacturer and user.		P

6.1.1	**Ambient air temperature**		P
	The ambient air temperature does not exceed +40 °C and its average over a period of 24 h does not exceed +35 °C.		P
	The lower limit of the ambient air temperature is –5 °C.		P
	Ambient air temperature is that existing in the vicinity of the equipment if supplied without enclosure, or in the vicinity of the enclosure if supplied with an enclosure.		P
	NOTE 1 Equipment intended to be used in ambient air temperature above +40 °C (e.g. in forges, boiler rooms, tropical countries) or below –5 °C (e.g. –25 °C, as required by IEC 60439-1 for outdoor installed low-voltage switchgear and controlgear assemblies) should be designed or used according to the relevant product standard, where applicable, or according to agreement between manufacturer and user.		P
	Information given in the manufacturer's catalogue may take the place of such an agreement.		P
	NOTE 2 Standard reference air temperature for certain types of equipment, e.g., circuit-breakers or overload relays for starters, is indicated in the relevant product standard.		P
6.1.2	**Altitude**		P
	The altitude of the site of installation does not exceed 2 000 m.		P
	NOTE For equipment to be used at higher altitudes, it is necessary to take into account the reduction of the dielectric strength and the cooling effect of the air.		P
	Electrical equipment intended to operate under these conditions shall be designed or used in accordance with an agreement between manufacturer and user.		P
6.1.3	**Atmospheric conditions**		P
6.1.3.1	**Humidity**		P
	The relative humidity of the air does not exceed 50 % at a maximum temperature of +40 °C.		P
	Higher relative humidities may be permitted at lower temperatures, e.g. 90 % at +20 °C.		P

	Special measures may be necessary in cases of occasional condensation due to variations in temperature.		P
	NOTE Pollution degrees, as stated in 6.1.3.2, define the environmental conditions more precisely.		P
6.1.3.2	**Pollution degree**		P
	The pollution degree (see 2.5.58) refers to the environmental conditions for which the equipment is intended.		P
	NOTE 1 The micro-environment of the creepage distance or clearance and not the environment of the equipment determines the effect on the insulation.		P
	The micro-environment might be better or worse than the environment of the equipment.		P
	It includes all factors influencing the insulation, such as climatic and electromagnetic conditions, generation of pollution, etc.		P
	For equipment intended for use within an enclosure or provided with an integral enclosure, the pollution degree of the environment in the enclosure is applicable.		P
	For the purpose of evaluating clearances and creepage distances, the following four degrees of pollution of the micro-environment are established (clearances and creepage distances according to the different pollution degrees are given in Tables 13 and 15):		P
	Pollution degree 1		N
	No pollution or only dry, non-conductive pollution occurs.		N
	Pollution degree 2:		N
	Normally, only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation may be expected.		N
	Pollution degree 3:		P
	Conductive pollution occurs, or dry, non-conductive pollution occurs which becomes conductive due to condensation.		P
	Pollution degree 4:		N

	The pollution generates persistent conductivity caused, for instance, by conductive dust or by rain or snow.		N
	Standard pollution degree of industrial applications:		N
	Unless otherwise stated by the relevant product standard, equipment for industrial applications is generally for use in pollution degree 3 environment.		N
	However, other pollution degrees may be considered to apply depending upon particular applications or the micro-environment.		N
	NOTE 2 The pollution degree of the micro-environment for the equipment may be influenced by installation in an enclosure.		P
	Standard pollution degree of household and similar applications		P
	Unless otherwise stated by the relevant product standard, equipment for household and similar applications is generally for use in pollution degree 2 environment.		P
6.1.4	**Shock and vibration**		P
	Standard conditions of shock and vibration to which the equipment can be submitted are under consideration.		P
6.2	**Conditions during transport and storage**		P
	A special agreement shall be made between user and manufacturer if the conditions during transport and storage, e.g. temperature and humidity, differ from those defined in 6.1, except that, unless otherwise specified, the following temperature range applies during transport and storage: between –25 °C and +55 °C and, for short periods not exceeding 24 h, up to +70 °C.		P
	Equipment subjected to these extreme temperatures without being operated shall not undergo any irreversible damage and shall then operate normally under the specified conditions.		P
6.3	**Mounting**		P
	The equipment shall be mounted in accordance with the manufacturer's instructions.		P

7.1	**Constructional and performance requirement**		-
7.1.1	Materials		P
	Resistance to abnormal heat and fire (according to 8.1.1.1 of IEC 60947-1) of insulating current-carrying parts		P
	The suitability of materials used is verified by making tests:		P
	a) on the equipment; or		P
	b) on sections taken from the equipment; or		P
	c) on samples of identical material having representative cross-section.		P
	The suitability shall be determined with respect to resistance to abnormal heat and fire.		P
	The manufacturer shall indicate which tests, amongst a), b) and c), shall be used.		P
	If an identical material having representative cross-sections has already satisfied the requirements of any of the tests of 8.2.1, then those tests need not be repeated.		P
	Clamping units		P
	The clamping units shall allow the conductors to be connected by means ensuring that a reliable mechanical linkage and electrical contact is properly maintained.		P
	NOTE Screw-type clamping units are not suitable for the connection of flexible conductors with tin soldered ends.		P
	The clamping units shall be able to withstand the forces that can be applied through the connected conductors.		P
	Compliance is checked by inspection and by the tests of 8.3.3.1, 8.3.3.2 and 8.3.3.3.		P
	No contact pressure shall be transmitted through insulating materials other than ceramic, or other material with characteristics not less suitable, unless there is sufficient resiliency in the metallic parts to compensate for any possible shrinkage of the insulating material.		P
	The corresponding test is under consideration		P
7.1.2	**Mounting**		P

	Terminal blocks blocks shall be provided with means that allow them to be securely attached to a rail or a mounting surface.		P
	Tests shall be made in accordance with 8.3.2.		P
	NOTE Information on mounting on rails can be found in IEC 60715.		P
7.1.3	**Clearances and creepage distances**		P
	For Terminal blocks blocks for which the manufacturer has stated values of rated impulse withstand voltage *U*imp and rated insulation voltage *U*i, minimum values of clearances and creepage distances are given in tables 13 and 15 of IEC 60947-1.		P
	For Terminal blocks blocks for which the manufacturer has determined no value of rated impulse withstand voltage *U*imp, guidance for minimum values is given in annex A..		P
	Electrical requirements are given in 7.2.2		P

7.1.4	**Terminal blocks identification and marking**		P
	Subclause 7.1.7.4 of IEC 60947-1 applies with the following addition.		P
	A Terminal blocks block shall have provision, or at least space, for identification marks or numbers for each clamping unit or Terminal blocks assembly related to the circuit of which it forms a part.		P
	NOTE Such provision may consist of separate marking items, such as marking tags, identification labels, etc.		P
7.1.5	**Resistance to abnormal heat and fire**		P
	The insulation materials of Terminal blocks blocks shall not be adversely affected by abnormal heat and fire.		P
	Compliance is checked by the needle flame test according to IEC 60695-2-2 (see note in 7.1.1.1 of IEC 60947-1), as specified in 8.5 of this standard.		P
7.1.6	**Rated cross-section and rated connecting capacity**		P

	Terminal blocks blocks shall be so designed that conductors of the rated cross-section and the rated connecting capacity, if applicable, can be accepted.		P
	Compliance is checked by the test described in 8.3.3.4.		P
	The verification of the rated cross-section may be performed by the special test according to 8.3.3.5.		P
7.2	**Performance requirements**		P
7.2.1	**Temperature-rise**		P
	Terminal blocks blocks shall be tested in accordance with 8.4.5. The temperature-rise of the Terminal blocks shall not exceed 45 K.		P
7.2.2	**Dielectric properties**		P
	If the manufacturer has declared a value of the rated impulse withstand voltage *U*imp (see 4.3.1.3 of IEC 60947-1), the requirements of 7.2.3 and 7.2.3.1 of IEC 60947-1 apply.		P
	If applicable, the impulse withstand voltage test shall be carried out in accordance with 8.4.3 a).		P
	For the verification of solid insulation, the requirements of 7.2.3, 7.2.3.2 and 7.2.3.5 of IEC 60947-1 apply.		P
	The power-frequency withstand voltage test shall be carried out in accordance with 8.4.3 b).		P
	The verification of sufficient clearances and creepage distances shall be made in accordance with 8.4.2.		P
	If no value of *U*imp has been declared, the verification of clearance and creepage distances shall be made as stated in annex A.		P

7.2.3	**Rated short-time withstand current**		P
	A Terminal blocks block shall be capable of withstanding for 1 s the rated short-time withstand current which corresponds to 120 A/mm2 of its rated cross-section, in accordance with 8.4.6.		P
7.2.4	**Voltage drop**		P
	The voltage drop on a Terminal blocks block caused by the conductor connection, measured according to 8.4.4, shall not exceed the values specified in 8.4.4 and, where applicable, in 8.4.7.		P

7.2.5	**Electrical performance after ageing (for screwless-type Terminal blocks blocks only)**		P
	Terminal blocks blocks shall be capable of withstanding the ageing test comprising 192 temperature cycles in accordance with 8.4.7.		P
7.3	**Electromagnetic compatibility (EMC)**		P

8	**Tests**		P
8.1	**Kinds of test**		P
	Subclause 8.1.1 of IEC 60947-1 applies with the following addition.		P
	No routine tests are specified.		P
	The verification of the rated cross-section according to 8.3.3.5 is a special test. All other tests are type tests.		P
8.2	General		P
8.3	**Verification of Mechanical properties of Terminal blocks**		**-**
8.3.1	General		
8.3.3.1	Mechanical strength of Terminal blocks		P
	maximum cross-sectional area of conductor (mm²) .....:		-
	diameter of thread (mm) .....:		-
	torque (Nm) ..... :		-
	5 times on 2 separate clamping units		P
8.3.3.2	Testing for damage to and accidental loosening of conductor (flexion test)		-
	Subclauses 8.2.4.1 and 8.2.4.3 of IEC 60947-1 apply with the following modification. Each test shall be carried out on two clamping units of one Terminal blocks block.		
	For screw-type clamping units with a diameter of threads up to and including 2,8 mm, the tightening torque shall be in accordance with table C.1 or the torque specified by the manufacturer.		
	The tests shall be made with the type (rigid and/or flexible) and the number of conductors stated by the manufacturer as follows:		
	with the different types of conductor of the specified smallest cross-section (only one conductor connected);		

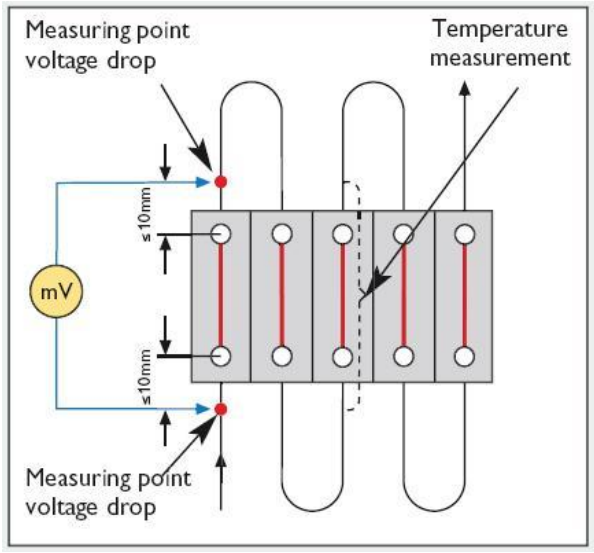
	with the different types of conductor of the specified rated cross-section (only one conductor connected);		
	and, if applicable,		P
	– with the type(s) of conductor of the largest connectable cross-section, if larger than the rated cross-section (only one conductor connected);		P
	- with the different types and maximum number of conductors of the smallest cross-section simultaneously connectable;		P
	- with the different types and maximum number of conductors of the largest cross-section simultaneously connectable;		P
	- with the different types and maximum number of conductors of the smallest and largest cross-section simultaneously connectable.		P

8.3.3.3	Pull-out test		P
	Force (N) .....:		-
	1 min, the conductor shall neither slip out of the Terminal blocks nor break near the clamping unit	No slip out, no break near the clamping unit	P

	Flexion test		N
	conductor of the largest cross-sectional area (mm²) .....:		-
	number of conductor of the largest cross-sectional .....:		-
	diameter of bushing hole (mm) ..... :		-
	Height between the equipment and the platen (mm) ..... :		-
	Mass at the conductor(s) (kg) .....:		-
	135 continuous revolutions: the conductor shall neither slip out of the Terminal blocks nor break near the clamping unit		P
8.3.4	Connecting capacity		P
	type of conductors .....:		-
	minimum cross-sectional area of conductor (mm²) .....:		-
	maximum cross-sectional area of conductor (mm²) .....:		-
	number of conductors simultaneously connectable to the Terminal blocks .....:		-
8.3.5	Connection		P
	Terminal blocks for connection to external conductors shall be readily accessible during installation		P
	clamping screws and nuts shall not serve to fix any other component		P

8.4.2	Verification of clearances and creepage distances		
8.4.2.1	General		P
8.4.2.2	Clearances		P
	Rated impulse withstand voltage		P

	Creepage distances		-
	Pollution degree ..... :		P
	Comparative tracking index (V) .....:		P
	Material group .....:		P
	Rated insulation voltage Ui (V) .....:		P
	Minimum creepage distances (mm) ..... :		—
	Measured creepage distances (mm) .....:		P
	In case Uimp is not indicated		P
8.4.4	**Verification of the voltage drop**		P
	The voltage drop shall be verified		P
	a) before and after the test of mechanical strength of clamping units (see 8.3.3.1);		P
	b) before and after the temperature-rise test (see 8.4.5);		P
	c) before and after the short-time withstand current test (see 8.4.6);		P
	d) before, during and after the ageing test (see 8.4.7).		P
	The verification is made as specified in 8.3.3.1, 8.4.5, 8.4.6 and 8.4.7.		P
	The voltage drop is measured on each Terminal blocks block as indicated in figure 2.		P
	The measurement is made with a direct current of 0,1 times the value given in table 4 or table 5.		P
	Before the tests according to a), b), c) and d) above, the voltage drop shall not exceed 3,2 mV.		P
	If the measured value exceeds 3,2 mV, the voltage drop is determined on each individual clamping unit separately, which shall not exceed 1,6 mV.		P
	After the tests according to a), b) and c), the voltage drop shall not exceed 150 % of the values measured before the test.		P
	During and after the test according to d), the voltage drop measured shall not exceed the values specified in 8.4.7.		P

			P

8.4.5	**Temperature rise**		-
	The test is made simultaneously on five adjacent Terminal blocks blocks connected in series by PVC insulated conductors of the rated cross-section, as shown in figure 2.		P
	The conductors shall be tightened with a torque according to table 4 of IEC 60947-1, with the respective table C.1 for screw-type clamping units with a diameter of threads up to and including 2,8 mm, or to a higher value specified by the manufacturer, if applicable.		P
	The minimum length of each of the six conductors shall be 1 m for rated cross-sections up to and including 10 mm^2 (AWG 8), and 2 m for larger rated cross-sections.		P
	The test circuit shall be located horizontally on a wooden surface as shown in figure 2 (e.g. table top or floor), the Terminal blocks blocks being securely fixed to this surface and the conductors lying freely on it.		P
	If the rated cross-section is below 10 mm^2 (AWG 8), the conductors shall be solid. For rated cross-sections equal to or higher than 10 mm^2 (AWG 8), the conductors shall be rigid stranded. Dur ing the test, screws of clamping units shall not be retightened.		P

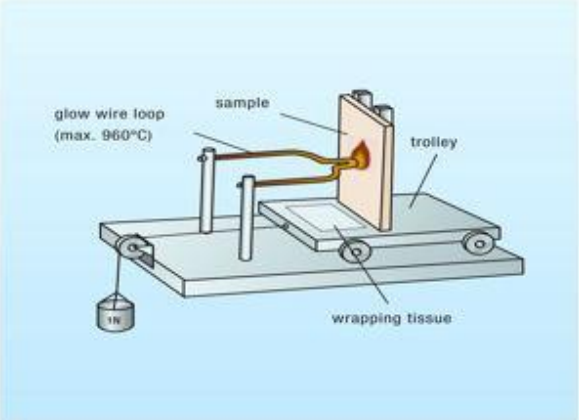
	After verification of the voltage drop according to 8.4.4, the test is made with a.c. singlephase current as given in table 4 or table 5 according to the rated cross-section, and is continued until steady temperature is reached.		P
	A variation of less than 1 K between any two out of three consecutive measurements made at an interval of 5 min is considered as steady temperature.		P
	For multi-tier Terminal blocks blocks, the test is made either with an a.c. single-phase current as given in table 4 or table 5, or with the current specified by the manufacturer.		P
	The temperature-rise of any part of the centrally located Terminal blocks block shall not exceed the limit given in 7.2.1 (see figure 2).		P
	At the end of the test, after cooling down to ambient air temperature and without any change in the arrangement, the Terminal blocks blocks shall pass the voltage drop test according to 8.4.4.		P
	ambient temperature 10-40 °C ..... :		—
	Contactor		-
	test enclosure W x H x D (mm x mm x mm) ..... :		—
	material of enclosure ..... :	plastic	—

8.4.6	**Short-time withstand current test**		-
	The purpose of this test is to verify the ability to withstand a thermal shock.		P
	The test is performed on one Terminal blocks block installed according to the manufacturer's instructions.		P
	It is wired with a conductor of the rated cross-section, tightened with the torque according to table 4 of IEC 60947-1, with the respective table C.1 for screw-type clamping units with a diameter of threads up to and including 2,8 mm, or with a higher value specified by the manufacturer, if applicable.		P

	If the rated cross-section is below 10 mm2 (AWG 8), the conductors shall be solid. For rated cross-sections equal to or higher than 10 mm2 (AWG 8), the conductors shall be rigid stranded.		P
	After verification of the voltage drop according to 8.4.4, the value and the duration of the test current shall be in accordance with 7.2.3.		P
	At the end of the test no damage that may impair further use shall have occurred to any part of the Terminal blocks block.		P
	After cooling down to ambient temperature and without any change in the arrangement, the Terminal blocks block shall pass the voltage drop test according to 8.4.4.		P

8.4.7	**Ageing test for screwless-type Terminal blocks blocks**		-
	The test is made simultaneously on five adjacent Terminal blocks blocks connected in series by conductors of the rated cross-section, as shown in figure 2.		P
	If the rated cross-section is below 10 mm2 (AWG 8), the conductors shall be solid. For rated cross-sections equal to or higher than 10 mm2 (AWG 8), the conductors shall be rigid stranded.		P
	For Terminal blocks blocks intended for use under “normal service conditions” (maximum 40 ° C according to 6.1.1 of IEC 60947-1), PVC-insulated conductors shall be used.		P
	For Terminal blocks blocks for which the manufacturer has specified “maximum service conditions above 40 ° C” (see 6.1.1, note 1, of IEC 60947-1), heat-resistant, insulated or non-insulated conductors shall be used.		P
	The minimum length of the conductor bridges shall be 300 mm.		P
	The Terminal blocks blocks are placed in a heating cabinet which is initially kept at a temperature of (20 +/- 2) ° C and then submitted to the verification of the voltage drop test.		P
	The whole test arrangement, including the conductors, shall not be moved until the voltage drop test has been completed.		P

	The Terminal blocks blocks are submitted to 192 temperature cycles as follows.		P
	The temperature in the heating cabinet is increased to 40 ° C according 8.3.3.3.1 of IEC 60947-1 or to the temperature value declared by the manufacturer for “maximum service conditions”.		P
	The temperature is maintained within _5 ° C of this value for approximately 10 min.		P
	During this test period the current according to 8.4.5 is applied.		P
	The Terminal blocks blocks are then cooled down to a temperature of approximately 30 ° C, forced cooling being allowed; they are kept at this temperature for approximately 10 min and, if necessary for measuring the voltage drop, it is allowed to cool down further to a temperature of (20 _ 5) ° C.		P
	NOTE As a guide, a value for the heating and cooling rate of the heating cabinet of approximately 1,5 ° C/min may be taken as a basis.		P
	The voltage drop in each Terminal blocks block is also determined according to 8.4.4 after each of 24 temperature cycles and after the 192 temperature cycles have been completed, each time at a temperature of (20 +/- 5) ° C.		P
	In no case the voltage drop shall exceed 4,8 mV or 1,5 times the value measured after the 24th cycle, whichever is the lower.		P
	If one of the Terminal blocks blocks does not withstand the test, the test is repeated on a second set of Terminal blocks blocks, all of which shall then comply with the repeated test.		P
	After this test, a visual inspection shall show no changes impairing further use such as cracks, deformations or the like.		P
	Furthermore, the pull-out test according to 8.3.3.3 shall be carried out.		P
	Max temperature		P
8.5	**Test of resistance to heat**		-
8.5.1	Test:		P

	- without removable covers..... 1 h (100 ± 2) °C		P
	- removable covers..... 1 h (70 ± 2) °C		P
	After the test no access to live parts, marking still legible		P
8.5.2	Ball pressure test for external parts of insulating material (parts retaining current-carrying parts and parts of the protective circuit in position) T = 125°C Ø of impression ≤ 2 mm		P
8.5.3	Ball pressure test for external parts of insulating material (parts not retaining current-carrying parts and parts of the protective circuit in position T = (70 ± 2)°C or T = ___ °C = (40 ± 2)°C + max. temperature rise of sub-clause 8.8 Ø of impression ≤ 2 mm		N
8.5.4	Resistance to abnormal heat and to fire		P
	External parts of insulating material shall not ignite or spread fire under fault or overload conditions		P
8.5.5	**Resistance to abnormal heat and to fire**		P
	Glow wire test:		
	No visible flame, no sustained glowing or flames and glowing extinguish within 30 s		P
	external parts retaining current-carrying parts and parts of the protective circuit in position ..... (960 ± 15)°C  	Terminal blocks block body no flame and no glowing on the sample.	P
	all other external parts ..... (650 ± 10)°C	_____ s	N

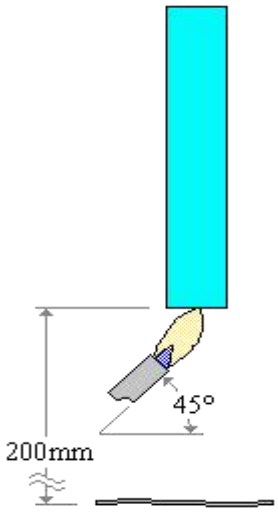
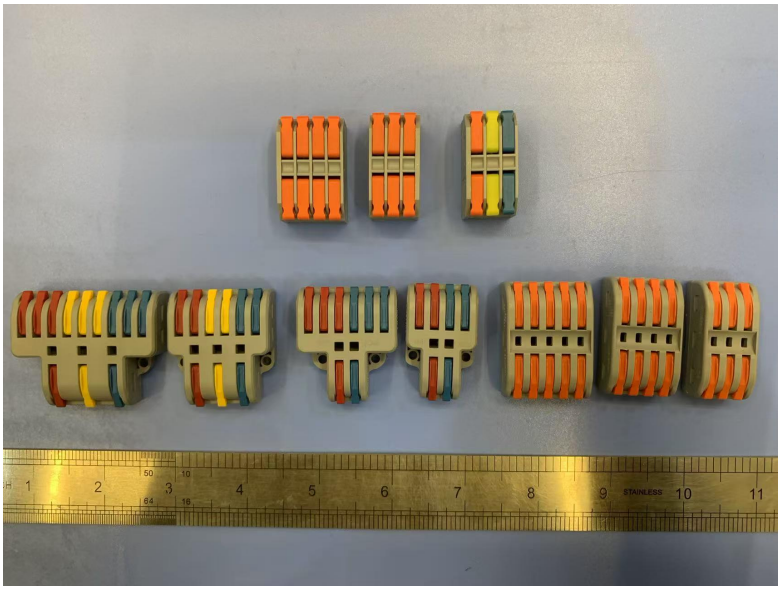
	Needle flame test 	Terminal blocks body: no flame and no glowing on the sample. Flame extinguished in 3s	P
8.6	**Verification of EMC characteristics**		N/A
8.6.1	**Immunity**		N/A
	Terminal blocks blocks within the scope of this standard are not sensitive to electromagnetic disturbances and therefore no immunity tests are necessary.		N/A
8.6.2	**Emission**		N/A
	Terminal blocks blocks within the scope of this standard do not generate electromagnetic disturbances and therefore no emission tests are necessary.		N/A

Photo documentation:

Type of equipment:	Terminals
Model:	PCT Series,R2601 Series,D2 Series,QC01 Series,L20 Series

Details of:	
View: [X] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

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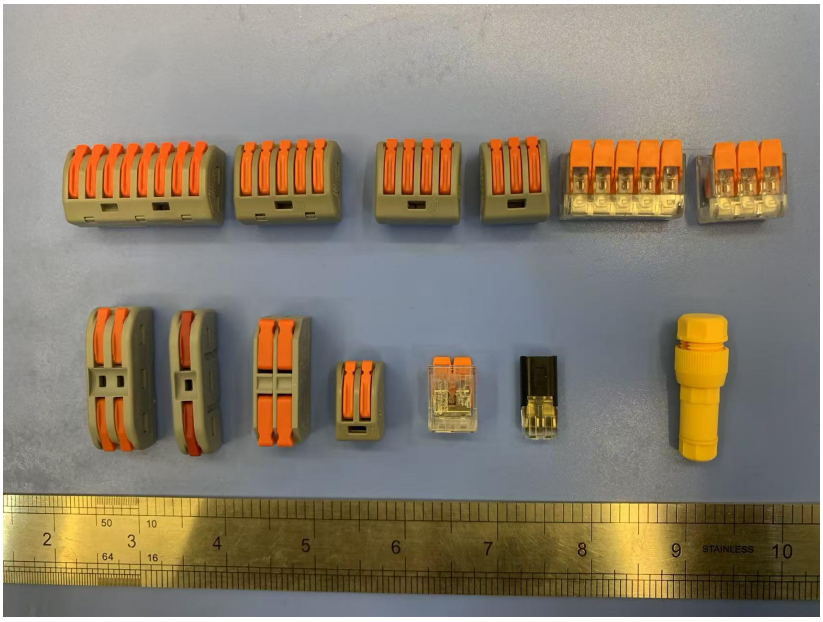
View: [X] general [ ] front [ ] rear [ ] right [ ] left [ ] top [ ] bottom	

- End of Test Report -