

# Haider

The logo for Haider features the word "Haider" in a bold, dark blue, sans-serif typeface. Directly beneath the text is a reflection of the same word, rendered in a lighter, semi-transparent blue, creating a mirror-like effect.

*The total solution of highway, railway Bridge Bearing  
Expansion Joint and Seismic Isolation*



## About Haider

Founded in 2000 with registered capital of Ten million USD, Suzhou Haider New Material Technology Co.,Ltd is specialized in designing and manufacturing railway and highway bridge bearings, bridge expansion joint devices, isolation bearing pads, damping devices, building deformation joint devices and spherical joint supports.

We have leading technologies, advanced equipment, complete testin system, professional installation teams and guaranteed after-sale service. We have passed the ISO9001:2008 International Quality Management System and ISOI 4001:2004 Environment Management System and obtained the National Industrial Production Certificate.

We are capable of designing and manufacturing and authorized to manufacture various products for various works according to client's requirements. Over the past years, we have developed our clients all over China and throughout Southeast Asia, Middle East, Africa, Australia and South America. Our products have been widely used in highways, railway bridges, public buildings and also been used in many national major projects and famous landmarks, such as, Shanghai Pudong International Airport, Beijing Capital International Airport and etc.

Holding the concept of "All kinds of virtues get together", we sincerely welcome all researching and designing institutes, construction companies, trading companies to contact us for product research and development and products sales. We are confident to providethe best products and best service to all of our clients.



## Project Completed

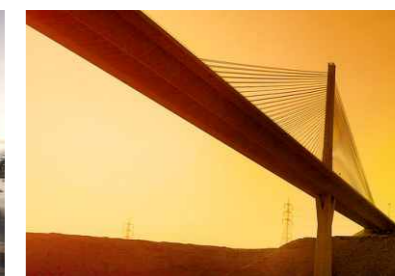
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FAHAD BRIDGE



HARAMAIN HIGH SPEED RAIL



WADI BRIDGE



ZAYTOON FARS



SITRA BRIDGE,BAHRAIN



TAIF BRIDGE



BAOJI-HANZHONG  
HIGHWAY



BEIJING -SHANGHAI  
HIGH SPEED RAILWAY



BEIJING CAPITAL AIRPORT



CAOE RIVER GRAND BRIDGE



CHENGDU INT'L AIRPORT



DAPU BRIDGE,FUJIAN



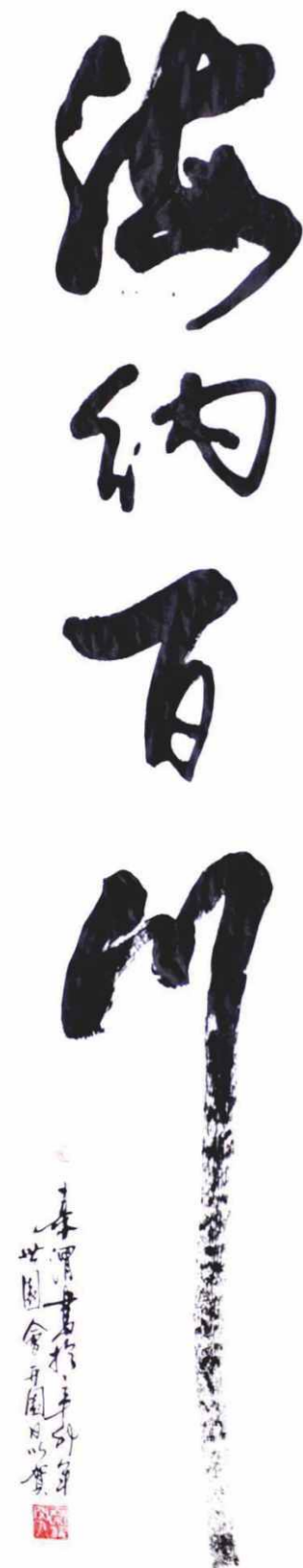
GUANGZHOU RAILWAY  
SOUTH STATION



HUANGPU SPORTS CENTER,  
GUANGZHOU



KUNSHAN ZHONGHUAN  
SPEEDWAY



## Project Completed



LIUGUANG RIVER BRIDGE,  
GUIZHOU



NO.312 STATE HIGHWAY  
SUZHOU SECTION



PUDONG INT'L AIRPORT



QINGDAO - LANZHOU  
HIGHWAY



QIPANZHOU BRIDGE,  
HUANGSHI



SHANGHAI LIGHT RAIL



SHANGHAI MAGLEV



SHITIAN HIGHWAY



TIANXINGZHOU YANGZI  
RIVER BRIDGE, WUHAN



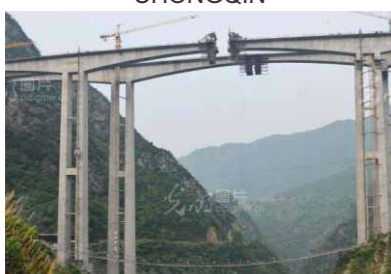
WUXI HIGHWAY,  
CHONGQIN



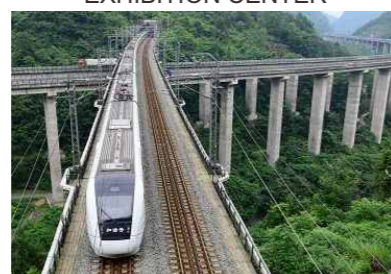
XIAMEN INT'L  
EXHIBITION CENTER



XINGOUHE BRIDGE,  
JIANGYIN



YANRU HIGHWAY, HUNAN

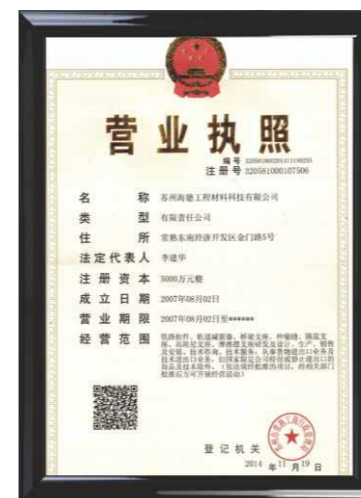


YICHANG - WANZHOU  
RAILWAY



ZHUJIAJIAN  
SEA-CROSSING BRIDGE

## Certificate



Business license



ISO9001:2008



High-tech product  
certification1



Honor the contract  
and keep the promise



Production license



Production license details



ISO14001:2004



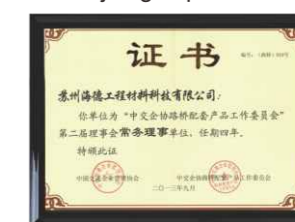
High-tech product  
certification2



Credit rating  
certificate



Private technology enterprises  
in Jiangsu province



a standing director member



Credit rating certificate



China's transportation  
enterprises famous brand



CE

## Patent We Own

Patent Number	Categories Of Patent	Patent Number	Categories Of Patent
ZL201420194265.5	Utility model	ZL02219629.3	Utility model
ZL201420194597.3	Utility model	ZL01237390.7	Utility model
ZL201420194713.1	Utility model	ZL01237391.5	Utility model
ZL201420194952.7	Utility model	ZL01237393.1	Utility model
ZL201420194289.0	Utility model	ZL01237389.3	Utility model
ZL201420194288.6	Utility model	ZL01237392.3	Utility model
ZL201420195140.4	Utility model	ZL01244918.0	Utility model
ZL201420195472.2	Utility model		
ZL201420815313.8	Utility model		
ZL201420815376.3	Utility model		
ZL201420815377.8	Utility model		
ZL201420815068.0	Utility model		
ZL201420815265.2	Utility model		
Patent Number	Categories Of Patent	Patent Number	Categories Of Patent
ZL201410161114.4	Invention	ZL02317652.0	Designs
ZL201410161111.0	Invention	ZL02350178.2	Designs
ZL201410160747.3	Invention	ZL02317651.2	Designs
ZL201410161039.1	Invention	ZL02350177.4	Designs
ZL201410161411.9	Invention		
ZL201410161642.X	Invention		
ZL201410799411.1	Invention		
ZL201410799412.6	Invention		



## Certificate Of Authorization Transfer



Pot Rubber Bearing GPZ (2009) Series



Pot Rubber Bearing GQZ Series



Laminated Rubber Bearing GJZ, GJZF, GYZ and GYZF Series



Laminated Rubber Bearing LNR Series



Pot Rubber Bearing JPZ Series



Spherical Bearing JQZ Series



High Damping Rubber Bearing HDR Series



Nonlinear Damper Reduce Isolation Spherical Bearing

## Test Report



Mechanical Properties of Spherical Bearing



Pot Bearing of Roads & Bridges



Mechanical Properties of Laminated Rubber Bearing



Type Test of High Damping Rubber Bearing



Pot Bearing of Roads & Bridges



Damping Rubber Bearing of Buildings



Expansion Joint of Bridges



Mechanical Properties of High Damping Rubber Bearing



Appearance and Dimension of Expansion Joint

## Testing Equipment



Pressure testing machine



Microcomputer control electronic universal tensile testing machine



Pendulum impact testing machine



Resistance to ozone aging box



Computer control electro-hydraulic servo pressure shear tester



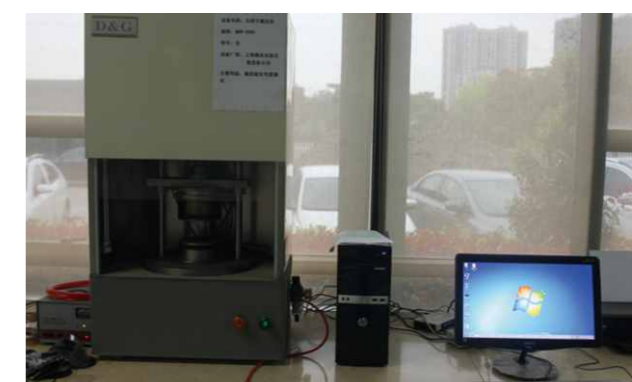
20000 kn dynamic testing machine



Mooney viscometer



hydraulic universal material testing machine



Multi-Function Rubber Rheometer

## Production Line



## Design and Production Standards

1. General Code for Design of Highway Bridges and Culverts (JTGD60-2004)
2. Code for Design of Highway Reinforced Concrete and Prestressed Concrete Bridge and Culvert (JTGD62-2004)
3. Guidelines for Seismic Design of Highway Bridges (JTG/TB02-01-2008)
4. Rubber Bearing for Highway Bridge (JT/T4-2004)
5. Specification of Rubber Bearing for Highway Bridge (JT/T663-2006)
6. Spherical Bearings for Bridges (GB/T 17955-2009)
7. Pot Bearing for Highway Bridges (JT/T391-2009)
8. Expansion Device of Highway Bridge (JT/T327-2004)
9. Basic Code for the Designs of the Railway Bridges and Culverts (TB 10002.1-2005)
10. Code for Design on Reinforced and Prestressed Concrete Structure of Railway Bridge and Culvert (TB 10002.3-2005)
11. Code for Seismic Design of Railway Engineering (GB50111-2006)
12. Code for Design on Steel Structure of Railway Bridge (TB 10002.2-2005)
13. Tentative Specification of Pot Rubber Bearing for Passenger Dedicated Railway Bridge (KJJ [2005] No. 101)
14. Supplemental Provisions for Tentative Specification of Pot Rubber Bearing for Passenger Dedicated Railway Bridge (KJJ [2007] No. 95)
15. Passenger Dedicated Railway Bridge (KJJ [2007] No. 95)
16. Pot Bearings for Railway Bridge (TB/T2331-2004)
17. Code for Design of Steel Structures (GB50017-2003)
18. Structural bearings – Part1: General design rules (EN 1337-1: 2000)
19. Structural bearings - Part2: Sliding elements (EN 1337-2: 2004)
20. Structural bearings – Part3: Elastomeric bearings (EN 1337-3: 2005)
21. Structural bearings - Part5: Pot bearings (EN 1337-5: 2005)
22. Structural bearings – Part7: Spherical and cylindrical PTFE bearings (EN 1337-7: 2001)

Rectangular and Round Laminated Rubber Bearing for Bridge

I.General

Laminated rubber bearing (GJZ and GYZ series) is usually made of several layers of sheet rubber and steel plates (the steel plate is used as the rigid bracing material). The rubbers and steel plates are cohered firmly after press vulcanization. This product has enough vertical stiffness to bear the vertical load, and the pressure of the upper structure can be transferred to the abutment; has good flexibility to adapt to the rotation at the beam end; has large shear deformation to meet the horizontal displacement of upper structure; has such features as simple structure, easy installation, steel saving, low cost, simple maintenance and easy replacement; has good seismic design which can reduce dynamic load's shock to bridge span structure and pier.



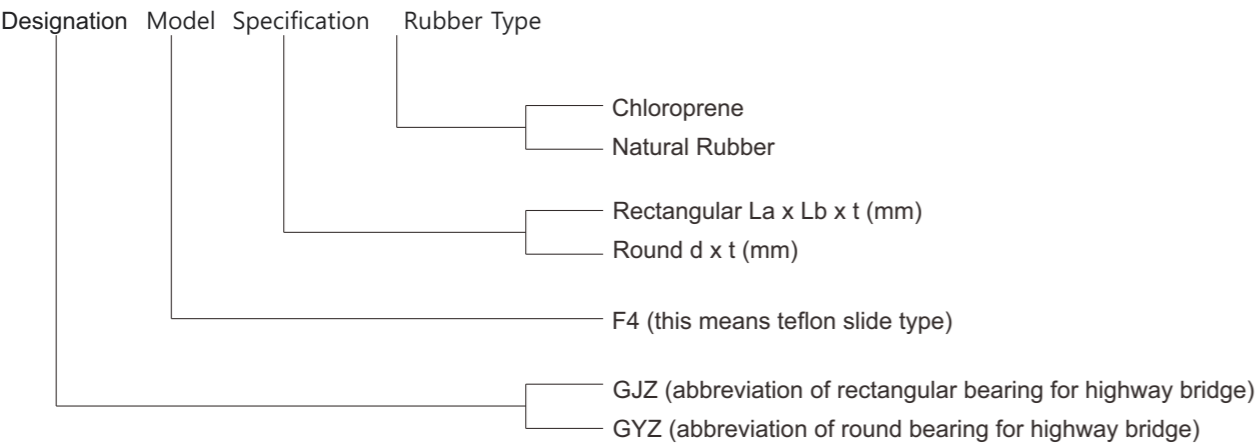
II.Applicable Temperature Scope

- 1. Ambient temperature type chloroprene rubber: -25°C ~+60°C
- 2. Cold-resistant natural rubber: -40°C~+60°C

III.Class of Loading

100KN~10,000KN, products with specific grade may be produced as required by the clients.

IV.Code of Laminated Rubber Bearing



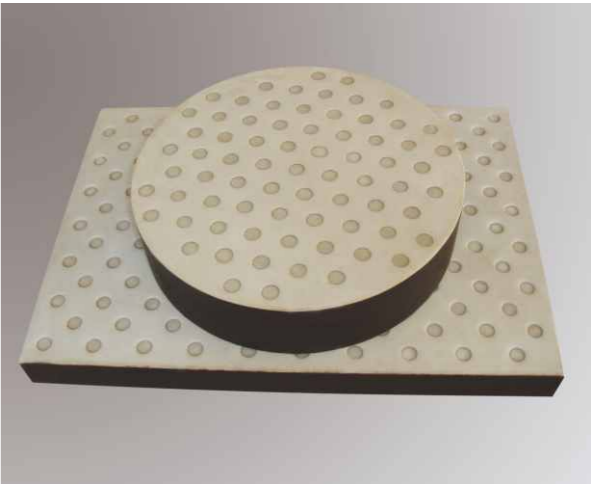
V.Representation of Rectangular and Round Laminated Rubber Bearing

- e.g.1: GJZ 300×350×52(CR) means rectangular bearing for highway bridge in size L350×W300×T52mm, using material chloroprene rubber.
- e.g.2: GYZF4 300×65(NR) means round PTFE sliding type bearing for highway bridge in size Dia.350×Tickness 52mm, using material natural rubber.

PTFE Sliding Rubber Bearing for Bridge

I.General

There are rectangular shape(GJZF4) & round shape(GYZF4) of PTFE sliding rubber bearing", which are made through the vulcanization of the 1.5-3mm thick PTFE sheet (with the same plane size as the laminated rubber bearing) cohered to the surface of rubber bearing by special adhesive technique. It has the function as the laminated bearing, and also can meet the requirements of bridges with bearing reaction for small and medium tonnages and large horizontal displacement. This kind of bearing is not only applicable to simply-supported bridge with large span and continuous bridge, but also can be used as sliding block for bridge incremental launching.



II.Scope of Application

- 1.. Used as expansion bearing, for large-span bridges(span > 30m), multi-span continuous bridge, continuous slab bridge with simply-supported beam and continuous bridge.
- 2.. Used as sliding block, for Continuous beam pushing, T beam traversing, and sliding of large equipment.

III.Design Parameters

The design parameters of teflon slide type rubber bearing shall refer to the design parameters of laminated rubber bearing.

IV.Applicable Temperature Scope

- 1. Chloroprene Rubber for normal temperature: -25℃ ~+60℃
- 2. Cold-resistant natural rubber: -40℃~+60℃

V.Class of Loading

100KN~10,000KN, products with specific grade may be produced as required by the clients.

Pot Rubber Bearing

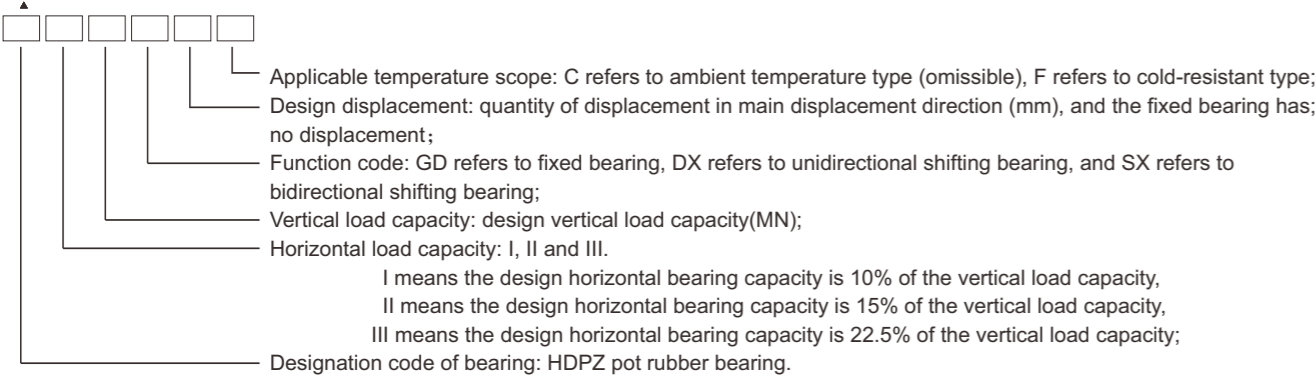
I.General

HDPZ pot rubber bearing is the bridge standard component developed with reference to and meet the Pot Rubber Bearing for Highway Bridge (JT/T 391-2009), European Standard Structural Bearings-Part 5: Pot Bearings (EN 1337-5:2005) and other related industry norms (double standards and multi-norm), has become the standard for transportation industry of China and is applicable to all kinds of highways, municipal roads and rail transit bridges.

II.Product Features

1. Novel structure
- Latch structure is used for fixed bearing, and the horizontal force can be evenly transferred to any direction to improve the loaded property of the bearing; intermediate guide rail is used for unidirectional shifting bearing, the machining precision is reliable, improving the slid-steering property of the bearing;
2. Good materials
- Q345 hot rolled steel plate is adopted for the bearing, improving the overall loaded property of the bearing;
- The wear-resistant material is the modified UHMWPE, improving the wear-resisting property, smooth property and service life of the bearing; the use of good materials effectively decreases the physical dimension and weight of the bearing and reduces the cost;
3. Easy installation
- It is recommended to connect the sleeve and anchor bolt to the pier and beam, which can be installed and replaced easily.
- With good material and optimized structure, HDPZ pot rubber bearing greatly improves the bearing capacity and usability, prolongs the service life, decreases the physical dimension and weight, shortens the processing cycle and reduces the cost, at the same time, it can be installed and replaced easily. It is a kind of new bridge component meeting the domestic and overseas double standards and multi-norm and recommended as industrial standard.

III.Bearing Mode



Examples:

HDPZ(I)-6.0-GD means the vertical bearing capacity is 6.0MN, the design horizontal bearing capacity is 10% of the vertical bearing capacity; ambient temperature type; HDPZ(I) fixed pot rubber bearing;

HDPZ (II)-10.0-DX-e50 means the vertical bearing capacity is 10.0MN, the quantity of displacement in main displacement direction is ±50mm, the design horizontal bearing capacity is 15% of the vertical bearing capacity; ambient temperature type; HDPZ(II) uni-directional shifting pot rubber bearing;

HDPZ(III ) -8.0-DX-e100 means the vertical bearing capacity is 8.0MN, the quantity of displacement in main displacement direction is ±100mm, the design horizontal bearing capacity is 22.5% of the vertical bearing capacity; ambient temperature type; HDPZ (III) unidirectional shifting pot rubber bearing.

IV.Product Structures



Fixed type series(HDPZ-Fixed)



Sliding Guided Series(HDPZ-Guided)



Free Sliding Expansion Series (HDPZ-Free )

V.Main Technical Properties

1. Vertical bearing capacity
- According to design requirements, this series of bearing provides 33 grades of vertical bearing capacity as follows: 0.4MN, 0.5MN, 0.6MN, 0.8MN, 1.0MN, 1.5MN, 2.0MN, 2.5MN, 3.0MN, 3.5MN, 4.0MN, 5.0MN, 6.0MN, 7.0MN, 8.0MN, 9.0MN, 10.0MN, 12.5MN, 15.0MN, 17.5MN, 20.0MN, 22.5MN, 25.0MN, 27.5MN, 30.0MN, 32.5MN, 35.0MN, 37.5MN, 40.0MN, 45.0MN, 50.0MN, 55.0MN, 60.0MN.
2. Horizontal bearing capacity
- Design horizontal bearing capacities of each direction of fixed bearing and the non-shifting direction of unidirectional shifting bearing are divided into 3 grades:
- The design horizontal bearing capacity of type JPZ (I) (ordinary type) is 10% of the bearing's vertical bearing capacity;
- The design horizontal bearing capacity of type JPZ (II) (anti-seismic type) is 15% of the bearing's vertical bearing capacity;
- The design horizontal bearing capacity of type JPZ (III) (anti-seismic type) is 22.5% of the bearing's vertical bearing capacity.
3. Design rotatio
- Design rotation of this series of bearing is more than ± 0.02 rad.
4. Design displacement
- The displacements in transverse direction of unidirectional shifting bearing with the shifting direction horizontally placed and bidirectional shifting bearing are ± 50mm;
- The displacements in the shifting direction of unidirectional shifting bearing and the longitudinal direction of bidirectional shifting bearing are:±50mm, ± 100mm, ± 150mm, ± 200mm, ±250mm;
- Displacement can be adjusted according to actual requirements in case of special needs.
5. Friction coefficient
- Friction coefficient of this series of bearing is less than 0.03.

6. Applicable temperature scope

-25℃ ~ +60℃ for normal temperature type; -40℃ ~ +60℃ for cold resistant type.

7. Girder bottom gradient

Gradient of cast-in-situ girder: can be adjusted by setting embedded steel plate and wedge-shaped concrete block in the girder bottom;

Gradient of precast girder: can be adjusted through embedded steel plate above the bearing when casting the girder, and by adding wedge-shaped gradient adjusting steel plate to the top surface of bearing after embedding steel plate in the girder bottom as well;

For small gradient (=2%), this series of bearing supports adjustment through directly setting gradient on the top of the upper bearing plate.

8. Concrete strength grade

When applying this series of bearing, the concrete strength grade of the girder body shall be more than C45, and that of the bearing pad stone shall be more than C40.

Spherial Bearing

I.General

[HDQZ Series Spherical Steel Bearings] are the standard bridge members series product developed in accordance with the national standard *Spherical Bearings for Bridges* (GB/T17955-2009), while referring to Structural bearings -Part 7:Spherical and cylindrical PTFE Bearings (EN1337-7:2004) and other relevant industrial codes (double standards and multi-norm), they are applicable to all types of bridges in highway, municipal transportation network and rail transit construction, especially curved, ramp skew and complicate-structured bridges.

II.Product Features

1.Novel structure

Unique scrollbar structure improves the rotation and mechanical performance of the bearing; stainless steel covered spherical cap rotating surface enhances the rotation performance of the bearing.

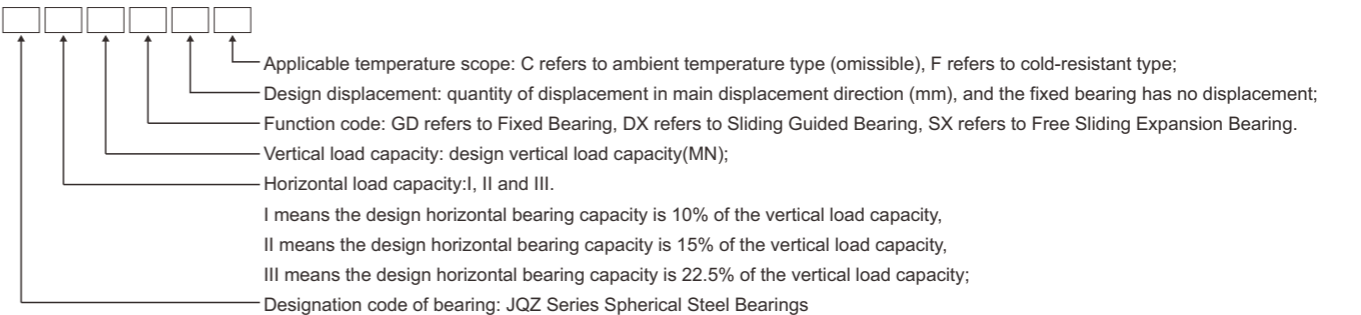
2.Good materials

The wear-resistant material is the modified UHMWPE, improving the wear-resisting property, smooth property and service life of the bearing; The use of qualitative materials effectively decreases the physical dimension and weight of the bearing and reduces the cost.

3.Easy installation

Flexibly designed accessory members, the pier and beam are connected with sleeve and anchor bolts which can be installed and replaced easily.  
With good material and optimized structure, HDQZ spherical steel bearings greatly improves the bearing, rotation and sliding capacities, prolongs the service life, decreases the physical dimension and weight, shortens the processing cycle and reduces the cost, at the same time, it can be installed and replaced easily. It is a new bridge component meeting the domestic and overseas "double standards and multi-norm" and recommended as industrial standard.

III.Bearing Model



Examples:

HDQZ(I)-6.0-GD means the vertical bearing capacity is 6.0MN, the design horizontal load capacity is 10% of the vertical load capacity; ambient temperature type;  
HDQZ(I) series spherical steel bearings;  
HDQZ (II)-10.0-DX-e50 means the vertical load capacity is 10.0MN, the quantity of displacement in main displacement direction is ±50mm, the design horizontal load capacity is 15% of the vertical load capacity; ambient temperature type;  
HDQZ(II) unidirectional shifting spherical steel bearing;  
HDQZ(III)-8.0-DX-e100 means the vertical load capacity is 8.0MN, the quantity of displacement in main displacement direction is ±100mm, the design horizontal load capacity is 22.5% of the vertical load capacity; ambient temperature type;  
HDQZ (III) unidirectional shifting spherical steel bearing.

## IV. Product Structures



HDQZ-Fixed

HDQZ-Guided

HDQZ-Free

## V. Main Technical Properties

## 1. Vertical bearing capacity

According to design requirements, this series of bearing provides 33 grades of vertical bearing capacity as follows:

1.0MN, 1.5MN, 2.0MN, 2.5MN, 3.0MN, 3.5MN, 4.0MN, 4.5MN, 5.0MN, 5.5MN, 6.0MN, 7.0MN, 8.0MN, 9.0MN, 10.0MN, 12.5MN, 15.0MN, 17.5MN, 20.0MN, 22.5MN, 25.0MN, 27.5MN, 30.0MN, 32.5MN, 35.0MN, 37.5MN, 40.0MN, 45.0MN, 50.0MN, 55.0MN, 60.0MN, 65.0MN, 70.0MN.

## 2. Horizontal load capacity

The design horizontal load capacity of each direction of fixed bearing and non-sliding direction of sliding guided bearing can be divided into 3 grades:

The design horizontal bearing capacity of type HDQZ (I) (ordinary type) is 10% of the bearing's vertical bearing capacity;

The design horizontal bearing capacity of type HDQZ (II) (anti-seismic type) is 15% of the bearing's vertical bearing capacity;

The design horizontal bearing capacity of type HDQZ (III) (anti-seismic type) is 22.5% of the bearing's vertical bearing capacity;

## 3. Design rotation

Design rotation of this series of bearing is no less than  $\pm 0.02$  rad.

## 4. Design displacement

The displacements in lateral direction of unidirectional shifting bearing with the moving direction horizontally placed and bidirectional shifting bearing are  $\pm 40$ mm;

The displacements in the shifting direction of unidirectional shifting bearing and the longitudinal direction of bidirectional shifting bearing are:  $\pm 50$ mm,  $\pm 100$ mm,  $\pm 150$ mm,  $\pm 200$ mm,  $\pm 250$ mm,  $\pm 300$ mm;

Displacement can be adjusted according to actual requirements in case of special needs.

## 5. Friction coefficient

Friction coefficient of this series of bearing is no more than  $\pm 0.03$ .

## 6. Temperature scope

Normal temperature type:  $-25^{\circ}\text{C} \sim +60^{\circ}\text{C}$ ; Cold-resistant type:  $-40^{\circ}\text{C} \sim +60^{\circ}\text{C}$ .

## 7. Beam bottom slope

Cast-in-place beam gradient: set by the bottom of the beam embedded steel or concrete wedge block adjustment;

Precast beam gradient: can be on the top of the embedded system when the beam through the bearing plate adjustment, can also be embedded in the bottom of beam and flat steel plate at the top of the pedestal after add wedge adjusting the slope plate; Slope is small (2%) or less, this series of bearing can be directly on the top of the pedestal set gradient to adjust.

## 8. Concrete strength grade

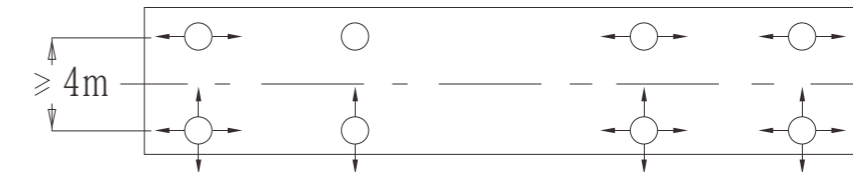
When the bearing is adopted, the beam body strength grade of concrete should not be below the C45, bearing pads should not be below the C40 concrete strength level.

## Set, Installation And Replacement

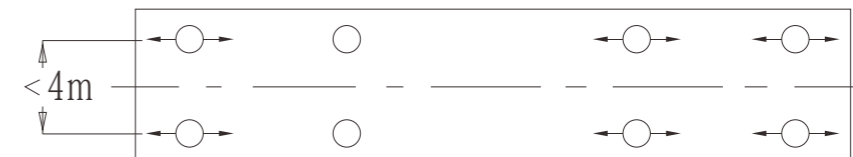
## I. Bearing Layout Principle

This series of pot rubber bearing has 3 types: fixed type, Guided type and Free type. According to the center distance between two bearings in transverse direction, the bearing layout of main bridge type is provided as follows for reference in designing:

Bearing layout of three-span continuous girder (center distance between bearing in transverse direction = 4m) is as follows:



Bearing layout of three-span continuous girder (center distance between bearing in transverse direction < 4m) is as follows:



Bearing layout of simply-supported girder is as follows:

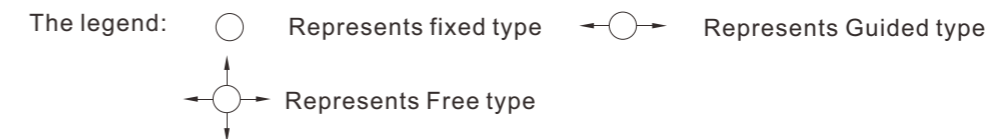
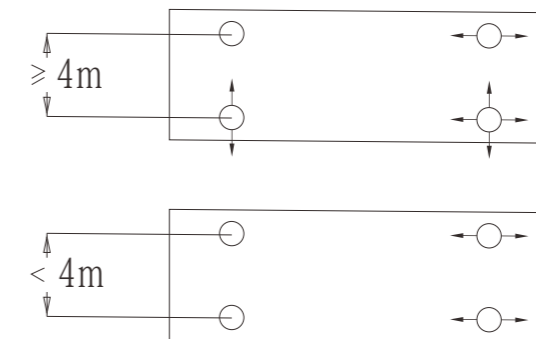


Fig. 2 Plan Sketch of Bearing Layout

## II. Bearing Installation Process

## 1. General

1.1 When applying this series of bearing, the level difference of four corners on the top of pad stone shall be less than 2mm. For the convenience of installation, maintenance and necessary replacement of bearing, the height of pad stone shall be higher than 100mm.

1.2 This series of bearings are connected between the upper structure and abutment or pier by sleeves and anchor bolt piers and abutments. To ensure that bearings are accurately installed and to reduce interference to load-bearing reinforcements in top of abutment, it is suggested to reserve holes for anchor bolt in the bearing pad stones of the top of pier and abutment. See the bearing installation figure (table) for detailed size of reserved holes. The positional deviations of the center and diagonal line of reserved hole shall be less than 10mm.

1.3 At least 4 layers of steel mesh reinforcement shall be added to the pad stone concrete in the top of bridge pier or abutment next to the bearing, and the layout scope of reinforcement shall be larger than the plane size of steel plate in bearing bottom. It is recommended to apply 12mm reinforcement in steel mesh reinforcement. The mesh shall be 100mm X 100mm and the mesh spacing shall be 60mm ~ 80mm. The steel mesh reinforcement is cut in reserved holes and strengthened reinforcement with same diameter shall be added around reserved hole. See Fig. 3 and Fig. 4 for steel mesh reinforcement:

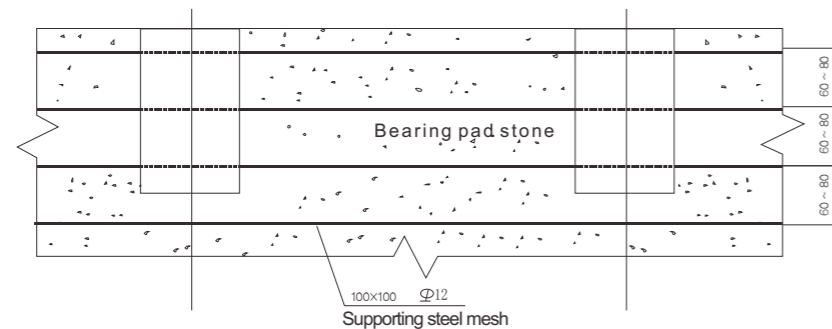


Fig.3 Elevation Sketch of Steel Mesh Reinforcement

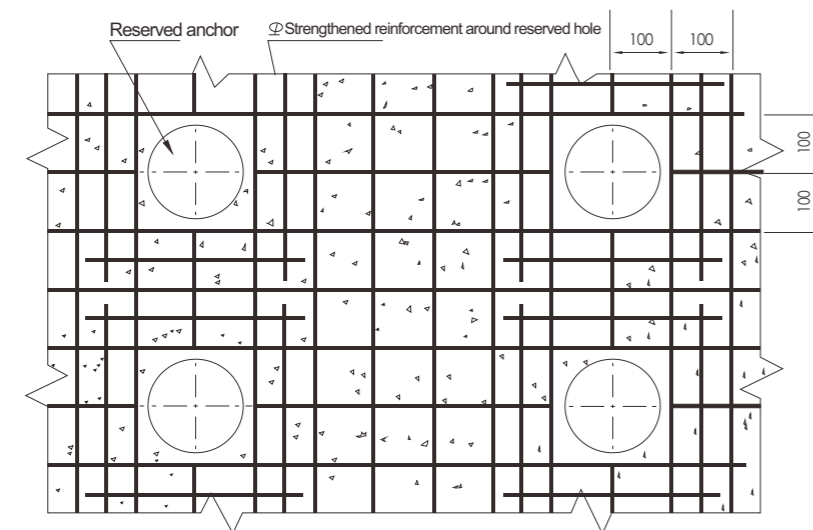


Fig. 4 Plan Sketch of Steel Mesh Reinforcement

## 2. Unload and Storage

- 2.1 The bearing shall be bundled up with tightropes and hoisted by forklift or hoisting equipment during loading and unloading. All parts of bearing are connected as required and are ready for installation. The bearing shall be well stored if not to be installed right after its arrival of construction site.
- 2.2 The bearing shall be stocked in flat storage site with square timber or wood brick pad under the sleeve of bearing. The storage site shall be resistant to moisture, sun and dust, and be clean; The bearing shall be kept away from materials that will impact bearing's quality, including acid, alkali, oils and organic solvent, and more than 1m away from heat source. The storage of bearing shall be convenient for the transportation and installation of bearing without any impact to site construction. The body part of this series of bearing is undecomposable.
- 2.3 All parts and paint of the bearing shall be protected from damage during the whole process of unloading, transportation and storage.

## 3. Check before installation

- 3.1 Check the center mark in the center of the bearing's top surface and accurately align it to the X axis (vertical axis) and Y axis (horizontal axis). The bearing elevation shall conform to design requirements;
- 3.2 Check if the bearing's bolt and dust boot is firmly fixed;
- 3.3 Check if the position of the corresponding abutment conforms to the bearing's specification;
- 3.4 Check the bearing's upper and lower plate surfaces that are close to concrete or cement mortar, and make sure they are free of dust and oil stain;
- 3.5 Check if the expected deviation value of shifting bearing conforms to its set value;
- 3.6 Loosen screws on the bearing's temporary fixed plate before installing shifting bearing, place the bearing's upper plate accurately according to expected deviation value, check if its pointer position is correct, and then re-tighten screws on fixed plate.

## 4. Property requirements for grouting material

The grouting material applied in bearing installation shall be non-shrinking epoxy mortar. See its property requirements in Table 1:

Project (%)	Technical Index	Project (%)	Technical Index
Compressive	8h	≥20	Fluidity
	12h	≥25	Temperature range
	24h	≥40	Initial setting time
	28d	≥50	Final setting time
	56d and 90d	No strength	
Bleeding		Expansion rate	≥

## 5. Grouting process

According to connection methods with girder and abutment (grouting process), there are three methods in installing this series of bearing: gravity grouting, pressure grouting and steel plate pre-assembly.

### 5.1 Gravity grouting

- 5.1.1 Chisel the surface of bearing pad stone to show its coarse aggregate with solid irregular surface, remove debris in reserved holes and soak the surface with water. (The height of pad stone shall be 25mm lower than initial designed height when installing bearing by gravity grouting).
- 5.1.2 Hoist the bearing on bearing pad stone, and adjust the height and flatness of the bearing with leveling bolt, steel sheet or thin jack.
- 5.1.3 Install a funnel in one end of grouting pipe and put the other end through reserved hole before sealing plate of bearing. Pouring the non-shrinking epoxy mortar into reserved hole through funnel and grouting pipe, and rapidly pull out grouting pipe (see Fig. 5).

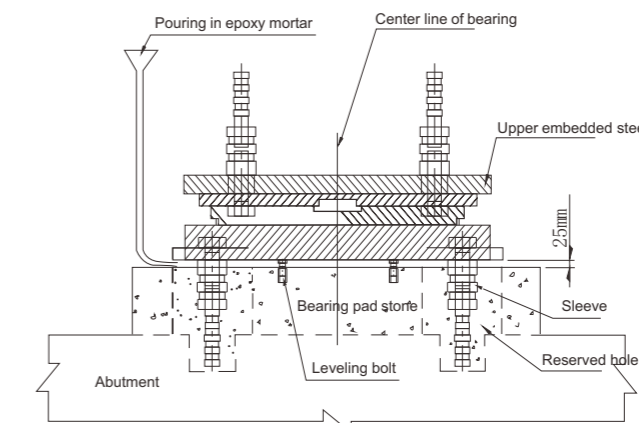


Fig. 5 Reserved Hole Grouting (Before Sealing Plate of Bearing)

5.1.4 Grouting and sealing plate: seal plate around bearing right after all reserved holes are grouted, and push grouting pipe into the bearing's bottom center position to grout from the center to other place in the bearing. Use vibrating spear to tamp down mortar and remove bubble during grouting and make sure all gaps are filled with mortar. The grouted mortar shall be 10mm higher than the lower bearing plate (see Fig. 6).

5.1.5 Preliminarily calculate needed mortar volume before grouting, and make sure that there is not much difference between the value of actually grouted mortar and calculated value in order to avoid inadequate mortar during grouting. Remove plate and steel wedges of four corners after final set of grouting material. Check if there is leakage, if necessary, replenish mortar in leakage areas and fill gaps left by steel wedges with mortar.

5.1.6 Do not collide bearing or conduct any works on it before the strength of epoxy mortar met design requirement.

5.1.7 Check the surface of non-shrinking epoxy mortar after the temporary plates are removed and ensure that the surface is flawless.

5.1.8 Tighten the anchor bolt after the strength of epoxy mortar met design requirement and finish the installation of bearing.

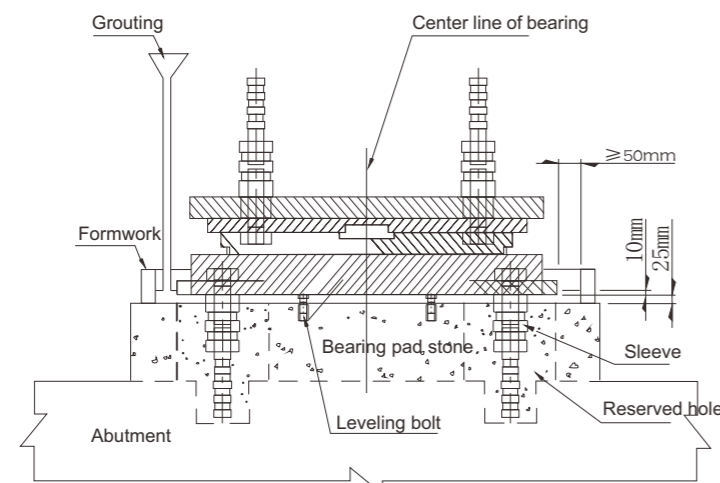


Fig. 6 Grouting between Bearing Pad Stone and Bearing

## 5.2 Pressure grouting

5.2.1 Set grouting nozzle that will lead to reserved holes in the side of bearing pad stone in advance.

5.2.2 Check the top of bearing pad stone and ensure that its height meet design height and the surface is flat and smooth with level difference of four corners less than 2mm.

5.2.3 Paste a layer of epoxy mortar on the top of pad stone, check the position and height of the bearing and set the bearing in place.

5.2.4 After the bearing is in place, check its position and height, grouting non-shrinking epoxy mortar into reserved holes through grouting nozzle. Ensure that the mortar fully filled reserved holes and leaked from the top and that the mortar is firmly grouted. Tighten the anchor bolt the strength of epoxy mortar met design requirement and finish the installation of bearing (see Fig.7).

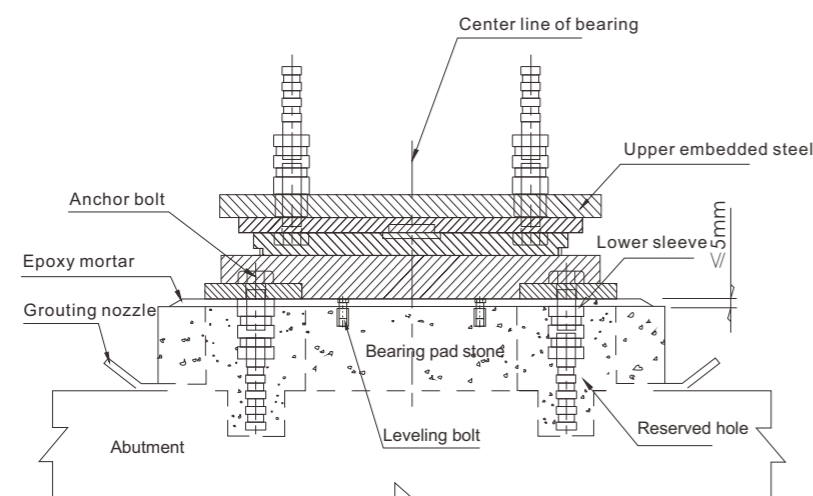


Fig. 7 Sketch of Pressure Grouting

## 5.3 Steel plate pre-assembly (the method is for the installation of the bearing of cast-in-situ girder only)

5.3.1 When installing the bearing of cast-in-situ girder in the method of steel plate pre-assembly, steel plate must be embedded in the top of pad stone (the lower sleeve shall applies the same structure of the upper sleeve). Reserved holes shall be set in the top of abutment only. Do not set reserved holes in the bearing pad stone.

5.3.2 Chisel the surface of bearing pad stone to reveal its coarse aggregate with solid irregular surface, and remove debris in reserved holes.

5.3.3 Erect plate of pad stone, hoist the lower embedded components of the bearing on the top of steel mesh reinforcement of bearing pad stone, and adjust the height and flatness of the embedded components.

5.3.4 Check the top of embedded components under the bearing and make sure its height meets the design height with level difference of four corners less than 2mm.

5.3.5 Pour concrete of bearing pad stone (the height of actual build pad stone shall be 10mm higher than initial design height when installing the bearing in the method of steel plate pre-assembly), and make sure the surface of concrete is 10mm above embedded steel plate (see Fig. 8).

5.3.6 Retest the top elevation of the lower embedded components of the bearing with level gauge after the strength of concrete of pad stone met design requirement, and make sure no error in the position and height of bearing.

5.3.7 Connect the bearing and the upper embedded components as a unit and install it on the top of the lower embedded steel plate to finish the installation of bearing (see Fig. 9).

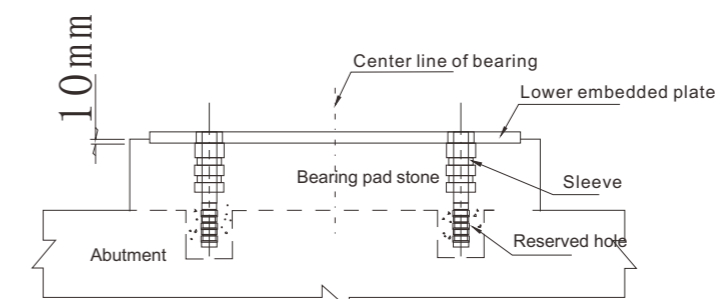


Fig. 8 Sketch of Steel Plate pre-assembly

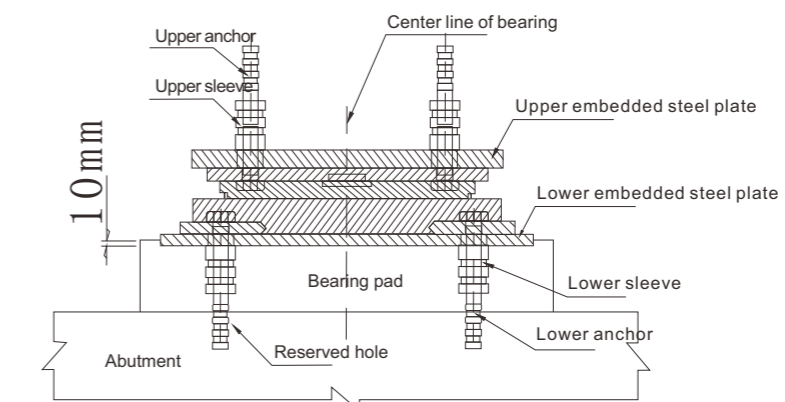


Fig. 9 Sketch of the Bearing Body and the Upper Embedded Component Installation

## 6. Guidelines for installation of concrete structure girder bearing

This series of bearing applies sleeves and anchor bolts in connecting main girders, piers and abutments for the concrete structure girder. See installation drawing for detailed installation size and technical requirements.

6.1 Guidelines for installation of cast-in-situ girder bearing (including bottom bearing of continuous medial horizontal girder of precast girder)

- 6.1.1 When pouring concrete in pier and bearing pad stone, set reserved holes in the pier and pad stone in advance, remove debris in reserved holes, and ensure that the surface of bearing pad stone is flat and smooth with level difference of four corners less than 2mm.
- 6.1.2 During the assembly of bearing in factory, please level the bearing to fit the upper and the lower components. Use the temporary connecting components to connect the bearing body as a unit, and make sure it will not get loose. Use anchor bolts to connect the bearing body with the upper and the lower embedded components (including the upper embedded steel plate, the upper and the lower anchor rods and sleeves) as a unit (or individually pack and deliver the upper and the lower components, then connect them as a unit during bearing installation).
- 6.1.3 Check if the connection of bearing and embedded components are in normal state and will not get loose easily in the construction site before the installation of bearing. Check if the surface of the upper embedded components and the upper bearing steel plate fit closely together. Check the mark and installation direction of bearing to avoid any error in installation direction.
- 6.1.4 Install the whole unit of bearing on the top of pad stone, check the position and elevation of the bearing, and grout non-shrinking high strength epoxy mortar into reserved holes in the method of gravity grouting (see Fig. 7); and apply the method of steel plate pre-assembly as well (see the grouting guidelines in the instruction for details).
- 6.1.5 Conduct verification of the center position and elevation of the bearing again after the strength of epoxy mortar met design requirement, and tighten the upper and the lower anchor bolts.
- 6.1.6 Clean the surface of the upper embedded steel plate, install the plate of main girders and conduct concrete pouring works of main girders. Pour concrete of main girders and remove scaffolds and other temporary connecting components after the strength of concrete met design standard to finish the installation of bearing.

## 6.2 Guidelines for installation of precast girder bearing

- 6.2.1 Set reserved holes in the pier and pad stone in advance, remove debris in reserved holes ensure that the surface is flat and smooth with level difference of four corners less than 2mm.
- 6.2.2 During assembly of bearing in factory, please level the bearing to fit the upper and the lower components. Use the temporary connecting components to connect the bearing body as a unit, and make sure it will not get loose. Use the lower anchor bolt to connect the bearing body with the lower embedded components (including the lower sleeve and anchor rod) as a unit (or individually pack and delivery the components, then connect them as a unit during bearing installation); Individually pack and delivery the upper embedded components (including the upper embedded steel plate 1, the upper anchor rod and sleeve). Strictly conduct anti-corrosive treatment of the exposed steel plate surface in accordance with the anti-corrosive treatment of the exposed bearing surface.
- 6.2.3 Check if the connection of bearing and embedded components are in normal state and will not get loose easily in the construction site before the installation of bearing. Check the mark and installation direction of bearing to avoid any error in installation direction.
- 6.2.4 Embed components (including the upper embedded steel plate, sleeve and anchor rod) under the girder before precasting main girders and make sure the surface evenness of the upper embedded steel plate is less than one thousandth of the max plate size. Adjust the gradient with embedded steel plate or leveling block in the bottom of girder to meet the level requirement of installing embedded steel plate (see Fig. 10).

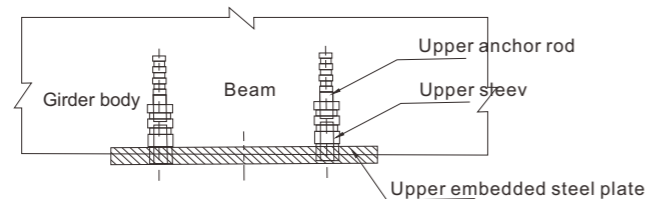


Fig. 10 Installation of Bearing Embedded Components

- 6.2.5 Hoist the precast girder 20mm over the bearing after installing the whole bearing on the pad stone (see Fig. 11). Carefully check position and elevation of the bearing, and then tighten the upper anchor bolt to set the girder body in place. Pour non-shrinking epoxy mortar into reserved holes by the method of pressure grouting (see Fig. 7) (see the grouting guidelines in the instruction for details). ♦ Install precast girder jack on the abutment in when installing the bearing of precast girder in the method of gravity grouting (erect temporary rigid support in the case of insufficient installation space on the abutment). Install the bearing that has been equipped with the lower sleeve and anchor rod in the bottom of girder and check if the surface of the upper embedded plate and the upper bearing steel plate fit closely together. Hoist the precast girder body to the top of the temporary supporting jack. Adjust the position and elevation of the girder body with the jack, and pour non-shrinking high-strength epoxy mortar into the gaps of the lower part and reserved holes in the method of pressure grouting (see Fig. 5) (see the grouting guidelines in the instruction for details)
- 6.2.6 Conduct verification of the center position and elevation of the bearing again after strength of epoxy mortar met design requirement, and tighten the upper and the lower anchor bolts to finish the installation of bearing.

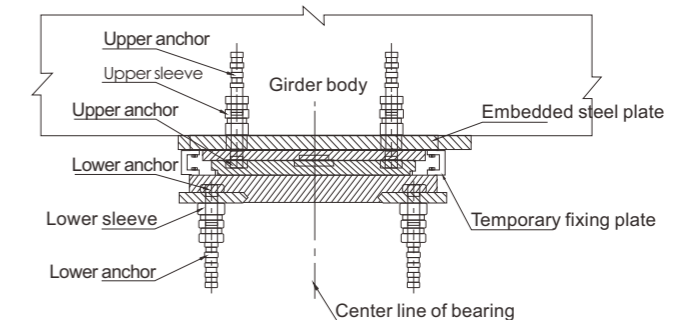


图11. 将底座安装至梁底

## 7. Guidelines for Installation of steel structure bearing

When the bearings are used for steel structure beam body, they are connected to steel girder with high-strength bolt, and to pier and support with anchor bolt, sleeve and anchor rod.

### 7.1 Installation preparations

- 7.1.1 Before erection of steel girder, lift and set the bearing on the preset bearing transverse slideway beside the bearing pad stone.
- 7.1.2 Mark longitudinal and transverse centerline respectively on the bearing top surface, meanwhile re-measure the level of bearing pad stone.
- 7.1.3 Check the surface of pad stone and then roughen the surface, meanwhile check the position and depth of reserved hole and handle the non-conformance timely, after that, remove the foreign matters in reserved hole.

### 7.2 Jack installation

- 7.2.1 Install the jacks beneath joint center of the bottom of steel girder to act as the main support for steel girder hoisting and to ensure the even loading on every joint.
- 7.2.2 Install one jack outside every main truss joint center to regulate the balance of the steel girder during jacking up.
- 7.2.3 Install one jack transversally on the slides (or temporary supporting point) of left and right truss joints to regulate the horizontal position of the steel girder.

### 7.3 Adjustment of the planimetric position of steel girder

- 7.3.1 During longitudinal pulling of steel girder, the longitudinal position of the girder was adjusted to within 1mm; therefore, the planimetric position of the steel girder must be re-adjusted after the erection of the four panels;
- 7.3.2 Escalate the jacks beneath the main truss joints evenly and slowly at the same time to stabilize and balance the steel girder. Stop jacking up when the slides on the joints are disengaged for 2cm, and then adjust the level of slide top surface to 2cm higher than the design level based on the pre-camber, and set stainless steel plate and teflon slide plate (lubricant shall be applied between) on the top surface of slide;
- 7.3.3 Lower the jack and make the jack disengage from the steel girder to transfer the load to the slide with stainless steel plate and teflon slide plate (lubricant shall be applied between). Jack up the steel girder transversely and precisely, adjust the planimetric position of the steel girder using the jacks transversely installed beside the slides on the left and right truss joints according to the position of the four panels steel girder and under the instruction of Surveying and Installation Team, and the derivation of planimetric position shall be controlled within 1mm.

### 7.4 Installation of steel girder bearing

- 7.4.1 Pull the bearing beside the pad stone transversely to the right place with chain hoist;
- 7.4.2 Lift the bearing (all parts are collected together temporarily) to make it closely attach to the steel girder with chain hoist and fill the empty space below the lower bearing plate with a wood slab.
- 7.4.3 Punch the nail to fit the steel girder into the bolt hole of the bearing and tighten the high strength bolts connecting bearing and steel girder.
- 7.4.4 Dismantle the wood slab and mark the longitudinal and transverse centerlines on the bearing pad stone to precisely adjust the planimetric position of the lower bearing plate and adjust the level of lower bearing plate according to the design or monitoring calculation requirements under the monitoring of Surveying and Installation Team and level the lower bearing plate to make the altitude differences of foursquare meet the code requirements;
- 7.4.5 Install grouting template and carry out gravity grouting to reserved hole and lower bearing plate (See Fig. 5 and Fig. 6). After the grouting mortar reaches the designed strength, dismantle the temporary connection of bearing and jack up the steel girder about 5mm to remove the temporary support point (or slide), then lower the steel girder down slowly to transfer the load to bearing.

7.5 Adjustment of level of steel girder

7.5.1 When adjustment of level is necessary, connect the bearings together temporarily, and then unscrew the connecting bolts of bearings and steel girder. Escalate the jacks beneath the joints evenly and slowly at the same time to stabilize and balance the steel girder, stop jacking up when a clearance of 2cm is formed between the bottom surface of the joints and the top surface of bearing.

7.5.2 Adjust the level of height-regulating steel plate or device according to the design elevation (taking the camber into consideration) under the supervision of Surveying and Installation Team, and then lower the jack to transfer the load to bearing and height-regulating steel plate.

7.5.3 Dismantle the jack to adjust the level of bearing.

III. Introduction to Accessory Components (Embedded steel plate, sleeve and anchor bolt etc.)

The precast beam and cast-in-situ beam with this series of bearings shall be set with embedded steel plate under the girder, and the size and technical requirements of the embedded steel plate shall conform to the requirements of this set of installation drawings; the surface of embedded steel plate shall be covered with paint or zinc coat, and if painting technology is applied, epoxy zinc rich primer shall be applied with a thickness of no less than 50 micrometer; the embedded steel plate may be purchased from bearing manufacturer or self-made by construction company (as per Fig.1)

The lower sleeve, anchor, anchor bolt and embedded steel plate (if any) connecting this series of bearings and bearing pad stones at top of the pier and abutment shall be installed as per this set of installation drawings, and such members can be purchased from bearing manufacturers or processed by the construction company as per Fig.1.

The anchor bolts for this series of bearings shall be grade 10.9 Dacromet coated high strength bolts; the bolt type shall be the ones specified in this set of installation drawings which can be purchased from bearing manufacturers or processed by the construction company as per Fig.1.

The surfaces of sleeves and anchors for this series of bearings shall be subjected to blackening (bluing) or galvanization, and the threaded hole shall be applied with butter before installation.

IV. Guidelines for Bearing Replacement

1. First, set the jack under the girder bottom plate, then unscrew the upper anchor bolt, and jack up the girder body 3mm away from the bearing top surface. (Note: two-span beam on the same pier top shall be jacked up at the same time, and the jacking height shall not be greater than the uneven settlement according to the beam design requirement)
2. Unscrew the anchor bolt under the bearing;
3. Remove the original bearing body (not include embedded steel plate);
4. Install the new qualified bearing body;
5. Tighten the lower anchor bolt to fix the bearing tightly after alignment;
6. Lower the girder slowly, then tighten the anchor bolt and remove the jack to complete the bearing replacement.

V. Maintenance of Bearing

The bearings shall be maintained in accordance with the requirements specified in Article 4.9 of Code for Maintenance of Highway (JTG H11-2004). The bearings shall be inspected timely within three months after the completion of construction to ensure the good working conditions and sealing of the bearings. The bearings shall be inspected again within one year of use, and any cause of problems shall be timely found and corrected, and checked once a year regularly in the second and third year. After the third year when the bearings maintain in a stable condition, they can be inspected as per Table 2 according to the actual condition.

VI. Bearing Marking

1. During the installation of bearing body and bearing embedded components, the unified mark and direction arrow indicating the "transverse direction of bridge" shall be set in an eye-catching area without any blocking to ensure accuracy.
2. Centerlines of the front and side surfaces of the bearing body and bearing embedded components shall be marked with permanent eye-catching color.
3. Nameplate specifying such key information as complete bearing code (including design vertical bearing capacity, design horizontal bearing capacity, function code, design displacement and applicable temperature scope), design rotation, date of manufacture, factory number and name of manufacturer shall be set on bearing.
4. Displacement marking and indication on the longitudinal (axial direction) displacement direction shall be set, and pre-bias shall be marked if pre-bias setting is necessary. Table 2 Bearing Inspection, Evaluation and Maintenance Items

Table 2 Bearing Inspection, Evaluation and Maintenance Items

S/N	Inspection Item	Inspection Item in details	Measured Result	Evaluation Conclusion
1	Effectiveness of corrosion protection for bearing	Track the rust protection of the bearing according to the service condition and carry out rust protection surface repairing if necessary.		
2	Connection status of anchoring parts	Check the threads for any rust, and replace the bolt with rusty threads; Check the bearing connection for any looseness, and any loose bolt shall be tightened.		
3	Crack on steel parts	Check the surface of steel parts for any crack.		
4	Steel parts desoldering	Check the weld joints between the stainless plate and substrate sheet and any desoldering shall be repaired.		
5	The height of modified ultrahigh-molecular weight polyethylene plate (h)	When =1.0mm, only normal inspection is necessary; When 0.5mm=h < 1.0mm, inspection frequency shall be increased; When 0.2mm=h<0.5mm, inspection frequency shall be increased furtherly; When h=0.2mm, it shall be evaluated by experts or be replaced.		
6	Over-displacement of bearings	Check the relative displacement of the bearing under the maximum and minimum temperatures, and any over-displacement found shall be analyzed for the cause and corrected.		
7	Over-rotation of bearings	Any over-rotation shall be analyzed for the cause and corrected.		
8	Overall inspection result of bearing			
9	Treatment suggestion			
10	Expected time for next inspection			

Cleaning, oil applying, tightening or replacement of anchor bolts of bearings are necessary during each inspection.



Expansion joint device of Bridge

Expansion device of bridge is for smooth access of vehicles through deck and conforms to requirements of superstructure deformation of bridge, which is a collection of various devices composed of rubber and steel materials set at expansion point of bridge. It is passed to beams via power transmission bearing structure. Second is to adapt to change of vertical and horizontal displacement of bridge and angle change of warping at beam end.

Expansion device can be divided into the followings in accordance with materials used and purposes: modulus, comb-type and seamless expansion device.

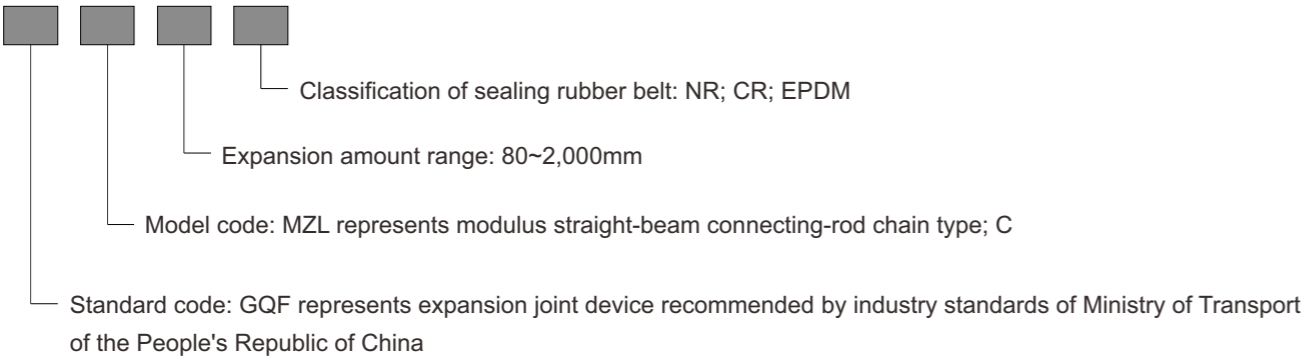
Module Expansion Joint Device

Module expansion joint device is an upgrading product promoted in the market in 1990s, mainly assembled with domestic hot-rolled compromise steel materials and sealing rubber belt. It is of reasonable structure and long service life and convenient for installation and maintenance, which is better than mat rubber expansion joint.

Module expansion joint device is divided into two forms: single expansion joint device and multiple expansion joint devices.

I. Code Representation and Significance

Code representation shall be consistent with those specified in Traffic Industry Standard of the People's Republic of China.



Example 1: GQF-C60 (CR) represents adopting type C recommended by industry standards of Ministry of Traffic. The expansion amount shall be 60mm CR sealing rubber belt bridge expansion device

Example 2: GQF-MZL480 (EPDM) represents type MZL recommended by industry standards of Ministry of Traffic. The expansion amount shall be 480mm EPDM sealing rubber belt bridge expansion device

II. Scope of Application of Rubber Compound

- 1. Expansion device with CR adopted which is applicable to regions with a temperature of -25℃~+60℃.
- 2. Expansion device with NR adopted which is applicable to regions with a temperature of -40℃~+60℃.
- 3. Expansion device with EODM adopted which is applicable to regions with a temperature of -40℃~+60℃.

III. Technical Condition for Design and Manufacturing

- 1. Design load: C20 load of vehicles specified in the Technical Standard of Highway Engineering JTJ88 (1995) is adopted for design.
- 2. Compromise steel materials which are applicable to this structure shall be 16Mn bridge special steel. The tensile strength of steels shall be not less than 480Mpa. The allowable bending stress shall be not less than 210Mpa.
- 3. Other steels of accessories can be applied to steels with strength no less than Q235.

IV. Calculation of Expansion Amount

The following factors shall be considered when selecting expansion amount range:

- 1. Influence of temperature variation;
- 2. Drying shrinkage and creep effect of concrete bridge;
- 3. Displacement influence brought by beam end rotation due to dead and live load;
- 4. Bearing displacement influence caused by braking force;
- 5. Vertical variation influence of shifting end of bridge due to large longitudinal slope;
- 6. Jointing method dislocation influence of skew bridge and curved bridge;
- 7. Influence of other potential factors, such as installation and construction error of shrinkage device, errors during processing, prestress after installation and loss of prestress.

It is difficult to calculate expansion amount accurately now with various factors above considered. Therefore, it is reasonable to reserve enough surplus in the design (select dimension of expansion device and see Table 1 for calculation of expansion amount)

The determination of calculation of expansion amount of expansion device will directly affect dimension selection of expansion device. Application effects of expansion device will be directly affected in case of improper selection of expansion device dimension. Clearance among bridges shall also be considered when selecting expansion device dimension to ensure anchoring between expansion device and both ends of beam ans slab to achieve best effects. Therefore, enough surplus shall be reserved when selecting the expansion amount to ensure application effect and durability of expansion device.

V. Documents Provided by Users to Factory

- 1. Cross sectional drawing of bridge: includes detailed design data of longitudinal slope, cross slope, pavement, safety belt and location and dimension of guardrails;
- 2. Construction and installation time and range of variation of temperature during installation of expansion device;
- 3. It shall be specified in case of special requirements by users. for example, Location of beam form and prestress anchorage; in this way, the factory ensures to process and manufacture, implement assembly, fixing and ex-factory in accordance with user requirements to avoid unnecessary rework and achieve high quality service. Positioning ex-factory shall be half of the maximum expansion amount of products in case of no temperature is provided during installation.

## Single Expansion Joint Device

### I. General Terms

Single bridge expansion joint is a new bridge expansion device composed of a steel side beam, a whole length of rubber sealing strip. Products are applicable to highway, city viaduct and flyover bridge projects with heavy traffic.

### II. Structural features and functions

In case of any displacement due to temperature difference for bridge beam, rubber sealing strip fixed in the trench of side beam mechanically is available to free expansion to prevent water and dust. Impact force of traveling vehicles will be passed to bridge structure via side beam and welded anchorage components. The product is of reliable connection and smooth combination with deck, watertight sealing, flexible expansion and smooth traveling as well as long service life, which is suitable for bridge with an expansion amount of 0-120mm.

### III. Major materials

Side beam of steels:

Domestic 16mn steel via hot extrusion is adopted, which is of good impact resistance, fatigue resistance, rust resistance, distortion resisting and welding, so as to ensure the service life of expansion joint.

Sealing rubber strip:

CR or EPDM or NR shall be adopted for manufacturing, which is of good aging resistance, distortion resisting and water-proofing property. The design of sealing rubber strip includes single-layer (SE and bird-shaped series) and double layer rubber strips (EFEseries) and they are of different specifications to adapt different expansion amount.

Anchoring system:

Various anchoring parts including anchors and anchor plate are designed to achieve reliable connection between expansion joints and bridge and for bridge engineer to select according to design thickness of bridge deck. The company can design and manufacture for special purpose.

### IV. Type

Main type of single joint include: GQF-C\E\F\Z-60~80, RG-60~80 and SD-80~120.

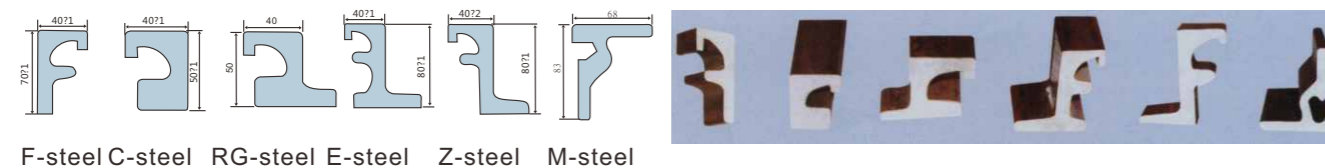
### V. Expansion resistance:

Compression force shall be 0.1KN/m during shrinkage

Longitudinal shearing force within operating range of shrinkage joint shall be 2.0KN/m

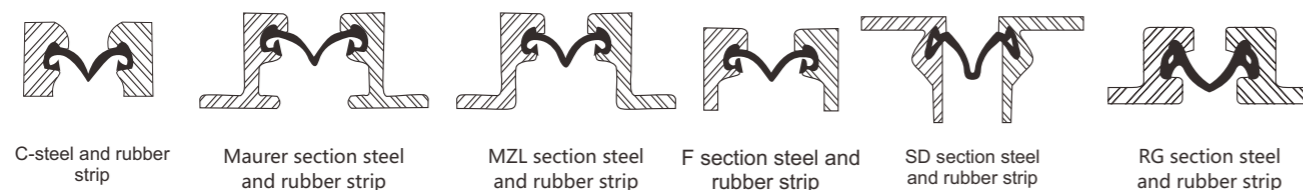


See the figure below for compromise steel section of expansion joints



F-steel C-steel RG-steel E-steel Z-steel M-steel

below for common section steel and sealing strip adopted for single joints



## Multiple Expansion Joint Devices

### I. General

Multiple joint is composed of side beam, medium beam, displacement control box, pressure bearing, compaction bearing, anchorage components and sealing rubber strip. The displacement shall be 0~80mm for each unit. Number of groups shall be determined in accordance with actual displacement requirements of bridge. The maximum displacement can reach 2,000mm now.

Major forms:

SSFB direct supporting expansion device

XF inclined supporting device

MZL connecting-rod chain type expansion device



### II. Features

#### 1. Firm and reliable

Side beam and medium beam of expansion device are made from rolling of 16Mn steel, which is capable of bearing vertical load and horizontal impact of large traffic flow and large tonnage vehicles. Firm welding of between embedded reinforcement of abutment, beam and anchorage components, which can transfer vehicle load to abutment reliably. Reasonable structure and durability can run on bridges with designed capacity of C20 and G120.

#### 2. Flexible expansion

The displacement control system of expansion device is composed of elastic components or inclined supporting components such as rubber spring and teflon bearing. The displacement of each group is even with less expansion friction resistance.

#### 3. Smooth deck and comfortable traveling

The device will ensure the free expansion displacement of beams and form and make the deck joint to be smooth and comfortable for traveling of vehicles.

#### 4. Waterproof and anti-corrosion

It shall be installed into the rubber sealing strip in the trench of each steel beam. It shall be processed as per bridge width, which can form good elastic deformation, water-proofing and dust proof; it can effectively protect the inner structure of expansion device and bearing at beam bottom from erosion.

#### 5. Large displacement and convenient selection

The displacement of the device is designed and manufactured as per modulus from 80~2,000mm. Design and construction department of bridge can select at its own discretion in accordance with actual expansion amount of superstructure of bridge.

#### 6. Expansion resistance

The compressive force shall be 1.0KN/m during shrinkage

The tensile strength shall be 4.0KN/m during stretching

Longitudinal shearing force within operating range of expansion joint shall be 2.0KN/m

Expansion Device of Comb-type Bridge

I. General

Expansion device of comb-type bridges is developed, designed and manufactured by our company. It is composed of comb-type steel plate, stainless steel sliding plate, CR sheet and anchor bolt

II. Main features

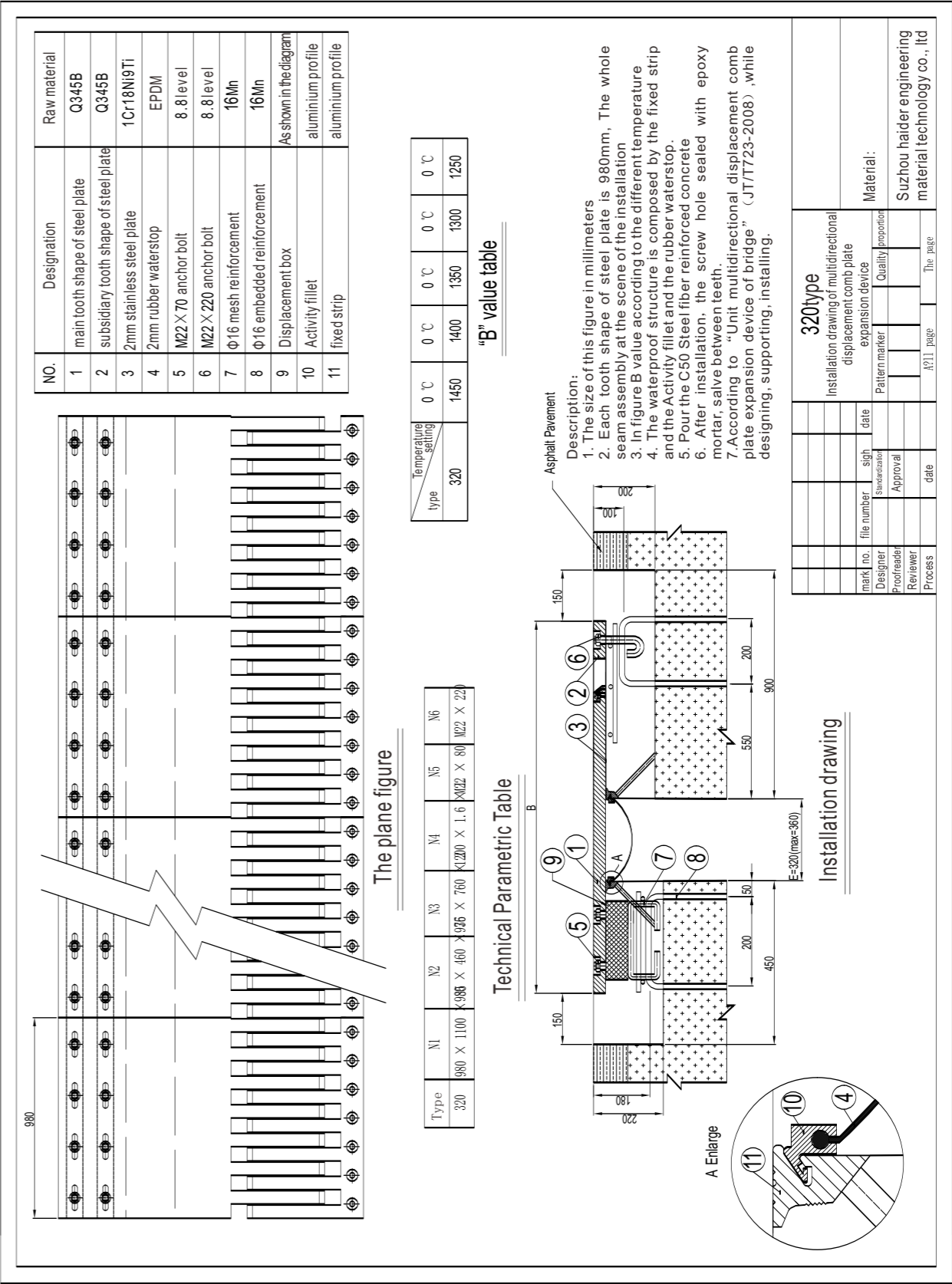
- 1. Low structure height and wide application range  
The allowable expansion amount of the expansion device is designed to be 40~400mm and the structure height is 100~150mm, which is applicable to highway bridge, viaduct and city flyover, especially has obvious technical advantages over old bridge reconstruction.
- 2. Smooth traveling  
The expansion function of the expansion device is achieved by the relative sliding among tooth-shaped steel plates. Rigid-flexible combination measures are adopted to remove vibration arisen from traveling of vehicles thoroughly and reduce the impact towards the bridge.
- 3. Excellent water-proofing property  
Two layers of chloroprene rubber water-proofing layers are provided for expansion device and water-proofing ointment is applied among comb-type steel plates. All these help achieve water-proofing effects and protect steel plates from corrosion so as to prolong the service life of expansion device.
- 4. Automatic removing  
Ash and sundries can only be seen on the surface of the expansion device due to the bedding layer of stainless steel plate-sundries are removed from gaps automatically via expansion process of comb-type steel plate and vehicle traveling.
- 5. Skid resistance  
Anti-skid slot is adopted on the surface of comb-type steel plate for the expansion device to enlarge the friction force between vehicles and steel plates to achieve excellent skid resistance.

III. Construction Sequence

- a) Excavation and slot cleaning
  - 1. Slot shall be cut smoothly and sand filling and sundries in the slot shall be removed completely.
  - 2. Depth and width of slot shall conform to design requirements.
  - 3. Concrete in the bottom of slot shall be solid and smooth and shall be poured again in case of any loosening and falling.
- b) Punch positioning  
Setting-out shall be implemented for positioning die opening in accordance with dedicated anchor bolt of design model. Anchor bolts shall be embedded with epoxy mortar after punching as per design requirements after setting-out.
- c) Setting of anti-cracking reinforcement mesh  
Anti-cracking reinforcement mesh shall be set in accordance with design requirements and wooden mould shall be poured according to site condition. The requirements for wooden mould shall be: firm without void and water-proofing and grout leakage resistance.
- d) Pouring of bottom layer concrete  
Pouring requirements: tamping, without cavity and screeding. Grade and flatness shall be strictly controlled.
- e) Installation of comb-type steel plate  
Concrete surface shall be cleaned and water-proofing rubber and stainless steel sliding plate shall be paved. Anchor bolt shall be fastened and epoxy mortar shall be used to grout gaps among bolt holes.
- f) Pouring of concrete at transition section at both sides  
Pouring requirements: tamping, without cavity and screeding. Grade and flatness shall be strictly controlled.
- g) Curing and maintenance  
Site shall be cleaned after 14 days of curing after the pouring of concrete. Traffic is available after ointment is poured into the gaps.



Installation of Comb-type Bridge Expansion Device



## Installation and Maintenance of Modulus Bridge Expansion Device

### I. Installation of expansion device

For the same excellent expansion device, different construction and installation quality will cause different application effects and durability. According to our investigation and research, it shows that the construction and installation quality of modulus expansion device is the last sector for ensuring the application effects of expansion device. Therefore, the following requirements are put forward concerning site construction and installation of modulus expansion device:

1. Construction company must reserve a slot for installing expansion device at the beam head (or slab head) and beam end, beam end and abutment in accordance with dimension specified in the design drawings. Anchorage reinforcement shall be bedded as per drawing requirements. Anchor reinforcement shall be connected with beam end or abutment in a reliable manner. It shall conform to relevant regulations in construction specifications of bridge when implementing the welding of main reinforcement.

2. Expansion devices assembled by the factory shall be transported to construction site by dedicated vehicle. During the transportation of expansion device, construction shall be implemented under the guidance of manufacturer in case of splicing is required at the construction site due to restrictions of transportation length or other reasons. Expansion device shall be padded at least 30cm from the ground and shall not be stored in the open air when storage is required for expansion device at the construction site.

3. The clearance at both ends of main beam (or slab) must be checked after completion whether conforms to design or not, whether the position of anchorage reinforcement or components is correct before the expansion device is installed on the bridge. Whether the model of expansion device is applicable or not shall be considered in case of non-conformance with design requirements. Remedies such as adjusting the dimension among gaps of expansion joints or replacing models of expansion device must be considered in case of failing to meet requirements and ensuring reliable anchoring.

4. It is required to check whether the "J" or "a" value of expansion device conforms to installation temperature before the expansion device is installed on the bridge. Or horizontal jack and fixtures shall be used for adjustment in accordance with actual temperature (in case of any discrepancy with temperature provided by the factory during installation) under the guidance of engineer until it conforms to design requirements. It can be fixed with dedicated fixtures after being checked and signed by construction and installation principle.

5. Concrete in the reserved slot shall be chipped and cleaned before the hoisting of expansion device. The reserved slot shall reach appropriate width and depth when cleaning the formation level to put modulus expansion device with large displacement. All surplus reinforcement must be removed to ensure the gap of beam ends to conform to design requirements.

6. Hoisting point has been marked with conspicuous color during the ex-factory of expansion device. Hoisting must be implemented in accordance with hoisting point at the construction site. Proper strengthening measures shall be taken when necessary to ensure safety and reliability. Hoisting device shall be set at the slot and expansion device shall be installed in the reserved slot slowly. The center line of expansion device shall overlap with that of the bridge. The maximum deviation shall not be more than 10mm; the width value of expansion device along the bridge direction shall be put on the gaps of expansion device symmetrically. Level or steel ruler shall be used for positioning to match the top surface elevation and grade elevation (-1-1.5mm).

7. After the correct positioning of expansion device, height shall be positioned for reinforcement with vertical welding above  $\phi 16$  at expansion device box or anchor plate. Straightness shall be positioned for horizontal welding  $\phi 16$  reinforcement. The anchorage reinforcement at one side of expansion device shall be welded with reserved reinforcement in the reserved slot to ensure that the expansion device is firm. Welding shall be implemented for every 2~3 anchorage reinforcements. Reinforcement shall be anchored on the other side in accordance with the above procedures. Un-welded anchor reinforcement can be welded after both sides are fixed to ensure reliable anchoring. During the welding of anchor reinforcement, attention shall be paid not to weld freely on the side beam and medium beam to prevent deformation of steel beam. Then lateral connecting horizontal reinforcement shall be connected. One side shall be welded in case of difficulty and caliper shall be loosened for free expansion. At this time, expansion device has taken effect. After the anchoring of expansion device, fixing steel plate at the top of expansion device shall be removed and fitting bolt shall be cut. Grinding wheel shall be used to grind smooth and zinc paint shall be applied.

8. After completion of the above procedures, necessary formwork shall be installed and formworks for beam end and expansion device shall be set (2mm steel plate or equivalent polystyrene plastic board can be used). Formworks shall be manufactured in accordance with dimension of expansion device and gap of reserved slot. Formworks shall be tight to prevent mortar from flowing into displacement control box or gaps of bridge.

9. According to design drawings, epoxy resin concrete or steel fibrous concrete with strength more than C40 shall be poured in the reserved slot of concrete or high-strength concrete with strength of C50 or more than C50 can be used to fill and tamp. Necessary measures shall be adopted when pouring concrete to ensure dense tamping. Iron plate and other plates shall be paved on the surface of expansion device for protection and shall be put into the displacement control box of expansion device where concrete flows. Concrete shall not be filled into the gaps of sealing rubber strip and surfaces. In case of the aforesaid situation, it is required to clean immediately and implement protection.

10. Attention shall be paid to curing after the concrete is poured. Traffic shall be blocked and can be available after concrete reaches required strength.

11. The water-proofing course and paving of bridge deck are generally completed with bridge deck works of the whole bridge. Temporary protection measures of adding covers shall be adopted for expansion device before paving to avoid crash and bearing direct vehicle load. Gaps shall occur on the bridge deck after the paving of bridge deck.

### II. Maintenance of expansion device

Regular repair and maintenance are necessary steps to ensure normal operation of expansion device and prolong the service life. Therefore, the followings shall be implemented for maintenance:

1. Combine with daily maintenance work of highway bridges. Clean sundries such as sediment and stone waste in the sealing rubber strip regularly. Prevent leakage due to the damage of sealing rubber strip caused by stressing of expansion device to affect free expansion and large pebbles. Replace rubber strip duly in case of leakage.

2. Check whether the joints of side beam and bridge deck paving is damaged or has cracks to cause leakage regularly. Repair immediately in case of the situation above to avoid affecting anchoring strength among expansion device, beams and plates.

3. Check whether the top of expansion device is smooth regularly. Further check whether the sliding bearing or sliding compaction bearing is damaged in case of any abnormalities. Replace duly in case of damage. The convenience for replacing parts and components has been fully considered in the design. It is feasible via actual tests.

4. Duly check whether the components of displacement control system are damaged in case of any large uneven displacement among gaps of expansion device during daily maintenance. Duly replace parts and components in case of any damage. Adopt standard components for convenient replacement. Generally, the strength and applicable durability of displacement control system have been fully considered in the design and it is not easy to occur.

5. Expansion device belongs to steel structure. Though protection treatment has been done before ex-factory, affected by operating environment, after some time, rust may occur and maintenance department shall implement rust prevention treatment periodically to ensure the durability of expansion device.



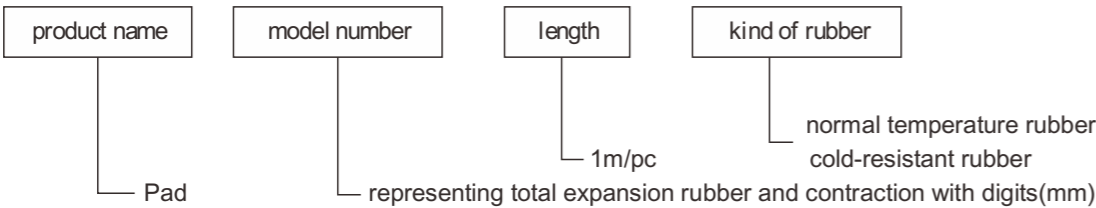
Pad-Type Serial Rubber - Bridge Expansion Joint

I. General

Pad –type serial rubber expansion joint, a product of the combination of rigidity and flexibility, has enough vertical rigidity to bear the load of traffic because of the steel plates between layers of rubber and the middle surface recombination high strength aluminum plate. The shearing and deformation properties enabled by the flexibility of the rubber layers and the structural expansion and contraction groove can help fulfill the displacement of the bridge surface.

II. product characteristic

The product is characterized by mid range movement capacity to accommodate for movenments alone center line of the bridge joint and for perpendiclar move ment also. Specially designed bent-type products for the side of pavement is also available.



ALUMINUM SKID PLATE: The saluminum plate sections are estruded from alloy 6061-T6, ASTM B221-62

STEEL SECTION: Structural steel angles are fomde from Q235, ASTM A36.

RUBBER:

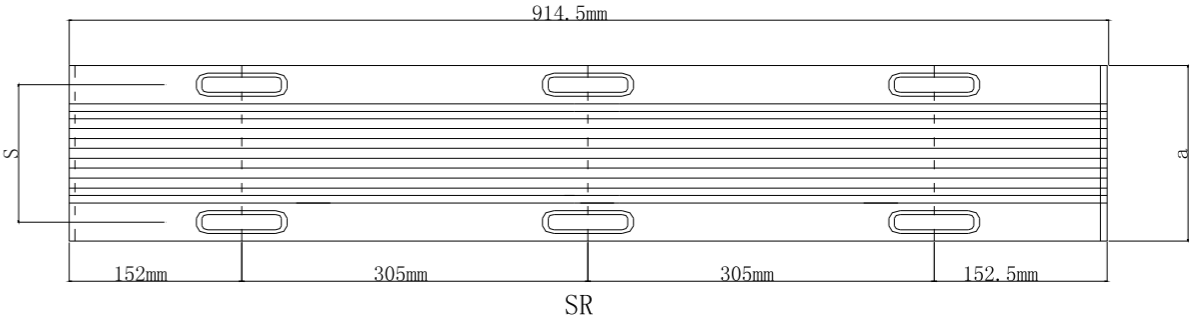
Normal temperature rubber; made of neoprene elastomer rubber.used in temperature of +80℃~-25℃

Cold-resistant rubber; made of trihydric ethylene propylene rubber. used in te mperature of +80℃~-45℃

JT/T327-2004

Item	Neoprene elastomer Rubber	Test method	
		GB	ASTM
Hardness (ShoreA), degree IRHD	60±5	GB/T531-1999	D2240
Tensile strength (Mpa)	≥ 15	GB/T528-1998	D412
Elongation at break(%)	≥ 400	GB/T528-1998	D412
Constant compression permanent deformation(Room temperature×24h)	≤ 20	GB/T7759-1996	D395B
Bears the ozone aging(25-50pphm)20%Elongation(40°C×96h)	No cracks	GB/T7762-1987	D1149
Bears the greasy dirt(Standard oil,23°C×168h)Change in volume(%)	-5~ +10		D471
90°peel strength (one plate method); Rubber andsteel (KN/m)	> 7	GB/T7760-2003	

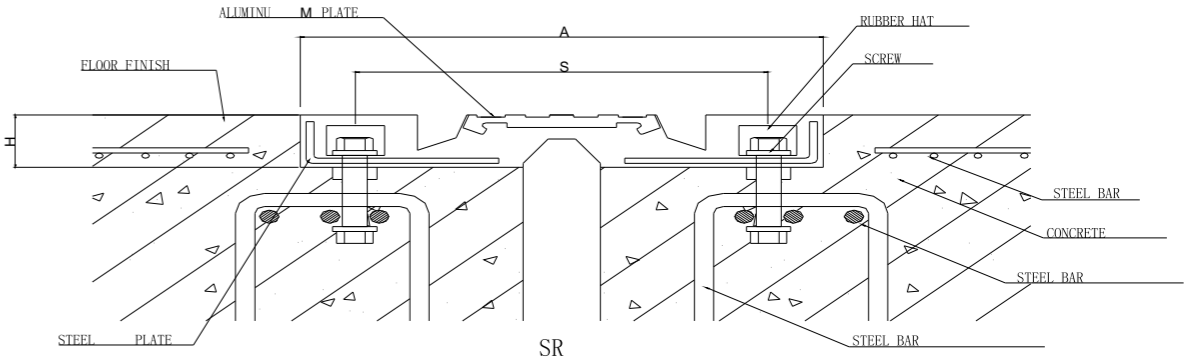
Example: pad-typemodel 30 neoprene elastomer rubber expansion joint represents pad-type with normal temperature rubber expansion joint with amount of expansion and contraction ≤30mm.



Tabel of specifications,model numbers,design parameters and accessories

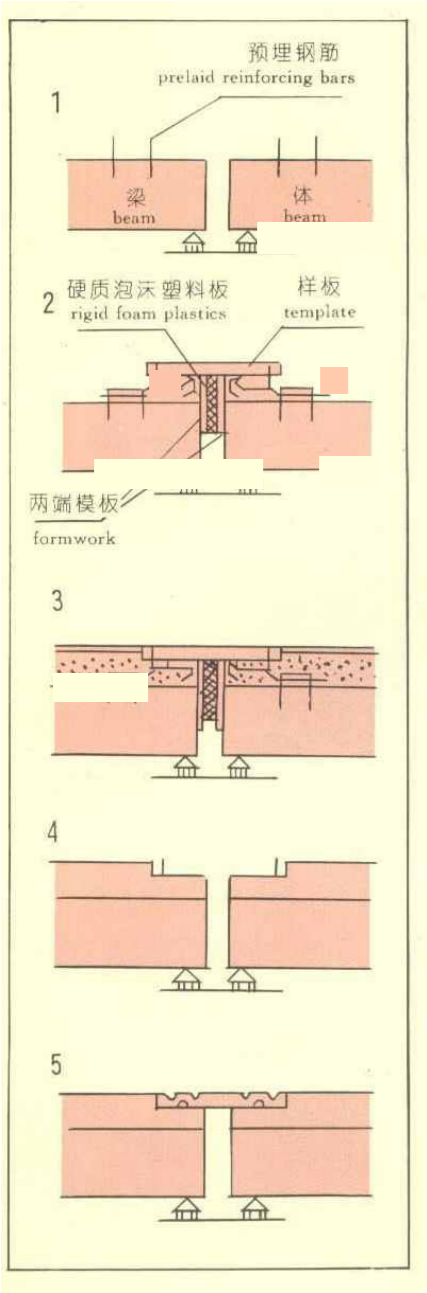
mode number	main dimensions (mm)		amount of expansion and contraction(mm)			Accesssories(mm)					
	width	thickne ss	total amount of expansion and contraction	Amount of expansion	amount of contraction	size of bolt	size of nut	spring coil	washer thickness	rubber cap	quantity (meter)
30	230	35	30	15	15	M12×70	M12	φ 12×3.5	custom-made		6
45	250	45	45	22.5	22.5	M12×70	M12	φ 12×3.5	custom-made		6
50	270	42	50	25	25	M12×70	M12	φ 12×4.5	custom-made		6
60	400	40	60	30	30	M14×70	M14	φ 14×4	custom-made		6
70	514	51	70	35	35	M14×70	M14	φ 14×4	custom-made		6
100	550	54	100	50	50	M18×70	M18	φ 18×4.5	custom-made		6
150	700	80	150	75	70	M18×70	M18	φ 18×4.5	custom-made		6
2A	270	40	51	25	25	M12×150	M12	φ 12	custom-made		6
2.5A	349	46	64	32	32	M16×150	M16	φ 16	custom-made		6
4A	584	54	101	50	50	M19×150	M19	φ 19	custom-made		6
6.5A	711	76	165	80	80	M22×150	M22	φ 22	custom-made		6
9A	950	95	229	110	110	M22×150	M22	φ 22	custom-made		6
13A	1397	127	330	160	160	M29×150	M29	φ 22	custom-made		6

Note: The basic length of the series is 1 meter, The other ones < 1m meter can be made according to the requirements or design of the users) .



Pad-type Serial Rubber - Bridge Expansion Joint

Installation Guide



1. Preparation for installation :Clean the beam –ends and end surface. Trim the beam –ends if they are not even , so as to install from work on both ends. The end surfaces should be washed clean after the dross is removed. Setting up the from work on both ends ,the template, locating the anchor bolts :The from work , whose top should be the sane level as the designed bottom of the rubber plate , is fixed by inserting rigid foam plastics between .Examine from work thoroughly to see if there are any gaps from which mortar will come out and stop them if there are any, so as to ensure that no concrete will enter the space for the expansion joint and that the horizontal displacement of the beams will not be affected.
2. The template, which is made according to the calculated position values, as hole bored on each side for bolts, Put the anchor bolts (M18)into the holes of the template. The bolts are to be welded to the prelaed reinforcing bars according to the requirements in design .the location difference of the bolts should be less than 1 mm and no accumulated difference should appear. The surface of the template should be of the same height as the bridge surface. At the same time thereinforcing angle bars and other components are welded. All the welding should not be done until all parts are accurately set.
3. Pouring concrete: After the above procedures, pour concrete under the expansion joint and in the transitional part of 50 cm on both sides, The concrete grade should not be below 425, vibrating to ensure no voids or crack-like forms in the structure so that the life-span of the expansion joint will not be affected.
4. Removing template and formwork on both ends :When the concrete is half set, take the template out, remove the figid foam plastics and the formwork on both ends and make smooth the position for the installation of rubber plate with high –grade mortar.
5. Installation of rubber plate: After the concrete has dried ,coat the installation surface with watertight value (B) and let the prelaed bolts go through the holes and tighten the nuts one by one .Do not forget to put washers and spring coils on the boles .Fill the holes with suitable amount of watertight glue and then put in rubber caps to make the rubber plate smooth. Apply sealing glue to the tongue-and-groove joint of two neigh-bouring rubber plates. They should be tightly installed one after another so as to strengthen watertight property.

Detail of Projects Performed

number	date	Project name	Company name	specification	quantity
1	2008.05	the replacement of sitra bridges Bahrain	Basf the chemical company Germany	Pot Bearing BS 5400	112
2	2008.06	Access Arrangement to Rashidiya park & ride Station	Basf the chemical company Germany	Pot Bearing BS 5400	160
3	2008.08	King Abdullah Project	Basf the chemical company Germany	Pot Bearing BS 5400	64
4	2008.1	Qatar Bahrain Causway	Basf the chemical company Germany	Pot Bearing BS 5400	52
5	2008.12	North Marana Causeway	Basf the chemical company Germany	Pot Bearing BS 5400	120
6	2008.08	Kace bay la sum Middle East	ETIC international France	Pot Bearing BS 5400	320
7	2008.1	Acacia ridge bridge Australia	ETIC international France	Pot Bearing BS 5400	120
8	2008.05	Zaytoon Fars Iran	Shib Kooh Zaytoon Co. Iran	Expansion joint	900
9	2008.08	Saudi Arabia	Af kaar Al-Banaa Trading Est	Expansion joint	500
10	2008.09	Saudi Arabia	Isnad Alwatan Contracting & Trading Co.Ltd.,	Pot Bearing BS 5400	24
11	2008.07	Vietnam	EID Engineering Co., Vietnam	elastomeric bearing	360
12	2008.09	No.5 HIGHWAY Vietnam	Thinh Phat Commercial Industrial JSC., Vietnam	Pot Bearing BS 5400	36
13	2008.06	Nepal	Nepal Hydro & Electric Ltd. Butwal Nepal	elastomeric bearing	108
14	2009.07	American	Imperial Electric, Scott DC Power Products Euclid Universal, Howell Electric Motors	elastomeric bearing	2400

Detail of Projects Performed

Date	Main Contractor	countries	The project name
2014.12.27	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.75+498
2014.12.27	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.73+658
2014.12.27	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.72+722
2014.10.9	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.2+854
2014.10.9	ALMABANI C ONTRACTORS	Saudi Arabia	INTERSECTION OF KING ABDULLAH WITH KING KHALED ROADS BRIDGE F1
2014.9.20	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.65+551
2014.8.30	ALMABANI C ONTRACTORS	Saudi Arabia	INTERSECTION OF KING ABDULLAH WITH KING KHALED ROADS BRIDGE B2
2014.8.30	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.108+521
2014.7.30	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.80+828
2014.6.13	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL AIRPORTS LINKS-LING 2A
2014.4.25	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.2+854
2014.4.2	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.2+854
2014.3.19	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL WADI BRIDGE STA.38+900
2014.1.16	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL ROAD BRIDGE ADI SOUTH STA.117+003
2014.1.15	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL ROAD BRIDGE ADI SOUTH STA.34+523
2013.12.17	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.92+371
2013.10.18	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL, WADI BRIDGE STA.165+425
2013.9.21	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL, RAIL BRIDGE STA.8+674
2013.8.31	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL, WADI BRIDGE STA.165+542
2013.8.31	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL, WADI BRIDGE STA.160+634
2013.7.26	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL, RAIL BRIDGE STA.156+980
2013.6.26	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL, RAIL BRIDGE STA.183+139-EAST
2013.6.26	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL, RAIL BRIDGE STA.5+078
2013.5.23	SOMAC CONTRACTING COMPANY	Saudi Arabia	BRIDGE EXECUTION AT IN TERSECTION OF KING, ABDUAZIZ R OAD WITH AL-ENAM Soud Bin Abdulziz R Oad
2013.5.22	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL, WADI BRIDGE STA.134+137
2013.5.21	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL, AIRPORT LINKS-LINKS 1B
2013.4.19	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL, RAIL BRIDGE STA.184+193
2013.3.26	Ali Moosa&sons Metal Industries	Saudi Arabia	KING ABDULLAH FIN ANCIAL DISTRIC T-PEDESTRIAN BRIDGE BRIDGE POT BEARING S
2013.2.18	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.76+250

Detail of Projects Performed

2013.1.15	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.447+044
2013.1.15	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.375+224
2012.11.16	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.121+120
2012.11.10	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.59+306
2012.10.32	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.115+140
2012.10.31	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL
2012.6.25	ALI MOOSA & SONS MATERIAL INDUSTRIES	Saudi Arabia	KING ABDULLAH FIN ANCIAL DISTRIC T-PEDESTRIAN BRIDGE,
2012.4.6	AL MABANI GENERAL CONTRACTORS Co.,	Jeddah	EXTENSION OF R OADS IN AL RIYADH OLD AIRPORT
2012.3.27	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL ROAD BRIDGE ADI SOUTH STA.94+263
2012.3.27	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL ROAD BRIDGE ADI SOUTH STA.94+262
2012.3.27	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.435+491
2012.3.27	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.327+189
2012.3.9	AL RAJHI ALLIANCE	Saudi Arabia	Entrances & Exits of Car park
2012.2.10	AL RAJHI ALLIANCE	Saudi Arabia	King Fahad & Alarab St.Bridge in Skaka
2011.12.26	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL ROAD BRIDGE STA.188+003
2011.12.22	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL WADI BRIDGE STA.351+275
2011.11.5	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.62+336
2011.11.5	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.41+605
2011.10.14	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.62+336
2011.10.14	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.41+605
2011.8.31	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.59+306
2011.8.31	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.59+306
2011.8.5	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.385+707
2011.6.29	Advanced Construction Co.for Cont.&Maintenance	Saudi Arabia	WEDGE VALLEY BRIDGE.TAIF BRIDGE POT BEARING
2011.6.28	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.368+494
2011.6.10	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.10+915
2011.6.9	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.380+312
2011.4.30	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL WADI BRIDGE STA.399+302
2011.4.13	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.30+680
2011.4.2	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL RAIL BRIDGE STA.344+432
2011.3.25	AL RAJHI ALLIANCE	Saudi Arabia	HARAMAIN HI GH SPEED RAIL WADI BRIDGE STA.228+627

Building Expansion Joint Engineering Project			
Name of Project	Place	Qty(m)	Date
<b>Airport:</b>			
1、 Xiaoshan International Airport	Hangzhou, Zhejiang	4567	May ,2003
2、 Chengdu International Airport	Chengdu, Sichuan	2068	Oct.2002
3、 Xianyang International Airport	Xi'An, Shanxi	1050	Aug.2003
4、 Taiping International Airport	Ha'ErBing, Heilongjiang	1200	March,2002
5、 Ningbo Xiaoshan Airport	Ningbo, Zhejiang	1600	June, 2003
6、 Qingdao International	Qingdao, Shandong	2560	May ,2003
7、 Pudong International	Shanghai	8620	June, 1999
<b>Subway:</b>			
1、 Shanghai Magnetic Railway	Shanghai	1850	March,2003
2、 Shanghai Light Railway	Shanghai	1063	May ,2002
3、 Beijing Western Station	Beijing	200	Aug.2001
6、 Nanjing Subway	Nanjing	1235	Jan.2005
<b>Exhibition Center:</b>			
1、 Shanghai Oriental Art 21	Shanghai	1650	Sept.2004
3、 Suzhou International Exhibition Center	Xiamen, Fujian	2080	Sept.2001
4、 Changshu International Exhibition Center	Suzhou, Jiangsu	2500	May ,2003
	Changshu, Jiangsu	1200	July , 2004
<b>Stadium:</b>			
Zhengzhou Sports Center	Zhengzhou, Henan	2305	March,2003
Yantai Sports Center	Yantai, Shandong	2000	Oct.2001
Guangzhou Huangpu Sports Center	Guangzhou, Guangdong	365	June, 2003
Taizhou Sports Center	Taizhou, Zhejiang	4536	Sept.2003
Jiaxing Sports Center	Jiaxing, Zhejiang	2500	April, 2006
ZhangJiaGang Sports Center	ZhangJiaGang, Jiangsu	1200	May , 2003
National Training Center	Beijing	150	Oct.2003
Taida Football Center	Tianjing	2300	Oct.2003
<b>Office Building:</b>			
National Dept. Of Organization	Beijing	3200	June,2003
Shanghai Police Center	Shanghai	1250	April, 2004
Shanghai Pudong Development Bank	Shanghai	1300	Aug.2004
National Weather Broadcasting Center	Beijing	2203	Nov .2004
Hunan Municipal Government Building	Hunan	2630	Aug.2005

Building Expansion Joint Engineering Project			
Name of Project	Place	Qty(m)	Date
<b>Hotel</b>			
Shanghai HongYun Hotel	Shanghai	800	Aug.2004
Shanghai Shunfeng Hotel	Shanghai	300	Oct.2005
Zhongda Hotel	Wujing, Jiangsu	2500	Aug.2004
Hebi Hotel	Henan	2360	Oct.2003
<b>Hospital</b>			
Zhongshan Hospital	Shanghai	1230	Sept.2004
Shanghai Public Center	Shanghai	1062	June, 2004
<b>Mall</b>			
Nanjing O'Best Supermarket	Nanjing, Jiangsu	2650	July ,2002
Shanghai YouLian Mall	Shanghai	980	Sept.2004
Beijing Zhongliang Square	Beijing	1020	Sept.2002
<b>Universities</b>			
China Comercial & Industrial University	Beijing	1560	Nov .2004
HuaBei Electric Power University	Beijing	2056	Nov .2004
Beijing JianGong University	Beijing	1200	April, 2006
ChangPing Primary School	Beijing	1086	March,2005
Shanghai Tongji University	Shanghai	2100	Aug.2004
Suzhou Indusrial Park	Suzhou, Jiangsu	1230	Oct.2003
<b>Residential Center</b>			
New City	Beijing	2236	Oct.2003
ShiQiao Park	Beijing	1200	Mar-03
Shanghai Hongqiao	Shanghai	1053	Mar-03
JinXing Park	Nanjing, Jiangsu	1364	Oct.2003
Hangzhou Sunshine	Hangzhou, Zhejiang	1035	Aug.2004
<b>Plants and workshops</b>			
Guangda Group	Shanghai	10265	June, 2006
Hongren Group	Shanghai	1600	Oct.2002
Youda Company	Suzhou	8548	April,2003
Tongyi Group	Suzhou	4260	April,2003

Bridge bearing engineering project				
Date	The project name	Name of the entity	specifications	Quantity (set)
2015.3	Danyang channel sunan canal 2 standard	Wuxi city traffic engineering co., LTD	laminated rubber bearing、 pot rubber bearing	2261
2015.3	Wenzhou city southwest of high-speed line 4	China's traffic first department of xiamen engineering co., LTD	pot rubber bearing、 Spherical bearing	1154
2015.2	XC- 1 new long zhangjiagang river and wiring project	TieSiJu in two companies	laminated rubber bearing、 pot rubber bearing	2524
2014.12	Hangzhou Xiaoshan airport highway reconstruction project, heart each paragraph	China railway twenty fourth group	pot rubber bearing、 Spherical bearing	412
2014.12	Zhongshan longitudinal four line 2 blocks	Guangzhou municipal group co., LTD	laminated rubber bearing、 Spherical bearing	3040
2014.11	1 the yueqing bay bridge	China's traffic first department	laminated rubber bearing	336
2014.9	The first bid I zhongshan longitudinal four wire	Guangdong macro long highway engineering co., LTD	laminated rubber bearing、 Spherical bearing	1362
2014.7	Wujiang east-west fast trunk line 7	Huaian xinhua road engineering co., LTD	laminated rubber bearing	3112
2014.7	Shanghai chongming yingyue (willow herb road construction site	In a construction group co., LTD	Spherical bearing、 laminated rubber bearing	498
2014.7	Ouhai avenue east extension hub for the distribution system project	China's traffic first department	Spherical bearing、 laminated rubber bearing	1503
2014.6	Wujiang east-west fast trunk A2 standard items	Wujiang city Ming Hong Kong road and bridge engineering co., LTD	Pot rubber bearing、 laminated rubber bearing	928
2014.6	Xiamen xiang 'an avenue project	China's traffic first department of xiamen engineering co., LTD	laminated rubber bearing、 pot rubber bearing	371
2014.5	GanYu wood river bridge	Xuzhou city highway engineering corporation	laminated rubber bearing	840
2014.5	Wujiang east-west fast trunk DXKS - A4 label project	Wuxi luqiao group co., LTD	laminated rubber bearing、 pot rubber bearing	10398
2014.4	Xining south city 6 standard	Xining south ring road general contracting project department intends to 6 points	laminated rubber bearing、 pot rubber bearing	762
2014.4	Pizhou	Pizhou traffic engineering co., LTD	laminated rubber bearing	1248
2014.4	Dredging port high-speed A2	Xuzhou city highway engineering corporation	laminated rubber bearing、 pot rubber bearing	2252
2014.4	Hangjinqiu expressway widening 3 standard items	In the second and the third engineering bureau co., LTD	laminated rubber bearing、 pot rubber bearing、 Spherical bearing	1580
2014.4	xining	Lanzhou into construction contracting co., LTD	laminated rubber bearing、 pot rubber bearing	435
2014.3	east jing road(east road - Dongchuan road new construction 1 mark)	Pudong new area of Shanghai construction (group) co., LTD	laminated rubber bearing、 pot rubber bearing	1748

Bridge bearing engineering project				
Date	The project name	Name of the entity	specifications	Quantity (set)
2014.3	Taishun 58 provincial highway (west hill) to xiao yu village highway engineering bid 1 construction project	Sichuan highway bridge construction group co., LTD	pot rubber bearing	1748
2014.3	Xinqi	Wuxi city traffic engineering co., LTD	laminated rubber bearing、 pot rubber bearing	1044
2014.2	Changshu sanhuan rapidness reconstruction project construction project BT - S7	Jiangsu gang tong bridge group co., LTD	laminated rubber bearing、 pot rubber bearing	468
2014.1	Suzhou east ring road fast first phase	Nanjing east road & bridge engineering co., LTD	Spherical bearing	702
2014.1	Changshu sanhuan rapidness reconstruction project BT - S123 standard	Jiangsu hongxin road & bridge construction co., LTD	laminated rubber bearing、 pot rubber bearing	2078
2014.1	Suzhou south east ring	TieSiJu group second engineering co., LTD., material centralized purchasing center	Spherical bearing、 laminated rubber bearing	808
2013.12	Chang Jia highway CJ - 7	In the second and the third engineering bureau co., LTD	laminated rubber bearing、 pot rubber bearing	1854
2013.12	Chang Jia highway 8 mark	Jiangsu province traffic engineering group	laminated rubber bearing、 pot rubber bearing	2078
2013.12	Chang Jia 5 mark	Wuxi luqiao group co., LTD	laminated rubber bearing、 pot rubber bearing	2490
2013.12	Chang Jia highway CJ - A4	Hand in a public office in the third engineering co., LTD	laminated rubber bearing、 pot rubber bearing	2016
2013.12	Shugang highway A1-2 standard	Huaian xinhua road engineering co., LTD	laminated rubber bearing、 pot rubber bearing	1262
2013.12	The north avenue rapidness renovation project	Kunshan city traffic engineering co., LTD	laminated rubber bearing	331
2013.12	Lianyungang coastal avenue project	China railway 20th bureau group company	Spherical bearing、 laminated rubber bearing	2152
2013.11	Jingning county/see fair to leaf village road reconstruction project bid II project department	China railway 10 bureau group second engineering co., LTD	laminated rubber bearing、 pot rubber bearing	224
2013.11	Zhangzhou new jiangdong bridge national highway 324 and highway engineering	In a public office of xiamen engineering co., LTD	Spherical bearing、 laminated rubber bearing	312
2013.11	Han river mouth beach avenue bridge	Xuzhou city highway engineering corporation	laminated rubber bearing	980
2013.1	Xiasha exchange to jiangdong bridge in highway engineering	Hangzhou traffic engineering group co., LTD	pot rubber bearing	1154
2013.1	Dayue highway contract section 7	Shandong province highway bridge construction co., LTD	laminated rubber bearing、 pot rubber bearing	954
2013.1	Taizhou city ring road project 2 overpass	Zhejiang zhongnan construction group co., LTD	pot rubber bearing、GYZ	539

Bridge bearing engineering project				
Date	The project name	Name of the entity	specifications	Quantity (set)
2013.1	Dong jing road construction project a standard	Pudong new area of Shanghai construction group co., LTD	laminated rubber bearing、pot rubber bearing	1748
2013.1	Zhejiang shengshan mountain to land port LJ - 5 standard	In the first highway engineering co., LTD	laminated rubber bearing、pot rubber bearing	1066
2013.1	Xicheng canal waterway regulation engineering bridge project	Nanjing run sheng construction group co., LTD	laminated rubber bearing、pot rubber bearing	1672
2013.09	Genetic S303 line to wood base bid highway QM - 1	China railway 21 game group co., LTD	laminated rubber bearing	418
2013.08	Chongqing unitary along the second division at a high speed	In a public office of xiamen engineering co., LTD	laminated rubber bearing、pot rubber bearing	556
2013.08	Chongqing unitary along the third division at a high speed	Hand in a public office in the first engineering co., LTD	laminated rubber bearing、pot rubber bearing	566
2013.08	Kunshan Yang ling pond QL1 standard items	TieSiJu group second engineering co., LTD	laminated rubber bearing、pot rubber bearing	1730
2013.08	Suzhou industrial park, the southern section of ZongEr Road	Hand in a public office in the second engineering co., LTD	laminated rubber bearing	914
2013.08	Long Pu third contract section at a high speed	China railway 10 bureau group second engineering co., LTD	pot rubber bearing	567
2013.08	228 provincial highway Su Yu zhang round high-speed highway reconstruction project in southern north central expressway engineering (including suzhou west HuanBei delay line segment) bridge bearing purchasing project XCLQ - standard XCLQ ZZCG - 1-3 blocks Suzhou traffic engineering group co., LTD	Wuxi luqiao group co., LTD Huayuan construction group co.,LTD Suzhou traffic engineering group co.,LTD Jiangsu province traffic engineering group co., LTD	laminated rubber bearing,pot rubber bearing,isolation bearing	3359
2013.08	Gezhoubu a company in suzhou wuzhong section of central expressway	Gezhoubu group first engineering co., LTD	laminated rubber bearing、pot rubber bearing	8332
2013.07	Wujiang S258 - A2 project	Wu jiang Ming Hong Kong road and bridge engineering co., LTD	laminated rubber bearing、pot rubber bearing	2400
2013.07	Kunshan S224 - S1 standard	Suzhou traffic engineering group co., LTD	laminated rubber bearing、pot rubber bearing	839
2013.07	Mound to build highway subgrade engineering	Wuxi city traffic engineering co., LTD	laminated rubber bearing、pot rubber bearing	1896
2013.07	Chongqing unitary along the highway division	In a public office	laminated rubber bearing、pot rubber bearing	1199
2013.07	Suzhou Ma Jian a standard road	China railway 10 bureau co., LTD	laminated rubber bearing	2280
2013.06	Su Zhentao highway south new construction of wujiang S258 - A2	Wu jiang Ming Hong Kong road and bridge engineering co., LTD	laminated rubber bearing、pot rubber bearing	2400
2013.06	Bao han HC - 02 contract period	In the first highway engineering co., LTD	laminated rubber bearing	2760

Bridge bearing engineering project				
Date	The project name	Name of the entity	specifications	Quantity (set)
2013.06	Kunshan middle ring	Shanghai construction ErJian group co., LTD	pot rubber bearing	426
2013.05	Kunshan city , central, west the rapidness project	Shanghai construction machinery co., LTD	pot rubber bearing	198
2013.05	Bypass line a suzhou section of 312 state highway 01 blocks	Jiangsu hong tong bridge group co., LTD	pot rubber bearing	230
2013.05	Suzhou section of national highway 312 bypass line a standard 02 blocks	Suzhou ErJian construction group co., LTD	laminated rubber bearing、pot rubber bearing	1520
2013.05	Bypass line a suzhou section of 312 state highway 03 blocks	Suzhou traffic engineering group co., LTD	laminated rubber bearing、pot rubber bearing	616
2013.05	Suzhou section of national highway 312 bypass line 2 standard 4 blocks	Huayuan construction group co., LTD	laminated rubber bearing、pot rubber bearing	1158
2013.05	Suzhou section of national highway 312 bypass line 2 6 blocks	Suzhou traffic engineering group co., LTD	laminated rubber bearing、pot rubber bearing	958
2013.05	Suzhou section of national highway 312 bypass line 2 7 blocks	Wuxi luqiao group co., LTD	laminated rubber bearing、pot rubber bearing	2471
2013.05	Bad expressway in suzhou high-tech zone 5 standard (xitang river road, 312 national highway )	China railway 24 group co., LTD	laminated rubber bearing、pot rubber bearing	480
2013.05	Suzhou industrial park, among other street site	In the second and the third engineering bureau co., LTD	laminated rubber bearing、pot rubber bearing	408
2013.04	Suzhou industrial park central six standard	Jiangsu province traffic engineering group co., LTD	pot rubber bearing	874
2013.04	Suzhou central 4 standard	Suzhou traffic engineering group co., LTD	pot rubber bearing	213
2013.04	Gansu lanzhou to yong jing comes up out of contract section 6 level highway	Hand in a public office in the tunnels engineering co., LTD	laminated rubber bearing	3061
2013.04	Gansu lanzhou to yong jing comes up out of first class highway contract section 9	Hand in a public office in the fifth engineering co., LTD	laminated rubber bearing	4088
2013.04	East ring south issue 2 standard	Jiangsu province traffic engineering group co., LTD	Spherical bearing、laminated rubber bearing	303
2013.02	Liaoning huludao lite high speed	In the first highway engineering co., LTD	laminated rubber bearing、pot rubber bearing	17853
2013.01	Suzhou central three standard	China railway 20th bureau group company	laminated rubber bearing、pot rubber bearing	466
2013.01	Suzhou south central	China railway 20th bureau group company	pot rubber bearing	935

Bridge bearing engineering project				
Date	The project name	Name of the entity	specifications	Quantity (set)
2013.01	Suzhou central standard	China railway 20th bureau group company	Spherical bearing、laminated rubber bearing、pot rubber bearing	983
3013.01	Jiangyin avenue JY - D standard	Suzhou traffic engineering group co., LTD	laminated rubber bearing、pot rubber bearing	216
2013.01	Jiangyin furong avenue new system canal bridge	Wuxi big sincerity construction co., LTD	laminated rubber bearing、pot rubber bearing	3728
2012.1	Wenzhou yongjia county oubei town bridge	Hand in a public office in the second engineering co., LTD	Spherical bearing、laminated rubber bearing	320
2012.1	Chongqing three-ring yongchuan to metro section on the highway	In a public office of xiamen engineering co., LTD	laminated rubber bearing	490
2012.1	Southern jiangsu kunshan kam fai road	Suzhou traffic engineering group co., LTD	laminated rubber bearing	3432
2012.11	Chongqing manley wanda high speed	In a public office in the wanda project headquarters	laminated rubber bearing、pot rubber bearing	2330
2012.09	Jiangsu baoying fei water canal bridge	Shandong LuQiao construction	laminated rubber bearing、pot rubber bearing	333
2012.09	Fold the ZD2 contract period of liujiaxia bridge of highway	In the first highway engineering co., LTD	Spherical bearing	347
2012.09	Fold the ZD2 contract period of liujiaxia bridge of highway	The jintan city hing road & bridge engineering co., LTD	laminated rubber bearing、pot rubber bearing	482
2012.08	National highway 329 zhoushan putuo GouShan to less than the cable project	Grew up in guangdong province highway engineering co., LTD	Spherical bearing、laminated rubber bearing	492
2012.07	Ancient high-speed YGHGSLJ contract section	Sichuan Wu Tong local road and bridge engineering	laminated rubber bearing、pot rubber bearing	358
2012.06	Gansu force can 17 standard items at a high speed	In the first highway engineering co., LTD	laminated rubber bearing	1577
2012.06	Jiangsu taicang port dredging port TC - A3 label at a high speed	Wuxi city traffic engineering co., LTD	laminated rubber bearing、pot rubber bearing	493
2012.05	Jiangsu dongtai	Wuxi city traffic engineering co., LTD	laminated rubber bearing、pot rubber bearing	2228
2012.05	Beijing new high-speed JiNing to shout river haot civil two the three divisions	In the first highway engineering co., LTD	Spherical bearing、laminated rubber bearing	2437
2012.05	Beijing new high-speed JiNing to shout river haot civil second marking a division	In the first highway engineering co., LTD	Spherical bearing、laminated rubber bearing	1514
2012.02	Zhejiang huzhou "to neighboring ShenJiaHu cable 5 standard	products group co., LTD	laminated rubber bearing、pot rubber bearing	1856
2012.02	Hunan inflammation you 27 standard at a high speed	Zhejiang tetragonal transportation construction co., LTD	laminated rubber bearing、pot rubber bearing	265
2012.01	Jiangsu lianyungang coastal highway GanYu LHGY - LQ1 standard	Xuzhou city highway engineering corporation	laminated rubber bearing	1057

Isolation bearing engineering project				
Date	The project name	Name of the entity	specifications	Quantity (set)
2015.8	No.3 Middle School of Danyang	No.3 Middle School of Danyang	LRB500、RB500	57
2015.8	Overpass of ZhongShan road in Pizhou	Headquarters of Overpass of ZhongShan road in Pizhou	Y4Q、J4Q、GPZ(KZ)	334
2015.8	Xian-Xianyang river grand bridge	CCCC	GJZF4、HDR	540
2015.6	Second contract section of Weiwu test	CCCC	HDR、GYZF4	488
2015.1	Nantong renmin road east extension phase ii	Nantong port brake municipal engineering co., LTD	high-damping rubber isolator、laminated rubber bearing	700
2014.11	Zhenjiang middle school	Jiangsu accer technology co., LTD	lead rubber bearing	48
2014.6	Huhehaote city	Hand in a public office in the sixth engineering co., LTD	high-damping rubber isolator	1902
2014.6	LanYong level highway contract section 9	In a public bureau five companies	high-damping rubber isolator	308
2014.3	Kunming (Chen Guying) in the northwest of affordable housing related elementary school	Jiangyin haida rubber and plastic co., LTD	lead rubber bearing、high-damping rubber isolator	143
2013.08	228 provincial highway Su Yu zhang round high-speed highway reconstruction project in southern north central expressway engineering (including suzhou west HuanBei delay line segment) bridge bearing purchasing project XCLQ - standard XCLQ ZZCG - 1-3 blocks	Suzhou traffic engineering group co., LTD	high-damping rubber isolator	68
2013.06	Liuhe district, nanjing city horse town another primary school	Jiangsu accer technology co., LTD	lead rubber bearing	40
2013.06	Liuhe district, nanjing city bamboo Zhen Town wushi hope primary school	Jiangsu accer technology co., LTD	lead rubber bearing	136
2013.06	Taiyuan city west central section	In the first highway engineering co., LTD	lead rubber bearing	43
			lead rubber bearing	21
			lead rubber bearing	70
			lead rubber bearing	21
			lead rubber bearing	42
			lead rubber bearing	25
			lead rubber bearing	86
2013.01	Shanghai port of two roads	Two port of Shanghai municipal corporation	lead rubber bearing	120

Isolation bearing engineering project				
Date	The project name	Name of the entity	specifications	Quantity (set)
2013.03	Shanghai port of two roads	Shanghai pudong road and bridge construction co., LTD	lead rubber bearing	132
2013.04	Shanghai port of two roads	Based in Shanghai company	lead rubber bearing	126
2012.11	No. 3 middle school in changzhou city , jiangsu province	Jiangsu accer technology co., LTD	lead rubber bearing	32
2012.1	Xuzhou city jia wang area green mountain spring western union elementary school	Jiangsu accer technology co., LTD	lead rubber bearing	183
2012.1	Xuzhou city rao jia wang area middle school	Jiangsu accer technology co., LTD	lead rubber bearing	101
2012.06	Jiangsu tongzhou city experimental primary school	Jiangsu accer technology co., LTD	lead rubber bearing	64
2012.06	Jiangsu tongzhou city senior high school	Jiangsu accer technology co., LTD	lead rubber bearing	138
2012.06	Changzhou city , jiangsu province qin secondary school	Jiangsu accer technology co., LTD	lead rubber bearing	65
2012.08	Jiangsu nanjing valley high school	Jiangsu accer technology co., LTD	lead rubber bearing	166
2011.01	Yunnan Iijiang airport highway phase ii	Yunnan Iijiang airport highway construction headquarters	lead rubber bearing	250
2010.01	Shiy an - tianshui high-speed shaanxi hanzhong western boundary	Xi 'an meng xing company	lead rubber bearing	105
2010.01	Shiy an - tianshui high-speed shaanxi hanzhong western boundary	China railway 15 bureau five companies	lead rubber bearing	88
2010.01	Shiy an - tianshui high-speed shaanxi hanzhong western boundary	China railway 17 bureau of four companies	lead rubber bearing	90
2010.01	Shiy an - tianshui high-speed shaanxi hanzhong western boundary	Medium five companies	lead rubber bearing	88

Bridge expansion joint engineering project				
Date	The project name	Name of the entity	specifications	Quantity (set)
2015.4	Suzhou wuzhong district south ring fast Lucy delay phase ii	China railway in a company	WBZ-80、WBZ-160、GQF-C-80	2246.5
2015.3	Suzhou high-tech zone central expressway project period of four standard (xitang river ~ 312 national highway )	Suzhou xu hong construction engineering co., LTD	WBZ-80、WBZ-120、WBZ-160	200
2015.2	Suzhou central expressway (wuzhong section) western route	Gezhouba first engineering co., LTD	D40、D80、D120、160、WBZ-80、GQZ-C-80、FM60、FM80、FM100、	1500
2014.10.	228 provincial highway Su Yu zhang round high-speed highway reconstruction project in southern north central expressway engineering (including suzhou west HuanBei delay line segment) bridge expansion joint procurement project XCLQ - standard XCLQ ZZCG - 1-4 blocks	Wuxi luqiao group co., LTD Suzhou traffic engineering group co.,LTD Jiangsu province traffic engineering group co.,LTD Hong Kong construction group co.,LTD	F30、F40、F60、F80、D80、D120、D160	3098
2014.10.	Suzhou section of national highway 312 by pass line 2 standard 09 blocks	China railway shisiju group co., LTD	GQF-C40、D60、E-60	317.5
2014.10.	Suzhou section of national highway 312 by pass line 2 standard 7 blocks	Wuxi luqiao group co., LTD	GQF-C40、D60、D80、D120、D160、F-60	986.5
2014.10.	Suzhou section of national highway 312 by pass line 2 standard 6 blocks	Suzhou traffic engineering group co., LTD	GQF-C40、D60、D80、D120、D160	731.6
2014.10.	Suzhou section of national highway 312 by pass line 2 standard 5 blocks	Yifeng construction group co., LTD	D120、D160	296.1
2014.10.	Suzhou section of national highway 312 by pass line 2 standard 4 blocks	Zhonggang construction group co., LTD	GQF-C40、D60、D80、D120、D160	990.1

Bridge expansion joint engineering project				
Date	The project name	Name of the entity	specifications	Quantity (set)
2014.9	Suzhou central expressway (wuzhong section) the eastern front	Gezhouba first engineering co., LTD	D60、D80、D120	640
2014.7	Suzhou expressway, central park ZHNX - 5 standard	Suzhou traffic engineering group co., LTD	WBZ-80、WBZ160、GQF-C-80	395.24
2014.7	Shanghai pudong jinqiao town middle ring 3 standard	Shanghai pudong road and bridge construction co., LTD	D120、D160	601.66
2014.6	Shanghai port of two highway 3 standard	Shanghai feng tai rubber products co., LTD	D80、D160	285.32
2014.4	Suzhou industrial park LouJiang expressway	China railway DaQiaoJu	WBZ-160	25
2014.4	Shanghai port of two highways 7/9 scale	Shanghai feng tai rubber products co., LTD	D80、D160	435.33
2014.3	Dongchuan road east jing road (east road -) new construction 1 mark	Pudong new area of Shanghai construction (group) co., LTD	The type 80、The type 240	185
2014.3	Suzhou industrial park, 4 standard seika street site	In the second and the third engineering bureau co., LTD	GQF-C80、WBZ-80、WBZ-160	625.8
2014.2	Suzhou industrial park central six standard	Jiangsu province traffic engineering group co., LTD	The type 80、The type 120	450
2014.2	Changshu sanhuan rapidness reconstruction project construction project BT - S7	Jiangsu gang tong bridge group co., LTD	D-60、D-80、D-100、D-120、D-160	843
2014.1	Mudu professional building, rebuilding of the river road engineering	Suzhou municipal branch ErJian construction group co., LTD	WBZ-80、WBZ-160	216.96
2013.11	The maintenance engineering of the national highway 329 zhoushan zhujiajian pointed	Grew up in guangdong province highway engineering co., LTD	GQF-F80、D160	398.5
2013.11	The yong freeway extension project in wenzhou second contract section	In the first highway engineering co., LTD	GQF-MZL160、GQF-MZL240、GQF-MZL320	124
2013.9	Huzhou shen su zhe wan to neighboring ShenJiaHu highway connecting the fourth contract segment	In the second shipping board of exchange co., LTD	GQF-F80、480、120	277
2013.09	Shenzhen same highway bridge maintenance	Wuhan second route bridge special engineering co., LTD	FM-80、strip	115.5
2013.09	Husha highway of Inner Mongolia	An tong construction co., LTD	D-80、D-160、CQF-FE40、CQF-FE60、CQF-FE80	931.92

Bridge expansion joint engineering project				
Date	The project name	Name of the entity	specifications	Quantity (set)
2013.07	Suqian Huancheng west professional engineering S2 section	Shandong luqiao group co., LTD. At a high speed	D80、D160、D320	379.8
2013.06	East loop of kunshan	Shanghai construction ErJian group co., LTD	D40、D80、D120、160	599
2013.6	Hangzhou east station extension project	Zhejiang province construction group co., LTD	Comb type 200	141.12
2013.06	In a public bureau of Beijing new high-speed collection called civil second marking a division	Hand in a male bureau of Beijing xinji shout	CQF-FE40、CQF-FE80、D160	1740
2013.06	Suzhou industrial park of central expressway bridge 1 level	Make three shipping board co., LTD	WBZ-80、WBZ-160	236.17
2013.05	Wenzhou oujiang nankou bridge	CCCC second highway engineering co., LTD	D-80、D-160、GQF-MZL160(NR)、GQF-MZL240(NR)、GQF-MZL320(NR)	662.73
2013.05	The nanjing south railway station integrated hub	Zhongjian eight innings infrastructure construction co., LTD	D80、D160、D240	253
2013.04	Rugao project	Jiangsu xincheng traffic engineering co., LTD	80 type 160 type	66
2013.02	Huludao jianxing highway	CCCC first engineering co., LTD	D80、D160	3889
2013.01	Suzhou central 1 section	China railway 20th bureau group company	WBZ-80、WBZ-160、GQF-C-80	784.74
2012.08	Shenyang hunhe bridge	China railway DaQiaoJu group second engineering co., LTD	D120、D160、RBKF320	240
2012.07	Zhejiang Xiao shandong entry overhead road	Zhejiang zhongnan construction group	PGF-160、SQ-IV40	231.2
2012.06	Hangzhou east station	Zhejiang construction group	CKF-L-40、CKF-L-50、	583
2012.04	Projects of 122 provincial road nanjing segments S122NJ - QL2 blocks	Zhongjian eight innings infrastructure construction co., LTD	RBF80、RBKF120、D80、D120	812.2
2012.04	The nanjing south railway station, airport expressway bridge engineering NZ - JCGS - B1 standard	Zhongjian eight innings infrastructure construction co., LTD	D80、D160、D240	222
2012.04	Phoenix a bridge project in guangzhou	CCCC second highway engineering co., LTD	D80、D160、D240	503.9

Bridge expansion joint engineering project				
Date	The project name	Name of the entity	specifications	Quantity (set)
2012.03	G6 call package highway reconstruction project HBTJ - 04	Hand in a public office in the tunnels engineering co., LTD	D40、D60、D80、D160	1627.35
2012.03	Lock the dragon temple in yunnan to the Mongolian high speed	Lock in yunnan highway co., LTD	D80、FD-80、QMSF-160	2580
2011.08	Shiyan - tianshui high-speed shaanxi border AD - M02 standard	China's transportation The second highway engineering co., LTD	D40、D80、160	2200
2011.06	Kunming line a standard sedan chair snow mountain	China railway 16th bureau group	PGF-60、PGF-80、PGF-160	1752.5
2011.06	Kunming line three standard sedan chair snow mountain	In the second shipping board of pay	PGF-80、PGF-160、PGF-320	2036
2011.06	Kunming line 2 standard sedan chair snow mountain	Yunnan road & bridge co., LTD	PGF-80、PGF-160	1060.44
2011.04	Nanjing slab bridge	China railway three innings	GAF-C-120、GQF-C-100	115
2011.04	Suzhou shanghai-nanjing high-speed HNL1 park line standard	Suzhou traffic engineering group	WBZ-80、D-160、GQF-C-80	253
2011.04	Shanxi pingy ang highway	Shanxi pingy ang highway construction management	C30、D60、D80、D160	1977.52
2011.02	Jiangyin around occurrence	Shandong luqiao group co., LTD	D80、D160	185
2011.02	Changzhou blue ocean bridge	Suzhou chuang xin municipal engineering co., LTD	D80、D160	130
2010.07	Yunnan lijiang airport highway	Yunnan lijiang airport highway construction headquarters	CD-60、FD-80	1200
2010.04	Xuzhou city , jiangsu province highway engineering corporation SSF - 1 mark	Xuzhou city highway engineering corporation	D80、D160、D240	269
2010.03	Kunshan, jiangsu dongcheng road D2	Kunshan city traffic on shipping engineering co., LTD	D80、D160	400
2009.12	Kuytun xinjiang karamay - g high speed	China railway group ten game first engineering co., LTD	D80、D160	1200
2009.12	Jiang Su jixu highway JX - FX3 standard	Nanjing traffic engineering co., LTD	D80	100
2009.11	Ningbo southeast zhejiang province	Hongrun construction group co., LTD	STF-80、STF-120、STF-160	1020
2009.11	Shanghai hongqiao transportation hub	Shanghai jinhua construction engineering co., LTD	HDSF-120、GQF-C-80	1200
2009.11	Wuhan days chau Yangtze river bridge	CCCC second on shipping engineering co., LTD	SCF-80、SCF-120	950
2009.06	The kunming the expansion project	Kunming urban construction investment and development co., LTD	PGF-80、PGF-120、PGF-160	2235
2008.08	Hunan zhuzhou xiangjiang river bridge	Iron a courtyard in zhuzhou	SFP-400、GQF-C-80	160

## Suzhou Central Expressway project



Suzhou Central Expressway project started in January 31, 2012, with a total length of 114.5 km, total investment of US\$ 6 billions, 38 interchanges in the whole line, opened to traffic in July 16, 2015. So far it is the largest investment in Suzhou municipal road engineering. Nearly US\$ 33 millions values of bridge bearings and expansion joints were provided and installed by Haider.

## Kunshan Central Expressway project



Kunshan Central Expressway project, with total length of 44 km, is the first country-level city who open circle overpass in our country, GPZ 2009 pot bearings were provided by Haider in the whole way.

## Taiyuan Central Expressway



Taiyuan Central Expressway, J4Q lead core isolation bearings and HDR high damping isolation bearings were adopted in the whole line, the maximum size of 1420\*1420mm.

## Huhehaote south circle expressway



Huhehaote south circle expressway, HDR high damping seismic isolator was adopted in the whole line.

## South of Xining belt expressway



South of Xining belt expressway, JPZ pot bearings were provided by Haider in the whole line.

## Shanghai two port highway



Shanghai two port highway, in the whole line, hyperbolic surface spherical seismic isolation bearings were provided by Haider.



海 纳 百 川 博 聚 美 德

All kinds of streams follow to the sea; All kinds of virtues get together

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