# 网架设计与施工说明

一.工程概况

1.网架型式: 螺栓球节点 正放四角锥 网架

2.支承形式: 多点柱支撑.

3.网架面积: 投影面积: 2790m*m;

4.设计使用年限:50年

二.设计与施工依据遵照以下规范:

1.<<网架结构设计与施工规程>>JGJ7-2010;

2.<<钢结构设计规范>>GB 50017-2003

3.<<钢结构工程施工及验收规范>>GB50205-2015;

4.<<冷弯薄壁型钢结构技术规范>>GB 50018-2002 ;

5.<<建筑抗震设计规范>>GB50011-2010;

6.<<建筑结构荷载规范>>GB5009-2012;

7.<<钢网架螺栓球节点>>JGT10-2009;

8.<<网架结构工程质量检验评定标准>>:GB 50205-2001 ;

三.材料

1.钢管材质应符合《碳素结构钢》GB700规定的Q235B钢开应符合GB3092规定的焊接钢管或符合GB3087规定的20号无缝钢管。

2.螺栓球采用GB699规定的6.5号钢锻造,表面应光滑无裂纹无过烧无麻点。

3.高强度螺栓采用《钢网架螺栓球节点用高强度螺栓》GB/ T16939-1997规定的材料,成品不允许任何部位任何深度或任何长度的浮火裂纹,高强度螺栓性能等级分别符合《钢网架螺栓球节点用高强螺栓》GB/ T16939-1997中规定的等级要求,表面硬度达HRC32~36,螺纹应符合《普通螺纹公差与配合》GB197中的6 g级,表面需发黑处理并涂防锈油。

4.封板、锥头材质均应符合GB700规定的Q235钢,套筒套筒材质应符合GB700规定的Q235钢或符合《低合金结构钢技术条件》GB1591规定的16 Mn 钢或《优质碳素结构钢钢号及一般技术条件》GB699规定的6.5号钢,封板、锥头及套筒外观不得有裂纹、过烧及氧化皮。

5.焊条:选用E43XX系列;连接焊缝等级要求:主管的对接焊缝为全熔透焊缝,焊缝质量等级为一级。其余全熔透焊缝质量等级为二级;

6.材料应具有质量证明及验收重告,钢球须打上工号,所有焊件应施焊工工号,所有产品的质量应符合<<钢网架行业标准>>JGJ75.1~75.3-91

7.承重结构采用的钢材应具有抗拉强度、伸长率、屈服强度和碳、磷含量的合格证,焊接承重结构以及重要的非焊接承重结构采用的钢材还应具有冷弯实验的合格证。

8.钢结构的钢材应符合下列规定:

1)钢材的屈服强度实测值与抗拉强度实测值的比值不应大于0.85;

2)钢材应有明显的屈服台阶,且伸长率不应小于20%;

3)钢材应有良好的焊接性和合格的冲击韧性。

9.钢板:未注明的钢板均采用Q235钢

四.设计技术参数:

1.静荷载:

上弦层: 0.80 kN/m*m;(周边球处叠加 10 kN/ 点 幕墙荷载)

下弦层: 0.30 kN/m*m;(普通灯具、风管、喷淋等)

2.活荷载: 0.50 kN/m*m;

4.基本风压: 0.80 kN/m*m;

5.地震基本设防烈度: 8度 ,场地类型:2

6.温度差: ±25° C

7.计算机程序自动形成网架自重.

8.荷载沿规性用在节点上,杆件不承受横向荷载.

9.控杆长细比<200,压杆长细比<180,洞口及支座处压杆长细比<150;

五.本网架工程采用浙江大学空间结构研究室研制开发的空间网格结构计算机辅助设计系统(MSTCAD2014)进行满应力优化设计.

六.网架总平面图中标"⊡"为支座与埋件位置,

旁边数字为支座反力设计值,单位: kN.图中未注明支座类型均为ZZ1。

七.图中几何尺寸为毫米制.

八.材料表中,,所选用规格不得任意替换,若备料确有困难时,须经设计单位同意.

网架所有材料均应有出厂合格证明书, 并应按规定比例经复验合格后方可使用。

九.对油漆和防火的要求:.

9.1 钢结构构件油漆前应进行抛丸除锈处理,局部修补时可采用手工机械除锈,除锈等级达到Sa2 1/2 级和St3级,处理后的钢材表面不得有焊渣、焊疤、灰尘、油污、水和毛刺等。

9.2 所有钢构件在出厂前应喷涂底漆;构件除锈完成至底漆喷涂的时间间隔不宜超过《规范》的规定。

9.3 预留底漆得分及运输、安装过程中损坏的底漆,应手工打磨后补足底漆厚度。

9.4 对于现场焊接部位,应清除焊渣并打磨后再刷油漆,油漆与本体部分相同。

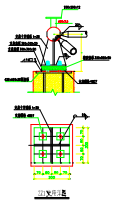
9.5 钢构件的涂装要求:水性无机富锌底漆,厚度≥ x40 um;中间漆,厚度≥ x25 um;聚氨酯面漆(用于室内)≥ x20 um。

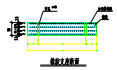
9.6 本工程中对于屋面钢结构主结构部分,耐火极限不低于1.5小时;对钢檩条及屋面系统,耐火极限不低于1.0小时。

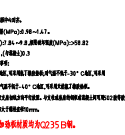
9.7 工程中选用的防火材料头须有国家检测机构对其耐火性能认可的检测报告及生产许可证。

9.8 所有防火涂料均应保证与底漆、中间漆或面漆具有良好的相容性、附着力及耐火性;

十.网架安装须在下部结构轴线及预埋承载板检验合格后进行安装.原序可由安装单位与设计单位商量确定.







3.支座球板及加劲板材质均为Q235B钢。

# Description of grid design and construction

one.Project situation

1. Network frame type: bolt ball node, forward four-angle cone, network frame.
2. Support form: multi-point column support.
3. Network frame area: Projection area: 2,790 m * m;
4. Design service life: 50 years

two. design and construction must comply with the following specifications:

1. <<Grid Structure Design and Construction Regulations>> JGJ7-2010;
2. <<Design Code for Steel Structures>> GB 50017-2003
3. <<Code for construction and acceptance of steel structure engineering>> GB50205-2015;
4. <<Technical specifications for cold-bent thin-wall steel structures>> GB 50018-2002;
5. <<Code for Building seismic Design>> GB50011-2010;
6. <<Load code of building structure>> GB5009-2012;
7.<< Steel grid bolt-ball joint >>JGT10-2009;
8. <<Quality inspection and evaluation standard of network structure engineering>>: GB 50205-2001;

three. Material

1. Steel pipe material shall conform to Q235B steel specified in GB700 and welded steel pipe specified in GB3092 or No.20 seamless steel pipe specified in GB3087.
2. Bolt ball shall be forged with No.45 steel as specified in GB699. The surface shall be smooth without crack without excessive burning without temp point.
3. High strength bolts shall be of materials specified in GB / T16939-High Strength Bolts for Steel Bolt Node 1997. The finished product shall not allow quenching crack at any depth or any length. High strength bolts must meet the T16939-1997. The surface hardness reaches HRC32~36. The threads shall conform to level 6g in GB197. The surface shall be black and coated with rust proof oil.
4. The sealing plate and cone head shall meet Q235 steel stipulated by GB700. The sleeve sleeve shall be Q235 steel stipulated by GB700 or 16Mn Steel for GB1591 for Low Alloy Structural Steel or No.45 Steel for GB699. The appearance of the sealing plate, cone head and sleeve shall not have cracks, overburn and oxidation skin.
5. Weld rod: E43XX series; connection welding grade requirements: the main butt weld is fully fused weld, and the weld quality grade is Grade 1.The quality grade of the other fully fused welds is Grade 2;
6. The material shall have the quality certificate and acceptance report, the steel ball shall be numbered, all welds shall be equipped with the welder work number, and the quality of all products shall meet <<steel mesh industry standard>> JGJ75.1~75.3-91
7. The steel used in the load-bearing structure shall have certificates of tensile strength, elongation rate, yield strength and sulfur and phosphorus content, Steel used for welded load-bearing structures and important non-welded load-bearing structures shall also have a certificate of cold bending test.
8. Steel structure of steel shall comply with the following provisions:
1) The ratio of measured yield strength of steel and tensile strength of steel shall not be greater than 0.85;
2) Steel shall have obvious yield steps, and the elongation rate shall not be less than 20%;
3) Steel shall have good welding and qualified impact toughness.
9. Steel plate: Q235 steel.

four.Design technical parameters:

1. Static load:
Upper string layer: 0.80 kN/m * m; (10kN / point curtain wall load superimposed at the surrounding ball)
Lower string layer: 0.30 kN/m * m; (ordinary lamps, air duct, spray, etc.)
2. Live load: 0.50 kN/m * m;
3. Basic air pressure: 0.80 kN/m * m;
5. Basic seismic fortification intensity: 8 degrees, site type: 2
6. Temperature difference: ± 25°
7. Computer programs will automatically form the dead weight of the network frame.
8. The load must act on the node, and the rod piece does not bear the lateral load.
9. The length ratio of the rod is <200, the length ratio is <180, and the length ratio at the opening and support is <150;

five.The space grid structure computer-aided design system (MSTCAD2014) is developed by the Space Structure Research Office of Zhejiang University.

six.The "⊡" of the general plan is the position of the support and buried parts, and the number next to the inversion design value of the support, unit: kN.The support types not indicated in the figure are ZZ1.

seven.The geometry in the figure is mm-made.

eight.In the material table,.The selected specifications shall not be replaced arbitrarily, If the preparation is really difficult, it shall be agreed by the design unit.All materials of the grid shall have a factory qualification certificate and can be used after passing the re-inspection in the specified proportion.

nine.Requirements for painting and fire prevention:

9.1 The steel structure components shall be removed before painting. Manual mechanical rust removal may be used for local repair. The rust removal grade shall reach Sa2 2 / 1 and St3, The treated steel surface shall not have welding slag, welding scar, dust, oil pollution, water and burr, etc.

9.2 All steel components shall be primed before leaving the factory; the time interval between the rust removal and the primer spraying shall not exceed the provisions specified in the Specification.

9.3 The reserved primer parts and the damaged primer during transportation and installation shall be polished by hand for the thickness of the primer.

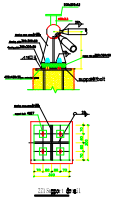
9.4 For welding site, welding slag shall be removed and paint painted the same as the body.

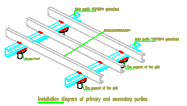
9.5 The main part of the steel structure of the roof shall not be less than primer, thickness 2x40um, intermediate paint, thickness 2x25um; polyurethane finish paint (for indoor) 2x20um.

9.6 For the main part of the steel structure of the roof shall not be less than 1.5 hours; for steel purlins and roof system, not less than 1.0 hours. report and production license approved by the national testing institution for its fire resistance performance.

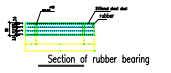
9.8 All fire-proof coatings shall be provided with good compatibility, adhesion and fire resistance with the primer, intermediate paint or finish;

ten.The network frame shall be installed in the installation order after the substructure axis and the embedded plate are accepted
The installation unit and the design unit to discuss to determine.





Installation diagram of primary and secondary purlins



Section of rubber bearing

explain:

1. Alignment between support center and center of embedded steel plate center of column top.
2. Rubber support shear elastic modulus (MPa): 0.98~1.47.
Allowable compressive strength (MPa): 7.84~9.8, ultimate destructive strength (MPa):> 58.82
3. Notes for the use of mesh frame plate rubber support;
a.Neoprene pad can be used for temperature not less than-25°C; for temperature not less than-30°C
Cold resistant neoprene pad; natural neoprene pad may be used for temperature not less than-40°C.
b.The long edge of the rubber pad shall be placed in parallel with the tangential direction of the mesh frame support.It can be fixed between steel plate or concrete with adhesive such as 502 glue with pillar or base.
c.The screw hole diameter on the rubber pad shall be 10mm larger than the bolt diameter.
3. The support connection plate and reinforcing plate are made of Q235B steel.