

Zeitschrift: IABSE congress report = Rapport du congrès AIPC = IVBH
Kongressbericht

Band: 12 (1984)

Artikel: Installation for runnability on long span bridge

Autor: Takayama, Akira / Tsuruta, Hiroaki / Goto, Mitsuru

DOI: <https://doi.org/10.5169/seals-12288>

Nutzungsbedingungen

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

Conditions d'utilisation

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

Terms of use

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

Download PDF: 10.08.2025

ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>

Installation for Runnability on Long Span Bridge

Akira TAKAYAMA, Hiroaki TSURUTA
 Mitsuru GOTO, Eiji KATAYAMA
 Honshu-Shikoku Bridge Authority
 Tokyo, Japan

Runnability of Train on Transit Girder System.

For development of transit girder system, runnability of train had been studied as mentioned below.

Runnability of trains at the transit girder system can be separately checked for sections of the expansion joint and the dispersion system for angular bend.

At the expansion joint, the structure is designed so that rail tracks may continue to secure a proper gauge line and wheelset load can be structurely supported.

Rail of the inserted girder type expansion joint is cut out partially to keep space for expansion, and the guardrails are arranged to prevent derailment.

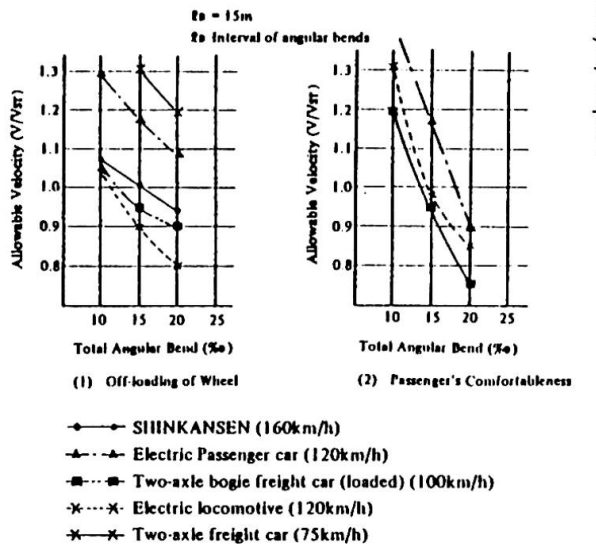
For the runnability on the expansion joint, running tests by actual cars were conducted in 1974 to certify safety of trains with speed up to 180 km/hr.

The runnability on the angular bend section is extremely influenced by a vertical and horizontal angular bend. The safety against derailment when a train run on the transit girder with vertical, horizontal angular bend or composite angular bend of the both and passenger's comfortableness for vertical and horizontal vibration had to be investigated.

The investigations for derailment and comfortableness were carried out for criteria of the rate of off-loading of wheels and the lateral pressure and magnitude of the vibration, respectively, and they were numerically analyzed or simulated for various types of cars.

And, important items among them were confirmed by running tests of actual cars and model cars, and results of the running tests and the calculation were compared. As the result of these investigations, relation between the running speed and the limit of angular bend is established as shown in right figure.

For example, when the total angular bend is 10‰ and span of the dispersion girder is 15m, these figures show that allowable velocity (V/V_{sr}) of Shinkansen is 1.07 for the rate of off-loading of wheels, in other words, Shinkansen car can run with 1.07 times speed of standard running speed. As for an electric locomotive, it can run with 1.04 times speed of 120 km/hr.



Allowable velocity V/V_{sr} above is defined as the ratio of investigated result to standard running speed

Fig.
 Allowable speed of various types of cars

INSTALLATION FOR RUNNABILITY ON LONG-SPAN BRIDGE

In Kojima-Sakaide Route of Honshu-Shikoku Bridge Project, suspension bridges and cable stayed bridges which have high flexibility are being constructed for highway and railroad with high speed trains.

At the end of these bridges, large amount of expansion/contraction and angular bend occur.

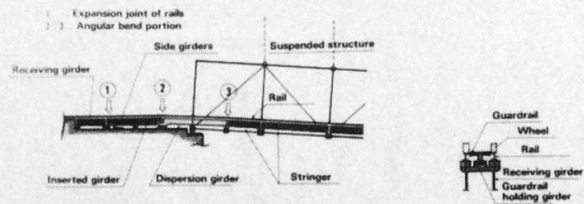
In order to let the high speed train run safely on these deformation, transit girder system has been developed.

Two types of expansion joint are developed.

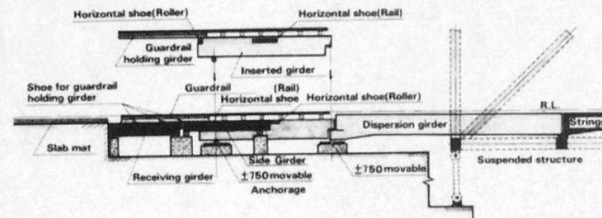
One is called the inserted girder type for expansion (including effect of earthquake) up to ± 750 mm of suspension bridges.

And, another is called the moving sleeper type for expansion up to ± 400 mm of cable stayed bridges.

Typical transit girder system of inserted girder system



General view of inserted girder type transit girder system



Plane Figure

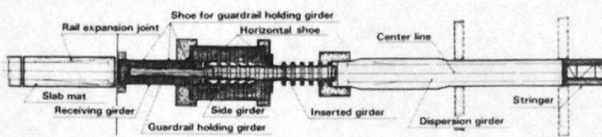
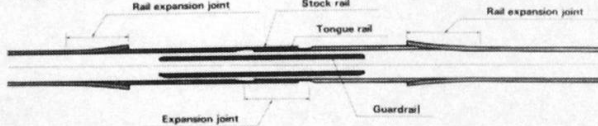
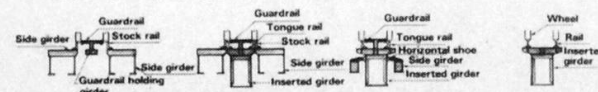


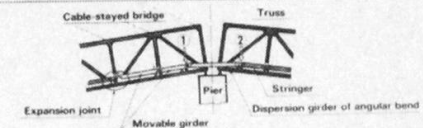
Figure of rail



Wheel passing on expansion joint

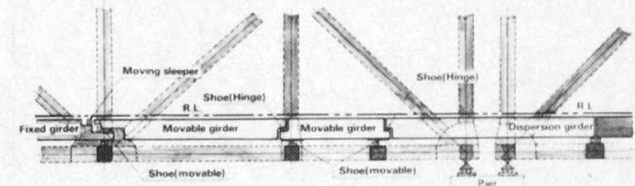


Typical transit girder system of moving sleeper type

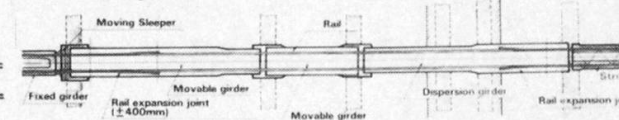


F: Fixed shoe
M: Movable shoe
1, 2: Angular bend portion

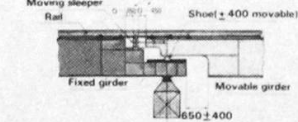
General view of moving sleeper type transit girder system



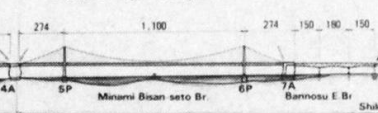
Plane Figure



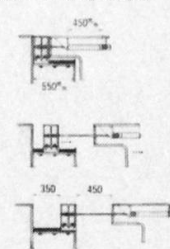
Interval for expansion



Detail of expansion joint



Behavior of moving sleeper



Bridges of Kojima-Sakaide route

setting portion
▲ Inserted girder type
■ Moving sleeper type