



## Dynamic behaviour of modular expansion joints

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## Summary

This paper describes the over rolling tests with the Kalibra lorry carried out at a Maurer modular swivel joint expansion joint situated at the Bridge near Ewijk on motorway A50 over the river Waal in the Netherlands. The dynamic behaviour of the joint was measured and analysed by the EMPA. The objectives of the tests were the vertical and horizontal load transfer: Dynamic amplification factors, upswing after unloading, damping and relation to real traffic. The characteristics were related to the fatigue life of these structures.

**Keywords:** Vertical load, horizontal load, dynamic amplification factor, damping, upswing, fatigue

## 1 Introduction

The single cell steel box Girder Bridge on the A50 near Ewijk over the river Waal has been opened for traffic on 30 June 1976. The total length of the bridge is 1055 m. The bridge consists of a cable-stayed bridge with a main span of 270 m and two adjacent spans of 105 m.

The approach spans on the southern embankment are: From the abutment 75 m and 3 times 90 m; the approach spans on the northern embankment are: From the abutment 60 m and two times 85 m. Fig. 1 shows the cross section of the bridge with the current traffic lane arrangement.

Today, each day about 6000 lorries are travelling over the bridge, both northbound and southbound. The bridge structure is continuous from the northern to the southern abutment. (See Fig. 2)

At the time of design and erection of the bridge, the roller shutter joints were considered the most appropriate solution for the large dilatations at the north and southern abutment. Under the rapidly increasing traffic volume, however, the roller shutter joints needed more and more maintenance, which led to an exchange of these joints in 1997 by swivel joints with a movement capacity of 560 mm (7 seals -DS 560) at the southern abutment and 720 mm (9 seals – DS 720) at the northern abutment. Until now, the swivel joint joints perform properly and show no deficiencies.