Network frame design and implementation of the work

one.Project overview

The basic form of the frame is the four-angle cone frame, with the bolt ball node + welding ball node connection. The size: the span is 103.2X 75.6m, and the projection area: 10420m2.

3. Seismic intensity 7 degrees, acceleration 0.1g, third group; site category: class.
4. Structural safety level is level 1, and the structure service life is 50 years.
5. The design of the grid steel pipe is 80% of the full stress.
6. length ratio of net frame pull rod [λ]≤200; length ratio of pressing rod [λ]≤ 150;
7. The maximum span deflection value calculated by the network frame design is 209mm, and the deflection span ratio is 1 / 360.
8. Support type: seismic ball hinge support seat.
9. The design anti-corrosion service life of the steel structure is 15 years.
10. The roof panel is the metal aluminum magnesium manganese plate roof, and see the construction for roof insulation practices.
11. Load standard value:
    Upper load: 0.50 kN/m2 (0.7 kN/m2)
    Upper string live load: 0.50 kN/m2
    Lower load: 0.30 kN/m2 (0.5 kN/m2)
    Lower load: 0.20 kN/m2 (0.3 kN/m2)
    Basic wind pressure: 0.35 kN/m2
    Basic snow pressure: 0.20 kN/m2
    Grid weight: computer generated automatically

The construction closing temperature is 10~15℃, the maximum heating temperature of the grid structure is 32℃, and the maximum cooling temperature is-37℃.

Note: In case of load increase or decrease, changing the load suspension position, the designer shall be notified to approve in advance.

2. Technical specifications to be observed in the design and construction

1. Technical Specification JGJ7-2010
2, building structure load code GB50009-2012
3.Code for seismic design of buildings GB50011-2010(2016 edition)
4, steel structure design specification GB50017-2003
5. Technical specification for cold-bent sheet steel structure GB50018-2002
6. Code for construction quality acceptance of steel structure engineering GB50205-2001
7. Welding Specification of steel structure GB50661-2011
8. Technical regulations for corrosion prevention of building steel structure JGJ / T251-2011
9. High strength bolt GB / T 16939-1997 for bolt ball node of steel mesh frame
10, Steel mesh frame bolt ball node JG / T10-2009
11. Steel mesh frame welded hollow ball node JG / T11-2009
12. Technical specifications for application of steel structure fire retardant coating CECS24:90
13. Technical code for fire prevention of building steel structure CECS200:2006
14. Ruust grade and rust removal grade of steel surface before coating GB8923-2011
15. Unified standard for the reliability design of building structure GB50153-2008

lii. Main materials

1. Steel: except as otherwise indicated, all Q235B steel is used.When steel pipe diameter is <180, Q235B steel is used according to the relevant regulations of Carbon Structural Steel (GB / T700); when steel pipe diameter is 180, Q345B steel is adopted Gold high strength structural steel " GB / T 1591, steel shall have tensile strength, elongation, yield strength, cold bending test and qualified guarantee of sulfur, phosphorus and carbon content.Steel pipe can be high-frequency welded pipe or seamless steel pipe, and the product quality complies with the provisions of Straight Joint Welded Steel Pipe (GB / T 13793) or Seamless Steel Pipe for Structure (GB / T8162).
2. High strength bolts: 40Cr in GB3077; meet the requirements of GB / T16939, the hardness inspection and appearance inspection shall be conducted one by one, without crack or damage.
3. The ratio of measured yield strength to tensile strength shall not be greater than 0.85; steel shall have obvious yield steps and elongation shall not be less than 20%; steel shall have good weldability and qualified impact toughness.
4. Bolt ball: forged with No.45 steel, the material meets the relevant provisions of High Quality Carbon Structural Steel (GB / T 699), and the product quality meets the provisions of Steel Network Rame Bolt Ball node (JG10-2009).
5. Q345B steel is used for the welding ball.Q345B.
6. Sleeve: adopt Q235B steel (<M36) or No.45 steel (M36) steel.The quality of products meets the provisions of Bolt Ball node (JG10-2009).
7. Seal plate and cone head: adopt Q235B steel or Q345B steel corresponding to the steel pipe, and the product quality meets the provisions of Steel Network Rame Bolt Ball Node (JG10-2009).Base thickness meets the (GB / T16939) requirements.
8. High strength bolt strength grade: M16~M36 is 10.9S; M39~M64 is 9.8S.The quality of the products meets the provisions of High Strength Bolts (GB / T16939).
9. Weld: Q235 welding adopts E43XX specified in Non-alloy Steel and Fine grain Steel (GB / T 5117-2012), and E43XX welding between Q235, Q345B and No.45 steel.
10. Other accessories: using Q235B steel, support bolts using ordinary thick bolts.
11. All support bolts shall be class 10.9 large hexagonal high strength bolts. supporting nuts and washers shall meet High Strength hexagonal Bolts, nut, Gasket and Technical Conditions (GB / T1231-2006).
12. The material shall have the quality certificate and acceptance report, the steel ball and all welds shall be numbered by the welder, and the quality of all products shall meet the provisions of the Steel Network Rame Bolt Ball node (JG / T10-2009).
13. In the material table, the selected specifications shall not be replaced arbitrarily. If it is really difficult to prepare materials, it must be agreed by the design unit.

Four, production

1. Steel pipe shall be fed by machine tools, and the feeding length shall be pre with welding shrinkage.The allowable length deviation is ± 1mm.
2. The thread requirement of the bolt ball node is of 6H level, and the accuracy meets the relevant provisions of ordinary Thread Tolerance and Cooperation (GB197).The angle allowable deviation is ± 20 ′.
3. The weld of steel pipe and cone head (or sealing plate) is full and without slag.lack of penetration.blowhole.Bite meat and other defects.When welding steel plates and balls, balls should be preheated 150 ~200° before welding.
4. The welding joints at both ends of steel pipe shall be inspected according to the quality in GB50205-2001; if the wall thickness of steel pipe is greater than or equal to 4mm, steel pipe shall be welded; each weld shall be stamped by the welder and the inspector shall have the examination certificate.
5. Use reasonable welding sequence to prevent welding deformation, such as symmetry, section, layered welding, jump welding, avoid one forming; and take effective measures to prevent or reduce deformation, when the deformation exceeds the current specification, must be corrected; welding joints should be neat and beautiful, without depression, welding, bite, slag, pores, welding and other defects.
6. The connection of support and bolt ball shall be conducted by factory preheating welding, and the welding grade shall not be less than grade 3.
7. The connection of steel pipe, tapered head and sealing plate shall be made by section docking weld. The weld quality shall meet the requirements of secondary quality grade stipulated in ultrasonic flaw Detection and Quality Classification Method of Steel mesh frame weld (JG / T3034.2).
8. All components shall be made for the accuracy of size and hole position in order to facilitate the site installation and welding.All unindicated welds in the design are full welding with a height of hf=1.2t (t is the thickness of thinner welds).

Five, installation

1. The grid installation shall be carried out after the axis of the lower structure and the embedded plate pass the acceptance, and the concrete strength grade reaches the design strength the superstructure can be installed only after the degree level.
2. Before installation, the plane position and elevation of the embedded parts or embedded bolts should be checked, and the deviation shall comply with the requirements of the Code for Acceptance of Construction Quality of Steel Structure Engineering (GB50205).For the supporting surface that does not meet the requirements, it should be leveled and adjusted in advance, and improper measures such as plugging the cushion steel plate under the excessive support plate shall not be used in the installation process.To make the support each point of the natural force, do not strongly pull the hard top.
3. Arrange the installation sequence of steel structure reasonably according to the requirements of construction organization and design.Before installing the structure, the components should be comprehensively checked: such as whether the number, length, verticality of the components meet the design requirements, etc.
4. After installation, all joints and excess screw holes should be packed with greasy plugs.
5. Appropriate measures should be taken when lifting the structure to prevent excessive bending and deformation.Consult with the designer when necessary.
6. Engineering installation shall strictly comply with the relevant regulations of JGJ7-2010 for space grid structure.

Six, coating

1. Before making all steel members, quartz sand blasting shall be treated on the surface of steel members, which shall not be removed by hand; the quality grade reaches Sa2 1 / 2 before coating (GB / T8923).
2. The steel components shall be sprayed in the workshop; the coating requirements are: epoxy zinc-rich primer twice, paint film thickness 60 m; epoxy iron intermediate paint twice, paint film thickness 60 m; two epoxy polyurethane finish paint, paint film thickness 60 m.Primer damaged during installation shall be coated before finish.
3. The fire resistance rating of the building is secondary, the fire resistance limit of the grid structure is 1.5 hours, and the fire resistance limit of the roof bearing components (purlins, roof support and other components) is 1.0 hours.Fire-retardant coating adopts ultra-thin fire-retardant coating, the variety and thickness of fire-retardant coating are in line with the "steel structure fire-retardant coating application technical specification CECS24:90", and should be conducted compatibility test with the paint, the test can be qualified before being used.

Seven, notes

1. Except the elevation of this set is calculated in meters, the other dimensions are measured in mm.
2. The load of air duct and horse path must act on the node, and the rod does not bear the transverse load.
3. The coordinates before and after loading shall be measured separately to check the installation deviation and deflection.
4. Attention should be paid during installation that under any circumstances, the construction load should not be greater than the design load.
5. During the use of the steel structure, the necessary maintenance should be carried out regularly according to the use situation to ensure the safety of the structure during the use.
6. Matters not covered herein shall be constructed in accordance with the relevant provisions of the current construction and acceptance codes and regulations.