

Study on after-slip strength of high-strength bolted frictional joints with a filler plate

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Abstract

According to the new Japanese Specifications for Highway Bridges, after-slip behavior should be verified in high-strength bolted frictional joints. Previous studies have investigated slip behavior with a filler plate. They have proposed the reduction factor of slip resistance. On the other hand, the ultimate strength of such a joint with a filler plate is not clear, and its design strength considering after-slip behavior is not also specified. In this study, for high-strength bolted frictional joints with various filler plate thicknesses, tensile tests and FEA were carried out. From obtained results, it was revealed that a filler plate did not resist load in bearing, and the number of bolt shear failure surfaces was decreased to one from two by a filler plate. It is also found that bolt shear strength decreased below the designed value as filler plate thickness is increased. The authors also proposed the simple design model for bolt shear strength in the frictional joints with a filler plate.

Keywords: filler plate; high-strength bolted frictional joints; after-slip strength; bolt shear strength

1 Introduction

Today, steel bridges are being designed, improving both productivity and constructability. In general, the structural cross-section should be changed at the joint section, not the members' general section. At this joint section, as shown in Figure 1, the filler plate is installed to fill the gap between the connected thin and thick plates.

In 2017, the Japanese Specifications for Highway Bridges was revised and transferred from allowable stress design to limit state design [1]. In high-strength bolted frictional joints, not only slip resistance but also after-slip resistance should be verified, and the high-strength bolted frictional joint

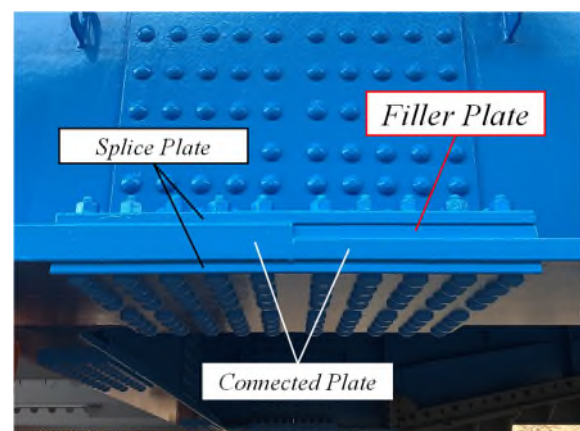


Figure 1. The high-strength bolted frictional joint with a filler plate