GB

NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA

UDC

P **GB 50303-2015**

Code for Acceptance of Construction Quality of Building Electrical Engineering

建筑电气工程施工质量验收规范

Issued on: December 3, 2015 **Implemented on: August 1, 2016**

Issued by: Ministry of Housing and Urban-Rural Construction of the People's Republic of China;
General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China.

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Code for Acceptance of Construction Quality of Building Electrical Engineering

1 General Provisions

1.1.1 This code is formulated with a view to strengthening the quality management of construction engineering, unifying the construction quality acceptance of building electrical engineering and ensuring the engineering quality.

1.1.2 This code is applicable to the construction quality acceptance of building electrical installation project with voltage class of 35kV or below.

1.1.3 Building electrical engineering construction quality acceptance shall meet those specified in this code as well as the current relevant ones of the nation.

subjected to site acceptance, and acceptance record shall be kept and acceptance data shall be filed. In case there are technical parameter requirements for design, the technical parameter shall be checked and meet the design requirements.

3.2.2 Products with production license or compulsory certification (CCC certification) shall be provided with license No. or CCC certification mark, and certification scope, effectiveness and authenticity of production license or CCC certificate shall be randomly inspected.

3.2.3 Technical documents for installation, application, maintenance and test requirements shall be provided in case of site acceptance of new type electrical equipment, instrument and materials.

3.2.4 As for site acceptance of imported electrical equipment, instrument or materials, quality certificate, performance test report as well as technical documents for installation, application, maintenance and test requirements shall be provided; as for imported electrical equipment with commodity inspection requirements, commodity inspection certificate shall also be provided.

3.2.5 In case on-site sampling inspection is carried out for site acceptance of main equipment, materials, finished product and semi-finished products or sampling inspection is carried out in qualified laboratory due to disagreement, the following requirements shall be met:

1 On-site sampling inspection: as for busway, conduit, insulated wire and cable of the same manufacturer, lot, model and specification, at least 1 sample shall be taken out from each lot; as for such electrical equipment as luminaire, socket and switch of the same manufacturer, material and type, 3% of each shall be sampled for inspection; as for luminaire with storage battery, 5% of them shall be sampled for inspection, and the inspection quantity shall not be less than 1 piece (set).

2 Sampling inspection carried out in qualified laboratory due to disagreement: as for busway, insulated wire, cable, ladder, tray, trunking, conduit, profile steel and galvanized product of the same manufacturer and lot but different specification, 10 % shall be subjected to sampling inspection and the quantity of specification of the inspected product shall not be less than 2; as for such electrical equipment as luminaire, socket and switch of the same manufacturer, material and type, in case the quantity is 500 pieces (sets) or below, 2 pieces (sets) shall be subjected to sampling inspection, and the quantity for sampling inspection for each shall at least be 2 pieces (sets), in case the quantity is more than 500, 3 pieces (sets) shall be subjected to sampling inspection.

3 As for multiple unit works included in the same construction project constructed by the same construction organization, in case main equipment, materials, finished product and semi-finished products of the same manufacturer, material, lot and type are used, the sampling ratio shall be calculated in a combined way.

4 In case of unqualified sampling inspection results, the sampling quantity for inspection may be doubled, in case there is still unqualified result, this lot of equipment, materials, finished products or semi-finished products shall be judged as unqualified products and shall not be used.

5 There shall be test report.

3.2.6 As for site acceptance of transformer, box-type substation, high-voltage electric equipment and electrical porcelain products, the following contents shall be covered:

1 Inspect quality certificate and accompanying technical documents: transformer shall

be provided with end-of-manufacturing test records;

2 Appearance inspection: the equipment shall possess nameplate, the surface coating shall be integral, the accessories shall be complete, the insulating piece shall be free from defect or crack, the part for oil charging shall be free from leakage, and the air pressure indication of charging high-pressure equipment shall be normal.

3.2.7 Site acceptance of high-voltage complete-set distribution cabinet, storage battery cabinet, UPS cabinet, EPS cabinet, complete set low-voltage distribution cabinet (box) and control cabinet (console, box) shall meet the following requirements:

1 Inspect quality certificate and accompanying technical documents: such complete set of cabinets as complete set high-voltage and low-voltage distribution cabinets, storage battery cabinet, UPS cabinet and EPS cabinet shall possess end-of-manufacturing test report;

2 Check product model and product technical parameter: they shall meet the design requirements;

3 Appearance inspection: the equipment shall possess nameplate, the surface coating shall be integral without visible collision dents, the elements and components in the equipment shall be intact and the wiring shall be free from shedding or sealing-off, the material and specification of insulated wire shall meet the design requirements, the battery case in storage battery cabinet shall be free from fragmentation or leakage, and the oil-filled equipment and the charging equipment shall be free from leakage.

3.2.8 Site acceptance of diesel power generating set shall include the following contents:

1 Check host, accessories special tools, spare parts and accompanying technical documents: quality certificate and end-of-manufacturing test run records shall be complete and integral, and generator and its control cabinet shall possess end-of-manufacturing test records.

2 Appearance inspection: the equipment shall possess nameplate; the coating shall be intact and the body shall be free from missing part.

3.2.9 As for site acceptance of electromotor, electrical heater, electric actuating machine and low-voltage switchgear, the following contents shall be covered:

1 Inspect quality certificate and accompanying technical documents: the filled contents shall be complete and intact;

2 Appearance inspection: the equipment shall possess nameplate; the coating shall be intact and the equipment components or accessories shall be complete and intact without defect.

3.2.10 Site acceptance of lighting fixture and accessories shall meet the following requirements:

1 Inspect quality certificate: the quality certificate contents shall be complete and intact, the luminaire material shall meet the design requirements and product standard requirements; gas discharge lamp of new type shall be accompanied by technical documents accompanying technical documents; the test data for such functions of internal short loop protection, overload protection, back discharge protection and polarity reverse connection protection of solar luminaire shall be complete and meet the design requirements.

2 Appearance inspection:

1) Luminaire coating shall be intact without damage, the accessories shall be complete, exposed-conductive-part of Category I luminaire shall be provided with special PE terminal;

2) Live part and part providing electrical shock protection of fixed luminaire shall be

well, and the identification shall be complete. The insulated wire or cable insulation layer sampled for inspection shall be intact with uniform thickness; the cable shall be free from flattening or distortion; the armour shall be free from loose coil; insulated wire and cable outer sheath shall possess visible identification and manufacturer mark.

3 Inspect insulation performance: insulation performance of wire and cable shall meet those specified in product technical standards or product technical documents.

4 Inspect nominal sectional area and resistance value: nominal sectional area of insulated wire and cable shall meet the design requirements, and their conductor resistance values shall meet the requirements of the current national standard Conductors of Insulated Cables (GB/T 3956).In case of disagreement about conductivity, insulation performance, insulation thickness, mechanical performance as well as flame-retardant and fire performance of insulated wire and cable, the corresponding products shall be sampled by lot and sent to qualified laboratory for inspection. Inspection item and content shall meet those specified in relevant current product standards of the nation.

3.2.13 Site acceptance of conduit shall meet the following requirements:

1 Inspect quality certificate: steel conduit shall possess product quality certificate, and plastic conduit shall possess quality certificate and corresponding test report.

2 Appearance inspection: steel conduit shall be free from flattening with smooth inner wall; non-galvanized steel conduit shall be free from corrosion with intact coating; galvanized steel conduit plating shall be intact, and its surface shall be free from rust stain; plastic conduit and accessories shall be free from fragmentation and the surface shall be provided with flame-retardant mark and manufacturer mark.

3 Diameter, wall thickness and uniformity of conduit shall be sampled by lot and inspected and shall meet those specified in relevant current product standards of the nation.

4 In case of disagreement about electrical continuity of steel conduit of mechanical connection and its accessories, inspection shall be conducted according to those specified in current national standard Conduit Systems for Electrical Installations (GB 20041).

5 In case of disagreement about flame-retardant performance of plastic conduit and accessories, the corresponding products shall be sampled by lot and sent to qualified laboratory for inspection.

3.2.14 Site acceptance of profile steel and welding electrode shall meet the following requirements:

1 Inspect quality certificate and material quality certificate: in case of disagreement, the corresponding products shall be sampled by lot and sent to qualified laboratory for inspection;

2 Appearance inspection: profile steel surface shall be free from severe corrosion, serious distortion, buckling and deformation; welding electrode packaging shall be intact; rust stain at electrode end shall not be found in unpacking inspection.

3.2.15 Site acceptance of galvanized metal product shall meet the following requirements:

1 Inspect product quality certificate: the conformance shall be inspected according to the design requirements;

2 Appearance inspection: zinc coating shall cover integrally, the surface shall be free from rust stain, and hardware fittings and accessories shall be complete without sand hole;

3 As for hot-dip galvanized steel embedded into soil, the zinc coating thickness shall be inspected and shall not be less than 63μm;

4 In case of disagreement about zinc coating quality, the corresponding products shall be sampled by lot and sent to qualified laboratory for inspection.

3.2.16 Site acceptance of ladder, tray and trunking shall meet the following requirements:

1 Inspect quality certificate and end-of-manufacturing inspection report: the filled contents shall be complete and intact;

2 Appearance inspection: the accessories shall be complete, and the surface shall be smooth without deformation; coatings of steel ladder, tray and trunking shall be intact without corrosion; plastic trunking shall be free from damage and shall be uniform in color; in case of disagreement about flame-retardant performance, the corresponding products shall be sampled by lot and sent to qualified laboratory for inspection; coatings of aluminum alloy ladder, tray and trunking shall be intact without torsional deformation, flattening or surface scratch.

3.2.17 Site acceptance of busway shall meet the following requirements:

1 Inspect quality certificate and accompanying installation technical documents which shall meet the following requirements:

1) Technical parameters in CCC type test report shall meet the design requirements; conductor specification and corresponding temperature rise value shall be consistent with conductor specification in CCC type test report; in case of disagreement about current-carrying capacity of conductor, corresponding products shall be send to qualified laboratory for ultimate temperature rise test; the temperature rise of rated current shall meet those specified in relevant current product standards of the nation;

2) As for fire-resistant busway, it shall pass the CCC certification and be provided with type inspection report issued by state-approved testing organization, and its fire resistance period shall meet the design requirements;

3) Protective earthing conductor (PE) shall be reliably connected to enclosure, the sectional area shall meet the requirements of product technical documents; in case the enclosure also serves as protective earthing conductor (PE), CCC type test report and product structure shall meet those specified in relevant current product standards of the nation.

2 Appearance inspection: sealed against moisture shall be in good condition, serial number of each section shall be marked clearly, accessories shall be complete without defect, enclosure shall be free from obvious deformation, busbar bolt overlap surface shall be flat and smooth, plating coverage shall be intact without peeling and pitted surface; fixed contact on plug-in busway shall be free from defect, with smooth surface and intact plating; as for busway with requirements on protection grade, protection grade of product and accessories as well as design conformance shall be inspected, and the identification shall be intact.

3.2.18 Site acceptance of cable head, component, wire connection device and wiring terminal shall meet the following requirements:

1 Inspect quality certificate and related technical documents which shall meet the following requirements:

1) Aluminium and aluminium alloy cable accessory shall be provided with inspection report matched with cable conductor;

2) Fire resistance grade of intermediate connecting accessories of mineral insulated cables shall not be inferior to that of the cable;

3) Rated voltage, connection capacity and protection grade of wire connection device and wiring terminal shall meet the design requirements:

2 Appearance inspection: components shall be complete, package identification and

board shall meet the design requirements, wiring shall be correct and handover test shall be passed.

3.3.3 Before wiring of electromotor, electrical heater and electric actuating machine, they shall be connected to mechanical equipment and meet the process requirement subjecting to manual operation, and the insulation resistance shall be tested and regarded as qualified.

3.3.4 Diesel power generating set installation shall meet the following requirements:

1 Before diesel power generating set installation, foundation shall pass the acceptance.

2 After the diesel power generating set is laid, preliminary levelling shall be carried out for diesel power generating set fixed by foundation bolt; bolt hole grouting, accurate levelling, foundation bolt fastening and secondary grouting shall be qualified; as for abutting diesel power generating set, the bottom shall be padded levelly and firmly.

3 Before no-load test run, systems of oil, gas, water-cooling, wind cooling and smoke emission as well as vibration isolation and noise proof facilities shall be installed, fire-fighting equipment shall be fully arranged, in place and meet the design requirements; generator shall be subjected to static test; wiring of switch board and cabinet accompanying the diesel power generating set shall be checked and regarded as qualified; diesel power generating set earthing shall be inspected and meet the design requirements.

4 Before load test run, no-load test run and test adjustment shall be qualified.

5 Before put into standby state, diesel power generating set shall be subjected to continuous failure-free load test run within specified time and shall be regarded as qualified.

3.3.5 Before UPS or EPS is connected to feeder line, it shall be subjected to test adjustment according to product technical requirements and confirmed through inspection.

3.3.6 Test and test run of electrical and power equipment shall meet the following requirements:

1 Before test of electrical and power equipment, the exposed-conductive-part shall be connected to the protective conductor, inspected and regarded as qualified;

2 Before energization, voltage withstand test of a.c. power frequency voltage withstand test of complete set power distribution (control) cabinet, console and box as well as actuation test of protective device shall be qualified;

3 Before no-load test run, simulation actuation test of control loop shall be qualified, rotation or actuation of electrical part and mechanical part shall be inspected by turning or manually and they shall be consistent.

3.3.7 Busway installation shall meet the following requirements:

1 Before installation of busway on transformer and complete set high-and-low voltage distribution cabinet, transformer, complete set high-and-low voltage distribution cabinet and wall bushing shall be installed, in place and pass the inspection.

2 Arrangement of busway support shall be carried out after structure capping, completion of indoor bottom ground construction or ground elevation determination, land clearing and interlayer distance rechecking;

3 Before busway installation, works of pipeline, air conditioning and building decoration related to busway installation position shall be completed;

4 Before busway grouping, the insulation resistance of each section of busbar shall pass the testing, and the insulation resistance value shall not be less than 20 MΩ;

5 Before energization, metal enclosure of busway shall be connected to external protective conductor, and insulation resistance testing of busbar and voltage withstand test of

a.c. power frequency shall be qualified.

3.3.8 Installation of ladder, tray and trunking shall meet the following requirements:

1 Before support installation, measuring and positioning shall be carried out;

2 Before installation of ladder, tray and trunking, support installation shall be completed; and whitewashing, painting or wall paper of ceiling and wall surface shall be basically completed.

3.3.9 Conduit laying shall meet the following requirements:

1 Before pipe arrangement, it shall be confirmed that inner and outer walls of non-galvanized steel conduit have been subjected to anti-corrosion treatment, except the outer wall of non-galvanized steel conduit embedded into concrete;

2 Before conduit embedment, inspect to confirm that route, trench depth and width as well as cushion treatment of outdoor directly-buried conduit meet the design requirements;

3 Pipe arrangement in cast-in-place concrete slab shall be carried out after completion of reinforcement binding in bottom layer and before reinforcement binding in upper layer; upper layer reinforcement binding and concrete pouring and vibrating may be carried out after pipe arrangement is completed, inspected and confirmed;

4 Before pipe arrangement in wall, reinforcement binding in cast-in-place concrete wall and setting-out at doors and windows shall have been completed;

5 Before junction box and conduit concealment, they shall be inspected and regarded as qualified;

6 Before laying of exposed conduit by passing through beam, plate and column, the arrangement of bushing, embedded part and support shall be inspected and meet the requirements;

7 Before pipe arrangement in suspended ceiling, setting-out shall be carried out for the position of light and electric appliance on the suspended ceiling which shall coordinate and cooperate with constructions of civil work and various disciplines.

3.3.10 Cable laying shall meet the following requirements:

1 Before support installation, temporary construction facilities, formwork and construction waste in cable trench and electrical shaft shall be cleared, and support shall be measured and positioned;

2 Before cable laying, installation of cable bearer, cable conduit, ladder, tray and trunking shall be completed, they shall have been connected to protective conductor, which are inspected and regarded as qualified;

3 Before cable laying, insulation test shall be qualified;

4 Before energization, cable shall pass the handover test; inspect and confirm that line direction, phase as well as measures for fire protection, separation and blockage meet the design requirements.

3.3.11 Insulated wire and cable wiring by passing through conduit and trunking shall meet the following requirements:

1 Welding construction shall be completed, installation quality of conduit and trunking shall be inspected and qualified;

2 Conduit or trunking shall be connected to cabinet, console and box; accumulated water and sundries in the conduit shall be removed.

3 Insulation resistance of insulated wire and cable shall be tested and regarded as qualified;

on bottom plate shall be completed first, then carry out construction of earthing device according to the design requirements, after inspection and confirmation, support formwork or carry out concrete pouring and vibrating.

2 As for earthing electrode earthed artificially, foundation trench shall be used or trench shall be excavated according to the design requirements, after inspection and confirmation, embed or drive in the earthing electrode and lay the underground earthing busbar.

3 Construction of reducing earthing resistance shall meet the following requirements:

1) As for construction of reducing earthing resistance by adopting earthing module, excavate pit for module according to design position, lead the underground earthing busbar to the module, and after inspection and confirmation, weld them together;

2) As for construction reducing earthing resistance by adding resistance reducing agent, excavate trench or drill hole for vertical pipe-burying according to the design requirements, clean the trench, and, after inspecting the embedded position of the earthing electrode, pour into resistance reducing agent;

3) As for construction reducing earthing resistance by soil replacement, excavate trench according to the design requirements first, clean the trench, and pave qualified soil with low resistivity at the trench bottom, after the pavement thickness is inspected and meets the design requirements, install earthing device; after the earthing device is connected and subjected to anti-corrosion treatment, pave one layer of soil with low resistivity.

4 Before device concealment, carry out inspection and acceptance, after they are qualified, then backfill.

3.3.19 Installation of lightning down-conductor shall meet the following requirements:

1 In case main reinforcement in building column is used as lightning down-conductor, after the main reinforcement in column are bound or connected, construct according to the design requirements, after inspection and confirmation, support the formwork;

2 As for lightning down-conductor directly laid into painting layer from foundation earthing electrode or artificial earthing electrode, inspect and confirm that no part is exposed, and then tile or paint;

3 As for lightning down-conductor directly led out from foundation earthing electrode or artificial earthing electrode and openly installed, embed or install support first, after inspection and confirmation, lay the lightning down-conductor.

3.3.20 Before installation of air-termination system, construction of earthing device and lightning down-conductor shall be completed; after air-termination system is installed, it shall be connected to lightning down-conductor timely.

3.3.21 Before testing lightning protection and earthing system, construction of earthing device shall be completed and pass the testing; lightning protection and air-termination system shall be installed, and the whole lightning protection and earthing system shall be connected into network.

3.3.22 Equipotential bonding shall meet the following requirements:

1 As for general equipotential bonding, inspect and confirm the position of earth conductor of general equipotential bonding terminal, install general equipotential bonding terminal board, and then carry out general equipotential bonding according to the design requirements;

2 As for local equipotential bonding, inspect and confirm the position of connection

terminal and sectional area of connection terminal board, install local equipotential bonding terminal board, and then carry out local equipotential bonding according to the design requirements;

3 As for construction metal shielding net case with special requirements, complete net cage construction first, after inspection and confirmation, connect it to the PE.

3.4 Division and Acceptance of Divisional Project (Subdivisional Project)

3.4.1 As for quality acceptance of building electrical divisional project, acceptance shall be carried out level-by-level (in the sequence of inspection lot, subdivisional work and subdivisional project); division of each subdivisional project, subdivisional work and inspection lot shall meet those specified in Appendix A of this code.

3.4.2 Division of inspection lot of building electrical divisional project shall meet the following requirements:

1 As for inspection lot of subdivisional work in installation project of electricity transformation and distribution room, main electricity transformation and distribution room shall be regarded as an inspection lot; as for subdivisional projects with several sub-electricity transformation and distribution rooms which do not belong to subunit project, each subdivisional project shall be regarded as an inspection lot, and the acceptance records shall be summarized into the acceptance records of subdivisional work relevant to all electricity transformation and distribution rooms; as for subdivisional project with several sub-electricity transformation and distribution rooms which belong to corresponding subunit project, the acceptance record shall be regarded as subdivisional work acceptance records, and after being summarized into acceptance records of subdivisional project, incorporated into divisional project acceptance records.

2 In supply main installation project, inspection lot of subdivisional work shall be divided according to serial numbers of power supply section and electrical shaft.

3 As for inspection lot of subdivisional work in electrical device power and electric lighting installation project, the division shall be consistent with that of the building civil work.

4 Subdivisional work in self-contained power supply and uninterruptible power supply installation project shall be regarded as an inspection lot.

5 As for inspection lot of subdivisional work in lightning protection and earthing device installation project, manual earthing device and earthing electrode using building foundation reinforcement shall be regarded as an inspection lot respectively, and large foundation may be divided into several inspection lots by block. As for lightning down-conductor installation work, building with less than 6-storey shall be regarded as an inspection lot; as for high-rise buildings, the interval of number of storey for grading ring arrangement shall be regarded as an inspection lot; in case air-termination systems are installed in the same roof, it shall be regarded as an inspection lot; general equipotential bonding of a building shall be regarded as an inspection lot; each local equipotential bonding shall be regarded as an inspection lot; electronic system equipment room shall be regarded as an inspection lot.

6 As for inspection lot of subdivisional work in outdoor electrical installation project, it shall be divided by court size, time for put into operation and functional block.

3.4.3 As for building electrical engineering acceptance, the quality control data of the following items shall be verified, and the data contents shall be authentic, complete and

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