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Standard for acceptance of construction quality of steel structures

钢结构工程施工质量验收标准

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Standard for acceptance of construction quality of steel structures

1 General requirements

1.0.1 In order to strengthen the quality management of construction projects, unify the acceptance of construction quality of steel structure projects, ensure the quality of steel structure projects, this standard is hereby formulated.

1.0.2 This standard is applicable to the acceptance of construction quality of steel structure engineering of industrial and civil buildings and structures.

1.0.3 This standard should be used in conjunction with the current national standard "Unified acceptance standard for building construction quality" GB 50300.

1.0.4 In addition to this standard, the acceptance of construction quality of steel structure projects shall also comply with the current relevant national standards.

2 Terms and symbols

2.1 Terms

2.1.1 Part

The smallest unit that constitutes a part or component, such as a gusset sheet, a flange sheet, etc.

2.1.2 Component

A unit composed of several parts, such as welded H-beams, steel brackets, etc.

2.1.3 Element

The basic unit of steel structure composed of parts or parts and components, such as beams, columns, supports, etc.

2.1.4 The smallest assembled rigid unit

In the installation project of steel grid and reticulated shell structure, the smallest installation unit except for the loose parts, which is generally divided into two

The profiled metal sheet whose longitudinal edges of the formed sheet are profiled edges that can be overlapped with each other, whose sheets are connected to structures through fasteners after being naturally overlapped.

2.1.16 Up standing seam metal sheet

The profiled metal sheet whose longitudinal edges of the formed sheet are profiled edges that can be overlapped with each other and, after the sheet and the sheet are naturally overlapped, which are crimped along the length direction by a special machine and connected to the structure through a fixed bracket.

2.1.17 Clip-lock metal sheet

The profiled metal sheet whose longitudinal sides of the formed sheet are profiled edges that can be overlapped with each other and the sheet-sheet installation of which is connected to the structure through a fixed bracket, after being clipped and pressed-in.

2.1.18 Flashing

An element having a certain shape as formed by rolling or mechanical bending of metal sheet, which is used to seal the edges of the gaps after the roof and wall profiled metal sheets are paved to prevent rainwater leakage.

2.1.19 Metal roofing system

The general term for the roof enclosure system composed of metal panels, fixed brackets, bottom plates, fasteners, heat preservation, moisture proof, heat insulation, sound insulation and other materials.

2.2 Symbols

2.2.1 Function and effect:

P - Design value of pretension of high-strength bolt;

ΔP - The loss of the pretension of the high-strength bolt;

T_{ch} - Checking torque of high-strength bolt;

T_c - Final tightening torque of high-strength bolts;

T_0 - Initial tightening torque of high-strength bolt.

2.2.2 Geometric parameters:

α - Spacing;

construction of steel structure projects shall have the requirements for the acceptance of the construction quality of not lower than the provisions of this standard.

3.0.4 The construction quality control of steel structure engineering shall be carried out in accordance with the following provisions:

1 The raw materials and finished products used shall be subject to mobilization acceptance. All raw materials and finished products involving safety and function shall be re-inspected in accordance with the provisions of 14.0.2 of this standard, meanwhile the sampling and sample delivery shall be witnessed by the supervision engineer (technical person in charge of the construction organization);

2 The quality control of each process shall be carried out according to the construction technical standards; inspection shall be carried out after each process is completed;

3 The handover inspection shall be carried out between the relevant trades; it shall be inspected and approved by the supervision engineer (the technical person in charge of the construction organization).

3.0.5 Acceptance of construction quality of steel structure engineering shall be carried out in accordance with inspection batches, item work, divisional (sub-divisional) work on the basis of qualified self-inspection by the construction organization. The division of item work in the divisional (sub-divisional) work of the steel structure engineering shall be implemented in accordance with the current national standard "Unified acceptance standard for building construction quality" GB 50300. The steel structure item work shall be composed of one or several inspection batches, the inspection batches of each item work shall be divided according to the provisions of this standard; meanwhile it shall be confirmed by the supervisor (or construction organization).

3.0.6 The qualified quality standard of the inspection batch shall meet the following requirements:

1 The main control items must meet the quality requirements of this standard;

2 The inspection results of general items shall have 80% or more check points (values) that meet the requirements of this standard, meanwhile the maximum (or minimum) value shall not exceed 1.2 times the allowable deviation value.

3.0.7 The qualified quality standards for item work shall meet the following requirements:

1 Each inspection batch included in the item work shall meet the quality

4.2.1 The variety, specification and performance of steel sheets shall meet the requirements of current national standards and meet design requirements. When the steel sheet enters the site, the test pieces shall be taken according to the current national standards, to be subject to the testing of the yield strength, tensile strength, elongation and thickness deviation. The testing results shall comply with the current national standards.

Inspection quantity: All quality certification documents are inspected; the sampling quantity is determined according to the mobilization batch and the sampling inspection plan of the product.

Inspection method: Check quality certification documents and sampling inspection report.

4.2.2 The steel sheet shall be subject to the witnessed sampling and reinspection in accordance with Appendix A of this standard. The results of the re-inspection shall meet the requirements of the current national standards and meet the design requirements.

Inspection quantity: Inspection for all.

Inspection method: Witness the sampling and sample delivery; check the re-inspection report.

II General items

4.2.3 The thickness of the steel sheet and its allowable deviation shall meet the requirements of its product standards and design documents.

Inspection quantity: Spot inspection for 10% of each batch of steel sheets of the same variety and specification; meanwhile it is no less than 3 pieces, 3 locations per piece shall be inspected.

Inspection method: Use vernier caliper or ultrasonic thickness gauge to make measurement.

4.2.4 The flatness of the steel sheet shall meet the requirements of its product standards.

Inspection quantity: Spot inspection for 10% of each batch of steel sheets of the same variety and specification; meanwhile it is no less than 3 pieces, 3 locations per piece shall be inspected.

Inspection method: Use stayguy, steel ruler and vernier caliper for measurement.

4.2.5 The surface appearance quality of the steel sheet shall not only meet the

Inspection quantity: Follow the Appendix A of this standard to carry out inspection based on the re-inspection batch size.

Inspection method: Witness the sampling and sample delivery; check the re-inspection report.

II General items

4.3.3 The cross-sectional size, thickness and allowable deviation of profiles and pipes shall meet the requirements of their product standards.

Inspection quantity: Spot inspection for 10% of each batch of profiles of the same variety and specification; meanwhile it is no less than 3 pieces, 3 locations per piece shall be inspected.

Inspection method: Use steel ruler, vernier caliper and ultrasonic thickness gauge for measurement.

4.3.4 The allowable deviation of the profile and pipe dimensions shall meet the requirements of their product standards.

Inspection quantity: Spot inspection for 10% of each batch of profiles of the same variety and specification; meanwhile it is no less than 3 pieces, 3 locations per piece shall be inspected.

Inspection method: Use stayguy and steel ruler for measurement.

4.3.5 The surface appearance quality of profiles and pipes shall meet the requirements of Article 4.2.5 of this standard.

Inspection quantity: Inspection for all.

Inspection method: Observation inspection.

4.4 Steel castings

I Main control item

4.4.1 The types, specifications and performance of the steel castings shall meet the requirements of the current national standards and meet the design requirements. When the steel castings enter the site, test pieces shall be taken according to the current national standards, to be subject to the inspection of the yield strength, tensile strength, elongation and thickness deviation; the inspection results shall comply with the current national standards.

Inspection quantity: All quality certification documents are inspected; the

4.5 Cables, tie rods and anchorage

I Main control item

4.5.1 The types, specifications and performance of the cables, tie rods and anchorages shall meet the requirements of the current national standards and meet the design requirements. When the cables, tie rods and anchorages enter the site, test pieces shall be taken according to the current national standards, to be subject to the inspection of the yield strength, tensile strength, elongation and thickness deviation; the inspection results shall comply with the current national standards.

Inspection quantity: All quality certification documents are inspected; the sampling quantity is determined according to the sampling inspection plan of the incoming batches and products.

Inspection method: Check quality certification documents and sampling inspection report.

4.5.2 The cables, tie rods, anchorages shall be sampled for re-inspection in accordance with the provisions of Appendix A of this standard; the re-inspection results shall meet the requirements of the current national standards and meet the design requirements.

Inspection quantity: Inspection for all.

Inspection method: Witness the sampling and sample delivery; check the re-inspection report.

II General item

4.5.3 The allowable deviation of the dimensions of cables, tie rods, anchorages and their connectors shall meet the requirements of their product standards and design.

Number of inspections: Inspection for all.

Inspection method: Use steel ruler, vernier caliper and stayguy for measurement.

4.5.4 The surface of the cable, the tie rod and its sheath shall be smooth; there shall be no cracks and visual defects such as folding, delamination, scarring and erosion.

Inspection quantity: Inspection for all.

Inspection method: Observation inspection.

Inspection quantity: Spot inspection for 1% per batches and shall not be less than 10 sets.

Inspection method: Use steel ruler and vernier caliper for measurement.

4.6.4 The construction organization shall re-inspect the mechanical properties and welding performance of the welding studs in accordance with the current national standard "Cheese head studs for arc stud welding" GB/T 10433; the results of the re-inspection shall meet the requirements of the current national standards and meet the design requirements.

Inspection quantity: A set of re-inspections shall be carried out for each batch number and it shall not be less than 5 tensile and 5 bending tests.

Inspection method: Witness the sampling and sample delivery; check the re-inspection report.

4.6.5 The appearance of the welding rod shall not have defects such as peeling of the coating or the welding core rust; the flux shall not be damp and agglomerate.

Inspection quantity: Spot inspection for 1% per batches and shall not be less than 10 packages.

Inspection method: Observation inspection.

4.7 Fasteners for connections

I Main control items

4.7.1 The variety, specification and performance of the assemble of high-strength bolt for steel structure connection shall meet the requirements of the current national standards and meet the design requirements. The assemble of high-strength large hexagon head bolt shall be accompanied by a torque coefficient inspection report; the torsion-shear type assemble of high-strength bolt shall be accompanied by a tightening axial force (pre-tension) inspection report. When the high-strength large hexagon head bolt assemble and the torsion-shear type high-strength bolt assemble enter the site, the test pieces shall be taken according to the current national standards and the torque coefficient for testing of the torque coefficient and tightening axial force (pre-tension), respectively. The inspection results shall meet the requirements of the current national standards.

Inspection quantity: All quality certification documents are inspected; the sampling quantity is determined according to the sampling inspection

results shall meet the requirements of their product standards.

Inspection quantity: Random check 8 pieces according to specifications.

Inspection method: Use hardness tester for measurement.

4.7.7 For ordinary bolts, self-tapping screws, rivets, pull rivets, shot nails, anchor bolts (mechanical and chemical reagent type), anchor bolts and other fastening standard parts, nuts, washers, etc., their varieties, specifications, performance shall meet the requirements of the current national product standards and meet the design requirements.

Inspection quantity: Inspection for all.

Inspection method: Check the product quality certificate, Chinese product mark and inspection report, etc.

4.8 Materials of spherical joints

I Main control item

4.8.1 The types, specifications and performance of the raw materials used to make the bolt sphere shall meet the requirements of the current national standards and meet the design requirements.

Inspection quantity: Inspection for all.

Inspection method: Check the product quality certificate, Chinese product mark and inspection report, etc.

4.8.2 The types, specifications, performances, etc. of the raw materials used in the production of sealing plates, cones and sleeves shall comply with the current national standards and meet the design requirements.

Inspection quantity: Inspection for all.

Inspection method: Check the product quality certificate, Chinese product mark and inspection report, etc.

4.8.3 The variety, specification, performance, etc. of the steel sheet used to make the welding sphere shall meet the requirements of the current national standards and meet the design requirements.

Inspection quantity: Inspection for all.

Inspection method: Check the product quality certificate, Chinese product mark and inspection report, etc.

and meet the design requirements.

Inspection quantity: Random inspection of 5% for each specification and no less than 10 pieces.

Inspection method: The thickness of the substrate is measured by a thickness gauge; the thickness of the coating layer is measured by the weighing method.

4.9.6 The fixing bracket for the profiled metal sheet shall be free of deformation; the surface shall be flat and smooth, free of cracks, damage, and corrosion.

Inspection quantity: Based on inspection batch or random inspection for 5% per each batch of incoming quantity.

Inspection method: Square measurement and observation inspection.

4.9.7 Fasteners for profiled metal sheet shall be free from damage and corrosion on the surface.

Inspection quantity: Based on inspection batch or random inspection for 5% per each batch of incoming quantity.

Inspection method: Observation inspection.

4.9.8 The appearance quality of rubber pads, sealants and other special materials for profiled metal sheet shall meet the product standard requirements; the packaging shall be intact.

Inspection quantity: Sample 10% for inspection according to each batch of incoming quantity.

Inspection method: Observation inspection.

4.10 Membrane materials of membrane structures

I Main control item

4.10.1 The varieties, specifications, performances, etc. of the membrane materials used for membrane structure shall meet the requirements of the current national standards and meet the design requirements. The quality of imported membrane products shall meet the requirements of the design and contract.

Inspection quantity: Inspection for all.

Inspection method: Check the product quality certificate, Chinese product mark and inspection report, etc.

4.11.3 The model, name, color and validity period of the anticorrosive coating and fireproof coating shall be consistent with their quality certification documents. After unpacking, there shall be no crusts, lumps, gels, etc.

Inspection quantity: Random inspection for 5% of the number of barrels and it shall not be less than 3 barrels.

Inspection method: Observation inspection.

4.12 Products and others

I Main control item

4.12.1 The variety, specification and performance of steel structure bearings and rubber pads shall comply with the current national standards and meet the design requirements.

Inspection quantity: Inspection for all.

Inspection method: Check the product quality certificate, Chinese product mark and inspection report, etc.

4.12.2 For other materials and finished products involved in steel structure projects, their varieties, specifications, performances, etc. shall meet the requirements of the current national standards and meet the design requirements.

Inspection quantity: Inspection for all.

Inspection method: Check the product quality certificate, Chinese product mark and inspection report, etc.

5 Welding engineering

5.1 General requirements

5.1.1 This chapter is applicable to the quality acceptance of welding engineering for steel element welding and stud (welding nail) in the fabrication and installation of steel structures.

5.1.2 The inspection batch of steel structure welding engineering can be divided into one or several inspection batch according to the division principle of inspection batch of corresponding steel structure production or installation engineering.

Inspection quantity: Random inspection of 10% of each batch of similar elements for grade 2 welds under static load, 15% of each batch of similar elements for grade 1 welds under static load and welds under dynamic load, and no less than 3 pieces: among the elements to be spot-checked, 5% of each type of weld shall be spot-checked according to the weld number, and it shall not be less than 1; 1 location shall be spot checked per weld and the total number of spot-checks shall not be less than 10 locations.

Inspection method: Use weld gauge for inspection.

5.2.9 For welds that require preheating or post-heating, the preheating temperature or post-heating temperature shall comply with the current national standards or be determined by welding procedure qualification.

Inspection quantity: Inspection for all.

Inspection method: Check the pre-heating or post-heating construction records and welding procedure qualification report.

5.3 Stud (welding nail) welding engineering

I Main control item

5.3.1 The construction organization shall conduct welding procedure qualification for the studs and steel used for welding; the results shall meet the design requirements and comply with the current national standards. The stud-welded porcelain ring shall be protected from moisture when stored; the damp-welded porcelain ring shall be baked at 120 °C ~ 150 °C for 1 h ~ 2 h before use.

Inspection quantity: Inspection for all.

Inspection method: Check the welding procedure qualification report and baking record.

5.3.2 After the appearance quality inspection of the stud welded joint is qualified, the bending sampling inspection shall be carried out; there shall be no visible cracks in the weld and heat-affected zone.

Inspection quantity: 1% of each inspection batch and shall not be less than 10.

Inspection method: Visually inspect the studs after bending for 30°.

II General item

5.3.3 The visual inspection of stud welded joints shall meet the requirements of Table 5.3.3-1. When the arc welding method is used for stud welding, the

inspection batches according to the division principle of the inspection batch of the production or installation engineering of corresponding steel structure.

6.2 Connection of ordinary fasteners

I Main control item

6.2.1 When ordinary bolts are used as permanent connecting bolts, when the design has requirements or their quality is doubtful, the minimum tensile load of the bolts shall be re-inspected. The test method can be implemented in accordance with Appendix B of this standard; the results shall meet the requirements of the current country standard "Mechanical properties of fasteners - Bolts, screws and studs" GB/T 3098.1.

Inspection quantity: 8 bolts of each specification shall be randomly inspected.

Inspection method: Check the physical bolt reinspection report.

6.2.2 The specification size of self-tapping nails, pulling rivets, shooting nails used to connect the thin steel sheets shall match the connected steel sheets; meet the design requirements; their spacing and edge distance shall meet the design requirements.

Inspection quantity: 1% of the number of connection joints shall be randomly inspected and shall not be less than 3.

Inspection method: Observation and ruler inspection.

II General items

6.2.3 The fastening of permanent ordinary bolts shall be firm and reliable; the number of exposed threads shall not be less than 2.

Inspection quantity: 10% of the number of connected nodes shall be randomly inspected and shall not be less than 3.

Inspection method: Observe and check by knocking with a small hammer.

6.2.4 Self-tapping screws, pulling rivets, shooting nails, etc. shall be tightly attached to the connected steel sheet; it shall be neatly arranged.

Inspection quantity: Randomly inspect 10% of the number of connection joints and shall not be less than 3.

Inspection method: Observe or check by knocking with a small hammer.

Inspection quantity: Randomly check 10% of the number of joints and no less than 10 joints. All the torshear type high-strength bolt assembles in the joints that have not been screwed off are subjected to final tightening torque inspection.

Inspection method: Observation inspection and execute according to Appendix D of this standard.

II General items

6.3.5 The tightening sequence and initial tightening and final tightening torque of high-strength bolt assemble shall meet the design requirements and meet the current industry standard "Technical specification for high strength bolt connections of steel structures" JGJ 82.

Inspection quantity: Inspection for all.

Inspection method: Check the torque wrench calibration record and bolt construction record.

6.3.6 After the high-strength bolt assemble is finally tightened, the number of bolt threads exposed shall be 2 ~ 3 threads, of which 10% of the bolt threads are allowed to expose 1 or 4 threads.

Inspection quantity: Randomly check 5% of the number of nodes, which shall not be less than 10.

Inspection method: Observation and inspection.

6.3.7 The friction surface of the high-strength bolt connection shall be kept dry and tidy. There shall be no flashes, burrs, welding spatter, welding scars, iron oxide scale, dirt, etc. The friction surface shall not be painted except for design requirements.

Inspection quantity: Inspection for all.

Inspection method: Observation and inspection.

6.3.8 High-strength bolts shall be able to penetrate the bolt holes freely. When they cannot be penetrated freely, a reamer shall be used for trimming. The number of trimmed holes shall not exceed 25% of the number of bolts at the joint; the hole diameter after reaming shall not exceed 1.2d (d is the bolt diameter).

Inspection quantity: Inspection for all the reamed bolt holes.

Inspection method: Observation inspection and check with calipers.

7.7.3 When the deviation of the bolt hole pitch exceeds the allowable deviation as specified in Table 7.7.2 of this standard, a welding rod that matches the base material shall be used for repair welding and make holing again.

Inspection quantity: Inspection for all.

Inspection method: Observation inspection.

8 Assembling engineering of steel elements

8.1 General requirements

8.1.1 This chapter can be used for the quality acceptance of element assembly in steel structure production and installation.

8.1.2 The steel structure assembly engineering can be divided into one or several inspection batches according to the division principle of the inspection batch of steel structure production engineering.

8.1.3 For the assembly of elements, it shall determine a reasonable assembly sequence according to design requirements, element form, connection mode, welding method and welding sequence.

8.1.4 The splicing of sheets and profiles shall be carried out before the assembly of elements. The assembly of elements shall be carried out after the components are assembled, welded, rectified and passed inspection. The concealed parts of the elements shall be closed after welding, bolting and painting are qualified.

8.2 Assembling and butting of components

I Main control item

8.2.1 The quality level of welds used when splicing or butting steels and steel components shall meet the design requirements. When there is no design requirement, penetration welds with a quality level of not less than grade 2 shall be used; for welds that directly bear tensile forces, the grade 1 penetration welds shall be used.

Inspection quantity: Inspection for all.

Inspection method: Check the ultrasonic inspection report.

II General items

9.1.4 The quality of pre-assembled steel elements shall not only meet the requirements of this standard, but also meet the design requirements.

9.1.5 When using computer simulation to simulate test assembling, the external dimensions of the simulated elements or units shall be the same as the actual geometric dimensions. When the deviation of test assembling using computer simulation exceeds the relevant requirements of this standard, entity test assembling shall be carried out according to the requirements of this chapter.

9.2 Entity test assembling

I Main control item

9.2.1 For multilayer laminates connected by high-strength bolts and ordinary bolts, a hole tester shall be used to check the passing rate of bolt holes; it shall meet the following requirements:

1 When using a hole tester that is 1.0 mm smaller than the nominal diameter of the hole, the pass rate of each group of holes shall not be less than 85%;

2 When using a hole tester that is 0.3 mm larger than the nominal diameter of the bolt, the pass rate shall be 100%.

Inspection quantity: Check all test assembling units.

Inspection method: Use a hole tester to inspect.

II General items

9.2.2 During the test assembling of entity, it should use punch nail which is not less than 10% of the total number of bolt holes for positioning; then use temporary bolts for fastening. The number of temporary bolts shall not be less than 20% of the number of bolt holes in a group of holes; meanwhile it shall not be less than 2.

Inspection quantity: Check all test assembling units.

Inspection method: Observation inspection.

9.2.3 The allowable deviation of the entity test assembling shall meet the requirements of Table 9.2.3.

Inspection quantity: Check all test assembling units.

Inspection method: It shall meet the requirements of Table 9.2.3.

Inspection quantity: Inspection for all.

Inspection method: Check certificates and other supporting documents.

II General items

9.3.2 The allowable deviation of simulation test assembling shall meet the requirements of Table 9.2.3 of this standard.

Inspection quantity: Check all test assembling units.

Inspection method: Computer simulation analysis.

10 Installation engineering of steel frame structures

10.1 General requirements

10.1.1 This chapter can be used for the quality acceptance of the installation engineering of the main structure of single-story and multi-story steel structures, underground steel structures, secondary elements such as purlins and wall frames, steel platforms, packway, steel ladders, and protective railings.

10.1.2 The steel structure installation engineering can be divided into one or several inspection batches according to deformation joints or space stability units; it can also be divided into one or several inspection batches according to floors or construction sections. The underground steel structure can be divided into inspection batches according to different underground layers.

10.1.3 The inspection batch of steel structure installation shall be accepted on the basis of the acceptance of raw materials and elements after mobilization as well as the acceptance of item work such as fastener connection, welding connection, corrosion protection.

10.1.4 For the structural installation measurement and correction, high-strength bolt assemble, friction surface slip coefficient of faying surface, construction and welding in winter or rainy season, etc., it shall formulate the corresponding construction process or scheme before implementation.

10.1.5 The detection of installation deviation shall be carried out before the structure forms a space rigid unit and is connected and fixed and the temporary supporting structure is removed.

10.1.6 During installation, construction loads and ice and snow loads are strictly prohibited to exceed the load-bearing capacity of beams, trusses, floor slabs, roof slabs, platform decking, etc.

II General items

10.8.3 The step height difference between adjacent stairs shall not be greater than 5 mm; the deviation of each step height from the design shall not be greater than 3 mm.

Inspection quantity: Randomly inspect 10% of the total number of stairs, and not be less than 3 runs.

Inspection method: Steel ruler.

10.8.4 The deviation of railing straightness shall not be greater than 5 mm.

Inspection quantity: Randomly inspect 10% of the total length of the railing, and not less than 5 m at each side.

Inspection method: On-site measurement by stayguy, level, spirit level and steel ruler.

10.8.5 The deviation of the spacing between the railings on both sides of the stairs and the design shall not be greater than 10 mm.

Inspection quantity: Randomly inspect 10% of the railings according to the total length, not less than 5 m on both sides.

Inspection method: On-site measurement by steel rulers.

10.9 Overall steel structures

I Main control item

10.9.1 The allowable deviation of the overall elevation offset and overall plane bending of the main steel structure shall meet the requirements of Table 10.9.1.

Inspection quantity: Inspection for all the main facades. For each elevation inspected, in addition to the two rows of corner columns, it shall also select at least one row of middle column.

Inspection method: Use theodolite, total station, GPS, etc. to measure.

11 Installation engineering of space structures

11.1 General requirements

11.1.1 The steel pipe grids, reticulated shells, cable-membrane space structures, and structural installation engineering with steel pipes (round pipes or rectangular pipes) as the main force-bearing elements (or objects) shall be subject to quality acceptance according to this chapter.

11.1.2 The installation engineering of steel grid, reticulated shell structure and steel pipe truss structure can be divided into one or several inspection batches according to deformation joints, space rigid elements, etc., or divided into one or several inspection batches according to floors or construction sections, etc.

11.1.3 The inspection batch for the production and installation engineering of prestressed cable rods and membrane structures can be divided into one or several inspection batches in combination with the inspection batch of the item work of corresponding steel structure production and installation.

11.1.4 The installation of prestressed cable rods shall have a special construction plan and corresponding monitoring measures, meanwhile it shall be approved by design and supervision.

11.1.5 The installation inspection of the space structure shall be carried out on the basis of the acceptance of the item work such as the acceptance of raw materials and finished products after mobilization, element fabrication, welding connection and fastener connection, etc.

11.2 Installation of bearing and anchor bolt (anchor)

I Main control item

11.2.1 The allowable deviations of the positioning axis and elevation of the steel grid, reticulated shell structure and the support shall meet the requirements of Table 11.2.1; the specifications and fastening of the support anchor shall meet the design requirements.

Inspection quantity: Randomly inspect 10% of the number of supports, and not be less than 3 places.

Inspection method: Actual measurement by theodolite and steel ruler.

be less than 4.

Inspection method: Actual measurement by theodolite, level, spirit level and steel ruler.

11.2.4 The deviation of the size of the anchor bolts (anchor) shall meet the requirements of Article 10.2.6 of this standard. The thread of the support anchor bolt shall be protected.

Inspection quantity: Randomly inspect 10% of the number of foundations, and no less than 3 places.

Inspection method: On-site measurement by steel ruler.

11.3 Installation of steel grid structure and reticulated shell

I Main control item

11.3.1 The deflection value of the steel grid and reticulated shell structure shall be measured after the completion of the overall assembly and the roofing project; the measured deflection value shall not exceed 1.15 times the calculated deflection value under the corresponding load conditions.

Inspection quantity: For steel grid and reticulated shell structures with a span of 24 m and below, measure a point at the center of the lower chord; for steel grids and reticulated shell structures with a span of 24 m or more, measure a point at the center of the lower chord and quarter points of each lower chord span.

Inspection method: Actual measurement by steel ruler, level or total station.

II General items

11.3.2 After the overall assembly of the bolted spherical joint grid frame and reticulated shell is completed, the high-strength bolts and the spherical joint shall be tightly connected; there shall be no gaps or looseness in the connection.

Inspection quantity: Randomly check 5% of the number of joints and not be less than 3.

Inspection method: Use ordinary wrench, feeler gauge and observation inspection.

11.3.3 Allowable deviation of the smallest assembled rigid unit shall meet the requirements of Table 11.3.3.

Inspection quantity: Random inspection of 5% of the number of units, and not be less than 3.

11.4.3 There shall be no crack defects on the end surface of the rectangular tube at the intersecting joints.

Inspection quantity: Polish and observe one by one.

Inspection method: Observe by polishing or inspect by magnifying glass or magnetic particle inspection.

11.4.4 The quality grade of butt welds of steel pipes shall meet the design requirements. When there is no design requirement, it shall comply with the current national standard "Code for welding of steel structures" GB 50661.

Inspection quantity: Check 20% according to similar joints, and not be less than 5.

Inspection method: Spot check by ultrasonic flaw detection.

II General items

11.4.5 The structure of the butt weld of the steel pipe or the weld along the cross-section shall meet the design requirements. When there is no design requirement, for steel pipes with wall thickness less than or equal to 6 mm, it should use I-shaped groove full circumference single-sided full penetration weld with backing plate; for steel pipes with wall thickness greater than 6 mm, it should use V-shaped groove full circumference single-sided full penetration weld with backing plate.

Inspection quantity: Inspection for all.

Inspection method: Check construction drawings, detailed construction drawings and construction records.

11.4.6 The welding sequence of overlapping branch pipes and the welding method of concealed welds in the steel pipe structure shall meet the design requirements.

Inspection quantity: Inspection for all.

Inspection method: Check construction drawings, detailed drawings and hidden records.

11.5 Making of cable and member

I Main control item

11.5.1 The dimensions and deviations of the cable, tie rod, cable head length, pin diameter, anchor head opening depth, etc. of the cable member shall

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