

## Construction Technology of Large-scale Laminated Rubber Isolated Bearing and Isolated Elastic sliding Bearing

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**Abstract.** The isolation system has made great progress in China. The installation of the isolation bearing is gradually mature. However, due to the design requirements, there is no case of large-scale isolation bearing construction in China. A terminal building in the history of China's isolation bearing for the first time on the diameter of 1.5 meters LNR1500 lead-free laminated rubber isolation bearing and model ESB1500 isolation elastic sliding bearing construction and installation. Through the system introduction of a terminal building two types of isolation bearing installation process for the future construction of isolated buildings to provide reference and experience, the best is to read these instructions and follow the outline of this text.

### Introduction

Since the beginning of the 20th century, 60 years ago, after a few decades, in the world has been widely developed and applied, compared to the traditional seismic technology, isolation technology mainly through the isolation of energy-saving parts to protect the main body Structure and internal equipment from damage, by setting the isolation bearing and damping components to isolate and consume some of the energy generated by the earthquake. The seismic engineering community summarizes and recovers the seismic safety of the building structure by investigating the earthquake damage of a large number of buildings, and points out the advantages and disadvantages of the traditional structure seismic technology and the existing problems. On the basis of breaking through the traditional technical route, the concept of structural damping control is put forward, which opens up a new way to solve the seismic problem of the project and the development is the building seismic fortification strategy of a major change and leap [1]. The basic principle of the isolation technology is to set up a safe enough isolation system between the superstructure of the building and the foundation so that the energy generated by the earthquake cannot be transmitted to the upper part of the structure, thus "isolating" the earthquake and greatly reducing the earthquake The destruction of the seismic technology. The essential effect of isolation is to separate the structure and / or components from seismic ground motion or bearing movement that may cause damage. This separation or decoupling is achieved by increasing the flexibility of the system and providing appropriate damping [2]. Isolation system is mainly composed of isolation bearings and dampers, Currently the most widely used Is the laminated rubber isolation bearing, friction sliding isolation bearing in the project also has a certain application.

An airport terminal with laminated rubber isolation bearing and seismic elastic sliding bearing combination system, on the one hand to play a laminated rubber isolation bearing and seismic elastic skid support "isolation" earthquake advantage, and the other On the one hand to overcome the isolation elastic skateboard support in the earthquake will produce a large displacement of the shortcomings, and through the dampers for damping energy consumption. Formed a very good performance of the isolation system.

### Installation process of isolation bearing

Isolation of the bearing before and after the installation of different processes, mainly divided into the following several processes. Fig.1 and Fig.2, respectively, is a laminated rubber isolation bearing and

isolation sliding elastic slide bearing design and installation plans Isolated bearing, as shown in Fig.1 and Fig.2, installed in the upper part of the pier, the first column to be reinforced barbed, column net banding is completed, through the sleeve and bolt installation positioning embedded plate welding. Positioning the embedded version of the thickness of 10mm, positioning embedded version of the reserved 20mm under the secondary grouting thickness. The elevation of the column is  $H$ , and the design elevation of the positioning board is  $H + 30\text{mm}$ . The bolts and sleeves tightened to prevent pouring concrete when the mortar into the bolt hole, to avoid the late bearing can not be successfully installed. And check the sleeve after installation and positioning of the embedded plate perpendicular to the joints to prevent the gap.

Followed by the installation of the column template, mold is completed, to have been installed on the template to review the measurement. Check the height of the column with the deviation of the position and design elevation and coordinates. If the deviation exceeds the stipulation, the template should be calibrated in time and re-measured. If the deviation is within the specified range, start the first pouring of concrete. After the concrete is solidified, the stencil is removed and the concrete is cured. When the concrete is maintained for a period of time, the upper part of the stigma is cleaned.

Then the positioning of the embedded version of the removed, and the concrete cut, ticking thickness to achieve the positioning of the embedded version of the design elevation of 20mm or less. After the completion of the re-installed to re-install positioning embedded board. And began to carry out secondary grouting. The purpose of secondary grouting is to enhance the strength of the pier and improve the carrying capacity of the pier. Secondary grouting is completed, when the concrete reaches the corresponding strength, the top of the pier is polished. So that the top of the column, for the isolation bearing to provide conditions for lifting..

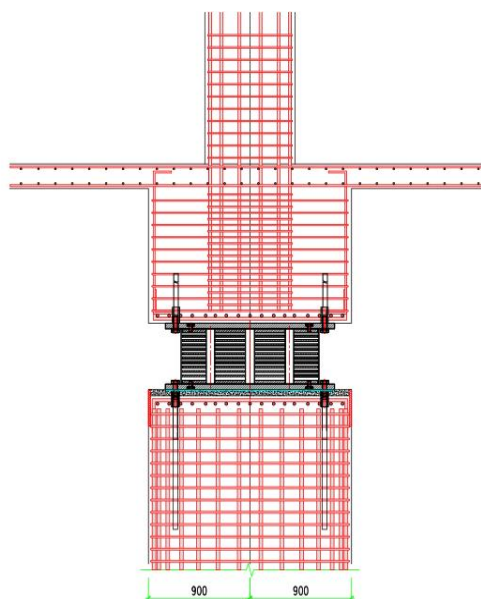


Fig. 1 Schematic design of laminated rubber bearing

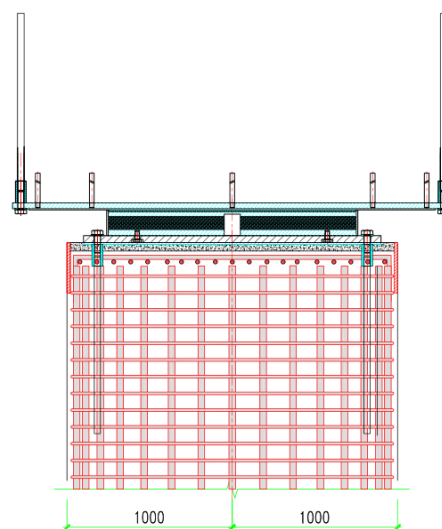


Fig. 2 Design of elastic slide bearing

Finally, the lifting of the bearing, lifting is completed, the upper flange plate connecting anchor, for the late so that the bearing and the upper structure of steel connected. Lay the oil felt and cover the inside of the flange plate. To prevent the late construction of mortar into the bolt hole, so that the seat can not be demolished, to the maintenance of the bearing difficult. Construction of simple flow process is as follows: support bar barbed bar → installation of embedded positioning → installation template → review → the first grouting → take the plate clean pulp chisel → re-installation positioning buried board → secondary grouting → grinding stigma → hoisting bearing Install the upper anchor bar → lay the oil felt.

## Lifting technology of isolation bearing

**Laminated rubber isolation bearing lifting** The first step is to prepare the work before lifting, to check the flatness of the stigma, from all directions evenly hit the positioning embedded version, check the positioning of the buried board below the density is flat, through the sound of different judgments whether there is a hollow area. After the inspection is completed, fix the bolts in the embedded plate sleeve and prevent the bolt holes from falling into foreign matter.

The second step to lift. The crane lifts the bearing from the place where the seismic support is stored and transported to the coordinate position where the support is to be installed. Through the signal workers command tower crane, adjust the position of the tower crane arm, so that the isolation bearing in the support to install the support above the support, and the bottom of the bearing from the stigma about a centimeter. Install the workers by shaking the suspension of the bearing, a small degree of adjustment of the location of the isolation bearing, so that the lower flange of the bearing plate and the pier positioning of the embedded plate on the bolt hole relative, and then quickly screw into the bolt Seat position is fixed.

The final signal workers command tower crane, the tower crane driver will completely drop the tower crane arm, the installation workers then unlock the lifting ring, so that the tower crane and isolation bearing separation, and with a wrench to each flange on the flange bolts, so that the isolation bearing Completely fixed on the support pier. And according to "laminated rubber bearing isolation technical regulations" CECS126:2001 requirements, the construction phase of the project, the monitoring unit should be isolated rubber bearing deformation of the vertical observation and record [3]. Has been lifted to complete the laminated rubber isolation bearing is shown in Fig.3



Fig. 3 Installation of Laminated Rubber Isolated Bearing

**Isolated elastic sliding bearing lifting** The lifting of the elastic skid support is divided into two parts, first lifting the elastic skid plate bearing body, and then lifting the upper part of the bearing body friction mirror panel. Lifting the elastic skid plate support body with the lifting of the same laminated rubber isolation bearing method. After the support body is lifted, install the gasket and the connecting plate in the corresponding bolt hole of the flange plate under the bearing body. Wherein the function of the connecting plate is to make the upper mirror plate in the lifting process to find a symmetrical position, the upper part of the friction mirror panel with a corresponding bolt hole, and the connecting plate connected by bolts. Table 1 specifies the allowable deviation of the bolt hole position of the connection plate in the specification [4]:

Connection plate diameter (or side length) (mm)	Allow deviation (mm)
$400 < D_d (S_d, \text{ or } L_t) \leq 1000$	$\pm 0.8$
$1000 < D_d (S_d, \text{ or } L_t) \leq 2000$	$\pm 1.2$
$D_d (S_d, \text{ or } L_t) > 2000$	$\pm 2.0$

Table. 1 Bolt hole for connection plate

Before lifting the mirror panel, the upper part of the body of the PTFE body friction surface wipe clean, is strictly prohibited on the tribal debris, lifting mirror panel requirements through the command tower crane and manual adjustment to find the mirror plate and the corresponding plate bolt hole position, Then after connecting bolts, lifting tower crane arm, fixing bolts. The entire hoisting process is completed. Has been lifted to complete the Isolated elastic sliding bearing in Fig.4.



Fig.4 Elastic slide bearing installation

## Conclusions

Large-scale isolation bearing installation process compared with the past, the diameter of 1.5m isolation bearing construction and installation; column grouting using secondary grouting process to improve the load capacity of the pier; the tower crane cannot be hoisting area can be used gantry crane The installation of the ESB600 and ESB1500 sliding bearing using the connection plate to find the mirror plate method, to solve the construction of the bearing component of the symmetry of the structure of the bearing Requirements, to meet the accuracy of the construction of the superstructure and the overall structure of the stability. Through the application of laminated rubber isolation bearing and rubber slide bearing in parallel, and set up a large damper, the structure of the isolation system greatly enhance the terminal's own seismic capacity. So that China's isolation technology and construction and installation technology has been greatly developed.

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