网架设计说明

一、工程概况

1、网架结构型式:本网架为正放四角锥螺栓球焊接钢网架。

2、网架平面尺寸详见平面图。

3、网架有组织排水。

4、网架支承形式:多柱点支承。

5、网架平面布置图中方框为支座,支座反力单位为千牛(KN)。

6.结构安全等级 : 二 级.

二、设计所遵循规范:(施工必须遵照以下规范)

1、《建筑结构荷载规范》	GB50009-2012
2、《建筑抗震设计规范》	GB50011-2010 (2016版)
3、《空间网格结构技术规程》	JGJ7-2010
4、《钢结构设计标准》	GB50017-2017
5、《钢结构工程施工质量验收规范》	GB50205-2017
6、《钢网架检测标准》	JGJ75.1~75.3--91
7、《网架结构工程质量检验评定标准》	JGJ78-91
8、《冷弯薄壁型钢结构技术规范》	GB50018-2016
9、《建筑设计防火规范》	GBJ50016-2014 (2018版)
10、《建筑钢结构焊接规程》	JGJ81-2002
11、《钢网架螺栓球节点用高强度螺栓》	GBT16939-2016
12、《建筑钢结构防火技术规范》	GB51249-2017
13、《建筑结构可靠性设计统一标准》	GB 50068-2018。

三、设计技术参数

1、上弦荷载 0.60 KN/m2 (承载原始值1.0 KN/m2)

2、上弦活载 0.50 KN/m2

3、下弦静载 0.50 KN/m2

4、基本风压 :0.50 KN/m2

5、基本雪压: 0.45 KN/m2

6、温度变化值:±30度.

7、地震参数:抗震7度,基本地震加速度0.15 g,所在地地震计地震分组为第二组,
场地类别为Ⅱ类,网架抗震构造0.04,关键杆件长细比控制180,压杆150.

8、场所制地震类别:丙类。

9、网架自重由计算机程序自动形成。

10、结构永质恒荷在节点上,使用中不得随意,杆件不得受损构荷载。

11、本工程采用空间网架设计软件(SFCAD2016)辅助设计。

四、材料要求

1、钢管:网架工程所用钢管与钢板,采用Q345B钢,其质量标准应符合现行国家标
准<<碳素结构钢>>(GB700-88),<<优质碳素结构钢>>
(GB/T 699-1999)规定的要求.钢材的强度实测值与抗拉强度实测值的比值不应大于0.85;
钢材应有明显的屈服台阶,且伸长率应小于20%;钢材应有良好的可焊性和合格的冲击韧性。

2、钢球:螺栓球采用《优质碳素结构钢》GB/ T699-1999 规定的45号钢圆进,
表面应光滑,无裂纹,无冠皮,无麻点。

3、高强螺栓:采用<<钢网架螺栓球节点用高强度螺栓>>(GBT16939-2016)
规定的40Cr,20MnTiB,35CrMo,35VB钢,此品不允许任何杂质,任何
程度或任何长度的裂纹,调质后的高强螺栓性能等级应符合
<<钢结构用高强度大六角头螺栓>>(GB1228)规定的10.9s性能等级的材料,
螺纹应符合<<普通螺纹公差与配合>>(GB197)中的6g级,表面露发黑处理
并涂防锈油。

4、、焊板.锥头.封板应均应符合《钢全结构钢》GB/ T700 规定的Q345B钢,钢管直径
大于等于75 时应保采用锥头,连接焊缝以及锥头和任何面应与连接构钢管等强,焊接应保
证强度和变形的要求。焊板.锥头所成不得有裂纹.过烧及氧化皮,并有试验报告。

5、杏钢:对质应符合《碳素结构钢》GB/ T700 规定的Q345B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45号钢》。
杏用外观不得有裂纹.过烧及氧化皮。

6、锚栓螺杆性能指标要求.锚栓螺杆及锚固螺筋的抗拉强度实测值与屈服强度实测值的比值不应小于1.25;
屈服强度实测值与屈服强度标准值的比值不应大于1.3,且在最大拉应下的总伸长率实测值不应小于9%。

7、紧固螺钉:材质采用Q0螺钢或Q0螺钢或70号弹簧钢。

8、焊条
a)导材为Q345B钢时,采用E506型电焊条,焊条性能应符合《碳钢焊条》(GB5117)的规定
b)导材为Q345钢与Q345号钢焊接时采用E50xx型电焊条,焊接温对应进行预热至150-200° C;
c)非以上两类焊缝采用二氧化碳气体保护焊,则焊丝应符合《二氧化碳气体保护焊用钢焊丝》(GB8110)。

9、网架所用材料都应有出厂合格证明书,无出厂证明书的材料长细比试验确认合格后方能使用.

所有产品质量应符合《钢网架行业标准》。

五、焊接

1、钢管与对杯.锥头组成杆件时,两端对接焊缝为全熔透焊缝。

2、支座螺栓球与底座的焊缝负保持球面热至150-200° C并使用安徽安焊发牙焊条;

3、本证明尺寸的焊缝一律满焊,最小焊缝高度为最小构件厚度的1.5倍且不小于Hf=6mm.

4、钢管对焊拼接
a)钢管对接焊缝需用V,其对V形缝构造角度为60° -90°,焊缝高 h>t(t为管壁)
和用衬垫焊条,焊缝缝根部宽度b≥2mm,衬垫厚度>0.5t;
c)钢管对接后,其直线度公差用不得超过长度的1/1000.

5、网架结构螺栓质量检验应过程<<钢结构工程施工质量验收规范>>
(GB50205-2001)规定的二级标准要求.

六、网架制作、安装

1、网架的制作、运输、安装应遵守《网架结构设计与施工规程》JGJ7-2010和
《钢结构工程施工质量验收规范》GB50205-2017,《钢网架螺栓球节点》
JG11-2016,《钢网安装检查及验收标准》JG12-1999。

2、构件出厂前应要进行预拼装工作;加吊装所注意易点的布置及吊装次序和临时加固措施。

3、预埋件对应度与网架支座承受点埋板连接,预以在施工中应地对保证其位置和标高。

为符合防雷要求网架支座与柱顶预埋钢板焊接处理,预埋钢板与柱内通长电气断
焊接处理。预埋件的偏移尺寸,标高以及平整度需符合设计要求,预埋件的允许偏差如下:

a)、预埋件中心线与支座轴线的偏移<15mm;

b)、标高差<±30mm;

c)、预埋件钢板平整度<3mm。

七、网架除锈、涂装

1、网架在制作前钢材从焊前打钢或酸锈,要求去锈性,无灰尘、油污等。除锈等级应符合
《涂装前钢材表面锈蚀等级和除锈等级》(GB/T8923.4-2013)中Sa2.5。

2、钢结除锈后,按《钢结构工程施工质量验收规范》(GB50205-2017)要求涂装,涂防锈底漆
两道(2X35um),面漆两道(2X35um);总干漆膜厚度不小于125um,安装过程中漆膜损伤部位
应进行补涂,使之不低于原有防腐护层要求;高强螺栓螺纹和螺栓球节螺栓球不得涂装。

3、本建筑耐体结构大学有为二级;网架防火等级为二级,钢结构钢防火涂层及建筑专业消要求,达到其规定的耐火极限要求:1.5小时
钢柱.钢支撑2.0小时;钢结构钢防火保护采用喷涂(抹涂)防火涂料;室内裸露构件,选用本膨胀型膨胀火涂料,
钢结构防火涂料选厚度不小于20 um;防火构造满足《建筑钢结构防火技术规范》 GB51249-2017
中4.2.1要求。

4、所选用的钢结构防火(防腐)涂料与防锈底漆涂(漆料)之间应进行相容性实验,实验合格后方可使用。

5、网架结构安装完成后应清除全部残留物及施工垃圾(钢屋面时完成)。

6、运输,来回时防止损伤。

八、网架分析结果简要

1、杆件最大应力/压力(1937.7/-4073.3)KN。

2、最大挠度Z=-124.3mm

3、本计算结果仅为网架部分,钢筋砼结构平方梁和网架支座面内方梁计算确定.

九、图例 上弦杆 —— 腹杆 —— 下弦杆 ---- 节点 ○ 支座

十、材料表中,所选用规格不得任意替换,若条材难有
困难时,须经设计单位同意,相对表中下杆长度为
理论下料长度,下料前要放出网架每种杆件,准确
使用全钢管尺寸无误,下料长度应避免出现点误差。

十一、本钢网架施工图应经具有钢结构施工资质的施工单位进行
行细化并放样设计且经过甲方及设计院认可后方可施工安装。

十二、网架加工前应对现场尺寸进行复测,确认无误后方可加工安装。

十三、其它

网架安装及使用中均不允许在杆件上悬挂重物.

钢网架应定期进行检验,保养与维护,易损构件应更换。

			网架设计说明	图样标记	重量 比例
设计	校对	标准			
制图	审定	文			
审核	批准	名		共 张	第 张
下	日期	重			

Grid design instructions

I. Project overview

1. Project name: Algeria Grid works
2. Structural type of the mesh frame: this mesh frame is a four-angle cone ball ball carbon steel mesh frame.
3. See the frame plan.
4. Organized drainage of the network frame.
5. Network frame support form: multi-column point support.
6. The frame in the layout plan of the network frame is the support, and the support reverse force unit is Gannu (KN).
7. Design service life: 50 years
8. Structural safety level: Grade II.
9. Structural importance systems: 1.0
10. Design specifications: (Construction must follow the following specifications)
a. Code for Load of Building Structure, GB50009-2012
b. Code for Seismic Design (GB50011-2010 (2016)
c. Technical Specification for Space Grid Structure, JGJ7-2010
d. Design Standard for Steel Structure, GB50017-2017
e. Quality Acceptance Engineering Construction Quality Acceptance Standard, GB50205-2020
f. Steel Grid Industry Standard JGJ75.1~75.3--91
g. Standard for Network Construction Engineering Quality Inspection and Evaluation(JGJ78-91)
h. Technical Specification for Cold-bent Thin-Wall Steel Structure GB50018-2016
i. Code for Fire Design GBJ50016--2014 (2018)
j. Welding Code for Building Steel Structure JGJ81--2002
k. High-strength bolts for steel bolts GBT16939-2016
l. Code for Fire Protection of Building Steel Structure GB51249-2017
m. Unified Standard for Building Structure Reliability Design GB 50068-2018.

II. Design technical parameters

1. Quiet load of 0.60KN / m2
2. The upper load is 0.50kN / m2
3. Lower string static load of 0.50KN / m2
4. Basic air pressure: 0.50kN / m2
5. Basic snow pressure: 0.30KN / m2
6. Temperature change value: ± 30 degrees.
7. Earthquake fortification intensity: 7 degrees, basic seismic acceleration value of 0.15g, Design seismic group of the site is the first group.
Site category is three categories, network frame damping ratio 0.02, key rod length fine ratio pull rod 180, pressure rod 150.
8. Ground roughness category: Class B.
9. The dead weight of the network frame is automatically formed by the computer program.
10. The load must act on the node, and shall not be overloaded in use, and the rod parts shall not bear the transverse load.
11. The computer-aided design system (MST2020)

Iv. Material requirements

a. Steel pipe: The steel used in the structure shall meet the following requirements, and shall have a quality certificate and re-inspection report.
b. The ratio of measured yield strength of steel to steel shall not be greater than 0.85;
c. Steel shall have obvious yield steps, and elongation shall not be less than 20%;
d. Steel shall have good suitability and qualified impact toughness;
e. Adopt Q235B steel, and the material meets the relevant regulations of the material compliance (carbon structural steel GB / T700-2006).
And has the tensile strength, elongation rate, yield strength, cold bending test and sulfur, phosphorus and carbon content of qualified assurance.Steel pipes may be high-frequency welded
The product quality meets the provisions of the <Straight Joint Welded Steel Pipe (GB / T 13793) for the Seamless Steel Pipe for Structure (GB / T81.62).
2. Steel ball: the ball ball shall be forged with No.45 steel specified in High Quality Carbon Structural Steel GB / T699--2015, surface adjustment round steel.
3. High strength bolts: use <<Steel frame ball ball nodes>> (GBT16939--2016):
Designated 40Cr, 20MnTiB, 35CrMo, 35VB steel, finished permitted any
Quenched crack of a depth or any length.The performance grade of high strength bolts after quenching adjustment round steel
The thread shall conform to level 6g in <<ordinary thread tolerance and coordination>> (GB197),
and the surface shall be blackened
And apply anti-rust oil.

4. Seal the plate.Tone head: the material shall meet the Q235B steel specified in GB / T700, steel pipe diameter
The cone head of 75 must be used. Any section of the joint weld and the cone head shall be
strong with the connected steel pipe, and the thickness shall be guaranteed.
Processing of the cone head, seal plate, cone head appearance shall not be cracked,Over-burn, oxidized skin, and test report.
5. Sleeve: The material shall meet the Q235B steel specified in Carbon Structural Steel GB / T700
or Technical Conditions for Low Alloy Structural Steel
(GB1591) 16Mn Steel or 45 Steel Steel Number and General Technical Conditions (GB699).
The sleeve shall look without cracks,Over-burn and oxidized skin.
6. Requirements for performance index of anchor bolt rod: the ratio of measured tensile strength of anchor bolt and reinforcement reinforcement to that of yield strength shall not be less than 1.25;
The ratio of the measured yield strength value to the standard yield strength value shall not be greater than 1.3, and the measured total elongation rate shall not be less than 9%.
7. Fastening screws: the materials use 40 chromium steel or 40 boron steel or No.70 spring steel.
8. Welding strip
A) When the base material is Q235B steel, E4303 shall be adopted and whose performance shall meet the provisions of Carbon Steel Welder (GB5117).
b) The base material is E43xx with No.45 welding strip, and the bolt is preheated to 150-200 degrees C before welding.
c) If the above two types of seals adopt CO 2 gas protection welding, the welding wire shall comply with Steel Molds for CO 2 Gas Protection Welding (GB8110).
9. All the materials used in the grid rack shall be with the factory qualification certificate, and the unqualified ones shall be used after the re-inspection is confirmed before they can be used.
The quality of all products shall meet the Steel Grid Industry Standards.

v. Welding seam

1. Steel pipe and sealing plate.When the cone head forms a rod, the butt welds at both ends are fully fused welds.
2. The heating of the support bolt ball and the base must be preheated to the ball to 150-200 degrees C before welding (the positioning dimple before welding).
3. Welds not indicated shall be full of welding, and the minimum weld height is 1.5 times the minimum member thickness and not less than Hf=6mm.
4. Double welding and splicing of steel pipe
A) Steel pipe butt weld, there shall not be two joints between the two adjacent nodes, and the minimum takeover length shall be greater than
At 800mm, and the pull rod shall not butt;
b) Steel pipe butt joint section, the angle of bilateral V joint is 60--90 degrees and the weld is high
b> t (t is pipe wall)
c) welded with a mask, the weld root width is ≥ 2mm, and the pad thickness is ≥ 0.5t;
5. The butt weld of the steel pipe shall be a full penetration weld, and shall be the nominal length.
6. Welding quality inspection of the network frame shall reach <<steel structure engineering construction quality acceptance standard>>
Secondary standard requirements specified in (GB50205--2020).
6. The quality grade of weld shall comply with GB 50661 of the current national standard Code for Steel Structure Welding <<Code for welding steel structures>> (GB50661--2011) and the national standard "Code for Construction Quality Acceptance of Steel Structure Welding".
For the butt weld with steel of less than 6mm thickness, the weld quality grade shall not be determined by ultrasonic flow detection.

VI. Production and installation of the network frame

1. The production, transportation and installation of the mesh shall comply with the mesh Structure Design and Construction Regulations, JGJ7--2010 and Acceptance Standard for Construction Quality of Steel Structure Works GB50205--2020, Bolt Ball node JG11--2016, The Standard for Inspection and Acceptance of Steel Network Rack, JG12--1999.
2. It is necessary to preassemble the components before leaving the factory; if holisting, pay attention to the arrangement of lifting points and take necessary temporary reinforcement measures.
3. The excessive plate of the embedded parts and the network frame support plate are connected by bolts, so its position and elevation shall be absolutely guaranteed during the construction. In order to meet the requirements of lightning protection, the network frame support and the embedded steel plate of the column are welded and connected, and the embedded steel plate and the column have a long electrical bar
Welding connectivity.The max dimension, elevation and flatness of the embedded parts shall meet the following requirements during the installation of the embedded parts as follows:
a).The offset of the centerline and the positioning axis of the embedded parts is <15mm;

b).The elevation error is <30mm;

c).The steel plate flatness of the embedded parts is <3mm.

7. Grid frame for rust removal and coating

1. The steel must be completely removed before production, without rust, dust, oil, etc.The rust removal grade shall meet Sa2.5 in Steel Surface (GBT8923.4--2013)
2. After steel rust removal, paint and rust prevention primer according to the Standard for Construction Quality Acceptance of Steel Construction Engineering (GB50205--2020)
Two courses (2X35um), two finishes (2X35um); total dry paint film thickness is not less than 125um, and paint film damage site during installation
It shall be applied to no less than the protection level of adjacent parts; high strength bolts and bolt ball bolt threads shall be coated with anti-rust oil.
3. The single fire resistance grade of this building is Grade II; the fire prevention grade of the network frame is Grade II. The fire prevention of the steel structure should meet the requirements of the construction specialty and meet the specified fire resistance limit beam: 1.5 hours piling bar.Steel support: 2.0 hours; the fire protection of steel structure by spraying (coating) fire retardant coatings, the thickness of fire retardant coatings is not less than the fire protection structure The coating, thickness of steel structure fire retardant coatings, shall be the fire protection structure meets the GB51249--2017 for Building Steel Structure Fire Prevention
Section 4.2.1 Requirements.
4. Phase soluble test should be carried out between the selected steel structure fire prevention (anti-corrosion) paint and the anti-corrosion prevention paint (paint), which can only be used after the test is qualified.
5. After the completion of the network frame structure, the excess holes should be blocked with plastic plugs and cement mortar sealing.
6. Construction,Prevent rain, wear dirty.

VII. Network frame pressure results

1. Maximum tensile force / pressure (1937.7/-4073.3)KN
2. Maximum deflection of Z=-124.3mm
3. The calculation result is only the grid part.Reinforced concrete column shall be determined by Party A according to the internal force design of the network frame support base.

IX. Illustration

Upper string bar— abdomen bar—lower string bar— node ○support

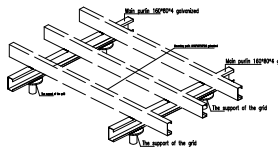
X. In the materials table, the selected specifications shall not be replaced arbitrarily, if the materials are available
difficult, the consent of the design unit, and the material length in the material table is
The the length of the material, the local real sample of the grid should be released before the material
Check the size of each steel pipe, the length of the material shall avoid negative error.
11. The construction drawing of the steel grid frame shall be carried out by the construction unit with the steel structure construction qualification
Detailed and complete out design and approved by Party A and the design Institute

XII. The site size of the grid shall be retested before processing, and it can be processed and
Installed after it is correct.

Thirteen, other

Heavy objects are not allowed to be suspended on the rod parts in the installation and use of the network frame.

Steel mesh frames shall be regularly inspected, maintained and maintained, and vulnerable components shall be replaced.



Installation diagram of primary and secondary purlins

Designed by Puye Steel Structure Engineering Co., LTD