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Code of acceptance for construction quality of ventilation and air conditioning works

通风与空调工程施工质量验收规范

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Code of acceptance for construction quality of ventilation and air conditioning works

1 General provisions

1.0.1 This code is developed with a view to unifying the quality acceptance for construction of ventilation and air conditioning and guaranteeing the work safety and quality.

1.0.2 This code is applicable to construction quality acceptance of the ventilation and air conditioning for industrial and civil buildings.

1.0.3 This code shall be used in conjunction with the current national standard GB 50300 *Unified Standard for Constructional Quality Acceptance of Building Engineering*.

1.0.4 The requirements for constructional quality of work which are specified for ventilation and air conditioning works in engineering technical document and work contract shall not be lower than those specified in this code.

1.0.5 The construction quality acceptance for ventilation and air conditioning works shall comply with not only this code but also the current relevant standards of the nation.

2 Terms

2.0.1
ventilation works
generic term for air supply, air exhaust, smoke control/exhaust, dedusting and pneumatic conveying system works

2.0.2
air conditioning works
generic term for comfort air conditioning, constant temperature and humidity air conditioning, cleanroom air purification and air conditioning system works

2.0.3
duct
duct, made from metallic, nonmetallic sheet or other material, for ventilation.

2.0.4

operation
(of cleanroom) with facilities operating in specified mode, at the presence of specified number of personnel, and production equipment operating in the status as agreed between the owner and the supplier

2.0.24
declared quality level
upper limit of total unqualified product(s) in inspection lot

3 Basic requirements

3.0.1 The acceptance for construction quality of ventilation and air conditioning works shall comply with not only the provisions of this code but also approved design documents and contracted items.

3.0.2 As far as works modification is concerned, a design alteration notice or technical approval from the Designer must be provided. Where the construction enterprise undertakes in-depth design for the construction drawings of ventilation and air conditioning, the drawings shall be confirmed by engineering design organization.

3.0.3 The main raw materials, as well as the material, specification and performance of finished product, semi-finished product and equipment, shall comply with the design documents and current national standards and materials or equipment that are expressly prohibited or obsoleted by the State shall not be adopted. The site acceptance of main raw material, finished product, semi-finished product and equipment shall meet the following requirements:

1 The approaching quality acceptance shall be confirmed by supervision engineer or the relevant person in-charge of the Developer.

2 Imported materials and equipment shall be provided with valid documents such as commodity inspection conformity certificate and Chinese quality certificate.

3.0.4 The new technology, new process, new material and new equipment adopted by ventilation and air conditioning works shall be provided with certificate of special technical appraisal acceptance.

3.0.5 The construction of ventilation and air conditioning works shall be carried out following established procedure and cooperate with civil engineering and other disciplines. The finished civil engineering construction relevant to ventilation and air conditioning system shall be jointly checked by the Developer (or General Contractor), Supervisor, Designer and Constructor. Organization of such joint check should be in the charge of the

2 Terminal devices of water system include radiant panel coil, internal coils of fan coil unit and air conditioning cabinet, plate heat exchanger, etc.

3 Automatic control systems of device include various transducers, e.g. temperature, pressure and flow, actuators, automatic control, intelligent system device and software, etc.

3.0.8 The acceptance for construction quality of ventilation and air conditioning subdivision project shall be carried out by the section projects listed in Table 3.0.7 herein according to actual engineering conditions. The quality acceptance of subdivision project shall be carried out after the section projects it is affiliated are completely accepted.

3.0.9 The acceptance for construction quality of ventilation and air conditioning section project shall be carried out according to the specific provisions herein corresponding to the section project. Section projects shall adopt one-off acceptance or acceptance by times, depending on the actual conditions of construction engineering. The acceptance lots and sample quantity may be determined according to the quantity and distribution of physical materials for the project, and shall cover the entire section project. When the section project involves ducts or pipes of multiple materials and construction processes, the acceptance lots should by classified by material.

3.0.10 The sampling for quality acceptance of inspection lot shall meet the following requirements:

1 The quality acceptance of inspection lot shall be in accordance with Annex B herein The sampling assessment scheme with product percent of pass larger than or equal to 95% shall be deemed as sampling scheme I (hereinafter referred to as "Scheme I") and is mainly applicable to dominant items; the sampling assessment scheme with product percent of pass larger than or equal to 85% shall be deemed as sampling scheme II (hereinafter referred to as "Scheme II") and is mainly applicable to general items.

2 If it is found that the product sample quantity, *n*, required by the sampling assessment scheme exceeds the product quantity, *N*, of inspection lot, all the products in the entire inspection lot shall be inspected.

3 The inspection of mandatory provision shall adopt one hundred percent inspection scheme.

3.0.11 The acceptable quality for the inspection lot acceptance of section project shall meet the following requirements:

1 Where the inspected party, through self-inspection, meets the requirements of this Code in terms of the quality of inspection lot and is granted with a construction acceptance record indicating corresponding accepted quality, the construction quality acceptance by

inspection lot may be carried out.

2 If one hundred percent inspection scheme is adopted, all the inspection results of dominant item quality shall be acceptable. As for general items, the quality inspection results and percent of pass by count shall not be less than 85% and no major defects shall present.

3 If the inspection adopts sampling scheme and the inspection result of inspection lot is acceptable, the lot quality acceptance shall be considered pass. Where the inspection result of sampling inspection lot does not comply with acceptable requirements, the tested party may apply for reinspection or retest.

4 Any product found unacceptable by quality acceptance shall be repaired or replaced by acceptable one.

3.0.12 The warranty period for the construction quality of ventilation and air conditioning works shall be calculated from the date on which the final acceptance is passed and last for two heating periods and cooling periods. For any construction quality problem encountered in the warranty period, the construction enterprise shall fulfill the warranty responsibilities.

3.0.13 The cleanliness grade of the clean room (area) in air cleaning and conditioning system shall meet the design requirements. The Maximum acceptable concentration of airborne particles shall be in accordance with those specified in Table D.4.6-1. The inspection of the cleanliness grade of clean room (area) shall comply with D.4 of Annex D hereof.

4 Duct making

4.1 General requirements

4.1.1 The quality acceptance of duct shall be carried out respectively by the material, processing technique and system class and shall cover such items such as the material, specification, strength, tightness and as-finished appearance quality of duct.

4.1.2 The sheets, profiles and other main materials for fabricating duct shall be subjected to acceptance for approaching the site and their quality shall meet the design requirements and the relevant requirements of current national standard and shall be supported by ex-factory inspection certificate. The finished duct selected in the engineering shall be provided with product qualification certificate or be subjected to strength and reinspection on site.

Inspection quantity: according to Scheme I.

Inspection method: by measuring with ruler, visual inspection, and checking material quality certificate and product qualification certificate.

4.2.7 The fabrication of duct for air cleaning and conditioning system shall meet the following requirements:

1 The internal surface of duct shall be flat and smooth; no reinforcing frame or reinforcing rib shall be set up inside the duct.

2 Duct shall be free from transversely spliced seam. Where the bottom edge width of rectangular duct is less than or equal to 900mm, the bottom surface shall be free from spliced seam; where it is more than 900mm and less than or equal to 1800mm, the bottom surface shall have at most 1 spliced seam; where it is larger than 1800 mm but less than or equal to 2700 mm, the bottom surface shall have at most 2 spliced seam.

3 The material for the bolt, nut, washer and rivet for duct shall be compatible with the duct material performance and shall not introduce electrochemical corrosion.

4 Where the air cleanliness is class N1~N5, the spacing of bolt and rivet hole for duct flange shall not be larger than 80mm; where the air cleanliness is class N6~N9, it shall not be larger than 120mm. Self-plugging rivets shall not be adopted.

5 Rectangular duct shall not use connection with S-shaped or right-angle slip. Where the side length of the duct for air cleaning and conditioning system is larger than 1000mm, no connection with steel sheet flange pinchcock shall be used in the absence of appropriate reinforcement measure.

6 For ducts for air cleaning and conditioning system of N1~N5 air cleanliness classes, no stud-snap crimp connection shall be adopted.

7 Ducts shall be cleaned after fabrication. The cleaning agent shall not be harmful to human body, duct material and product.

Inspection quantity: according to Scheme I.

Inspection method: by checking the material quality certificate, visual inspection and ignition test, and wiping with white silk cloth.

4.3 General items

4.3.1 The fabrication of metallic duct shall meet the following requirements:

1 The fabrication of duct using metallic flange connection shall meet the following requirements:

1) The crimped seam between duct and fitting shall be tight, consistent in width, straight and even in lapels, and uniform in arcs, with the two end faces parallel. Duct shall be free from obvious distortion and uplifting angle and its surface shall be flat and smooth, with unevenness not larger than 10mm.

2) Where the outside diameter or outer side length of duct is less than or equal to 300mm, its permissible deviation shall not be larger than 2mm; where the outside diameter or outer side length of duct is larger than 300mm, it shall not be larger than 3mm.The permissible deviation of duct mouth planeness shall not be larger than 2mm; the length difference between the two diagonals of rectangular duct shall not be greater than 3mm; the difference between any two diameters of circular flange shall not be greater than 3mm.

3) The weld of welded duct shall be plump, flat and smooth and shall be free from defects such as bump, penetrating slag inclusion and porosity, cracking. By visual inspection, the duct shall be flat and smooth and shall be free from unevenness larger than 10mm.

4) The weld of duct flange shall be well-fused, plump and free from false welding and hole. The permissible deviations for the outside diameter or outer side length and planeness of flange shall not be larger than 2mm.As for flanges from the same batch and of the same specification, arrangement of bolt holes shall be consistent and interchangeable.

5) Where riveting are used for connection between duct and flange, there shall be no sign of rivet escape or rivet omission; turnups shall be even and clung to the flange, their width shall be consistent and shall not be smaller than 6mm; seamings and the four corners of rectangular duct shall be free from cracks and holes.

6) Where welding connection is adopted between duct and flange, the weld shall be lower than the end face of flange. The duct of dedusting system should adopt full welding inside and intermittent welding outside. Where spot welding fixation is adopted between duct and flange, the welding points shall be of good fusion; the spacing between the welding points shall not be larger than 100mm; the flange shall be clung to the duct; penetrating gaps or holes shall not occur.

7) Galvanized steel plate duct shall have no more than 10% signs of badly damaged galvanized coat such as efflorescence and chalking.

8) Where the flange of aluminum plate or stainless steel plate duct adopts carbon steel material, the material specification shall comply with 4.2.3 and shall be subject to anti-

Inspection method: by observation and inspecting with ruler.

4.3.7 The included angle of single-side reducer for duct should not be less than 30°, while that of double-side reducer should not be less than 60°. The included angle between the branch and main duct of circular duct should not be greater than 60°.

Inspection quantity: according to Scheme II.

Inspection method: by measuring with ruler and visual inspection.

4.3.8 The fabrication of refractory duct shall meet the following requirements:

1 The permissible deviation for the caliber of refractory duct shall meet the requirements of 4.3.1 hereof.

2 For refractory duct adopting profile steel framework externally applied with fireproof plate, the framework welding shall be firm; the surfaces shall be flat and smooth; the deviation shall not be larger than 2mm. The laying form of fireproof plate shall be regular; the fixation shall be firm; joints shall be tightly blocked with fireproof material and shall be free from perforation.

3 For refractory duct adopting metallic duct externally applied with fire-proof thermal insulation, the duct tightness requirements regarding metallic duct for pressure system given in 4.2.1 hereof shall apply. The arrangement of the fire-proof thermal insulation shall be in accordance with those specified in Chapter 10 hereof.

Inspection quantity: according to Scheme II.

Inspection method: by measure with ruler and visual inspection.

5 Duct accessory

5.1 General requirements

5.1.1 Outsourced duct accessories shall have certification of acceptable product quality and corresponding technical data.

5.1.2 The linear size tolerance of duct accessory shall meet the requirements of Grade C tolerance as specified in the current national standard GB/T 1804 *General tolerances—Tolerances for linear and angular dimensions without individual tolerance indications*.

5.2 Dominant items

5.2.1 The variety, specification and performance of duct accessory material shall meet the design requirements.

Inspection quantity: according to Scheme I.

Inspection method: by observation, measuring with ruler and checking product qualification certification.

5.2.2 The performance parameters of outsourced finished duct accessory shall comply with the design requirements and relevant technical documents.

Inspection quantity: according to Scheme I.

Inspection method: by visual inspection and checking product technical documents.

5.2.3 The fabrication of finished air valve shall meet the following requirements:

1 Air valve shall be equipped with opening indicator which shall be able to reflect accurately the opening of valve leaf.

2 The handwheel or handle of manual air flow regulating valve shall turn off clockwise.

3 The drive actuator of electric and pneumatic regulating valve shall actuate reliably and normally operate under the maximum working pressure.

4 The air valve, moving parts, fixed parts and fasteners of air cleaning and conditioning system shall take anti-corrosion measures; the main shaft of air valve blade shall tightly fit for the shaft sleeve of valve body and shall take sealing measures.

5 Regulating air valves whose working pressure is larger than 1000Pa shall be provided with strength test certificate or test report indicating the ability of free on/off under 1.5 times the working pressure by the manufacturer.

6 Airtight valve shall be able to turn off tightly and its air leakage shall meet the design requirement.

Inspection quantity: according to Scheme I.

Inspection method: by observation, measuring with ruler, manual manipulation and checking testing report.

5.2.4 The fabrication of fire valve, smoke exhaust valve or smoke outlet shall meet the relevant requirements of the current national standard GB 15930 *Fire dampers for building-venting and smoke-venting system* and shall have corresponding product qualification

Inspection quantity: 100% inspection.

Inspection method: by visual inspection and checking the burning behavior test report of material.

5.3 General items

5.3.1 The moving mechanism of duct accessory shall actuate flexibly, braking and positioning devices shall actuate reliably and the flange specification shall be compatible with the duct flange connected.

Inspection quantity: according to Scheme II.

Inspection method: by visual inspection, manual manipulation and measuring with ruler.

5.3.2 The fabrication of air valve shall meet the following requirements:

1 Single-blade air valve shall have a firm structure, open/close flexibly and close tightly, and the clearance to valve body shall be less than 2mm. Multi-blade air valve shall not have obvious looseness while opening; blade overlapping shall fit closely and consistently while blades are closed. Multi-blade air valve whose sectional area is larger than 1.2m^2 shall implement regulation by group

2 The rotating shaft and hinge of check valve leaf shall adopt rust-resistant material. The valve leaf, under maximum load pressure, shall not have bending deformation, open/close flexibly and close tightly. Check valves installed horizontally shall have balance regulating mechanism.

3 The junction between the rotating shaft or tie bar of handle of tee regulating air valve and duct (valve body) shall be tight. The valve plate shall not collide or contact with the duct. Regulating shall be convenient. The handle and valve leaf shall be located in the same angular position. The tie bar shall be able to perform positioning and fixing within the manipulation range.

4 The body of flashboard air valve shall be tight and the inner walls shall be subjected to anti-corrosion treatment. The flashboard shall be flat and smooth, open/close flexibly and be provided with positioning and fixing device. The upper and lower nozzles of oblique flashboard air valve body shall be in alignment.

5 The flow constant range and precision of constant flow air valve shall meet the requirements of product technical document and engineering design.

6 The permissible deviation of air valve flange dimension shall be in accordance with

following requirements:

1 Silencing materials shall meet the requirements of engineering design and the casing shall be firm and airtight.

2 The silencing material filled in dissipative silencer shall have a volume density meeting the design requirements, be laid uniformly and provided with measures against settlement. The material, thickness and pitch of the sound splitters in splitter-type resistive silencer shall meet the requirements of product technical documents.

3 For the anechoic chamber (segment) assembled on site, the structure, quantity, pitch and fixation of sound splitter shall meet the design requirements.

4 The junction between the partition plate and wall plate of impedance-combined type and micro-perforated (aperture) plate-type silencer shall be tight; the plate surfaces shall be flat, smooth and burr-free; the aperture (perforated hole width), perforation (aperture) rate and resonant cavity size shall meet the relevant requirements of current national standard.

5 The interface between the silencer and silencing static pressure chamber shall be compatible with the duct connected and the permissible dimensional deviation shall be in accordance with those specified in Table 5.3.2.

Inspection quantity: according to Scheme II.

Inspection method: by visual inspection, measuring with ruler and checking material quality certificate.

5.3.7 The fabrication of flexible stub shall meet the following requirements:

1 The outside diameter or outer side length shall be compatible with duct dimensions.

2 Anti-corrosion, damp-proof, air-proof and mould-proof flexible materials shall be used.

3 The materials used for air cleaning and conditioning system shall also be smooth inside and dust proof.

4 The length of flexible stub should be 150mm ~ 250 mm; the making up or bonding up of joint shall be firm, reliable and free of cracking; formed stub shall be flat, smooth and free of distortion sign.

5 Flexible stub shall not be used as reducing connection pipe. The connection between rectangular flexible stub and duct shall not adopt hoop connection type.

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