Verification of applicability of weathering steel based on long-term exposure tests in Vietnam

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Abstract

Under the appropriate corrosion environment, weathering steel does not require paint, so it has reduced life cycle costs when compared to conventional steel. The applicability of weathering steel has been systematically investigated in countries like Japan and the United States of America. However, in Vietnam, the influence of environmental factors on corrosion behaviour and the applicability of weathering steel has been evaluated by short-term exposure tests. In this study, we performed long-term exposure tests in Vietnam to clarify the time-dependent changes of corrosion behaviour and to verify the applicability of weathering steel. The time-dependent changes of corrosion loss were dependent on the corrosion environment. The corrosion rate greatly increased in areas with high relative humidity. Weathering steel is applicable in various regions in Vietnam, but it should be applied carefully in areas with high relative humidity.

Keywords: Steel bridge, weathering steel, corrosion, long-term exposure test, airborne salt, time of wetness.

1 Introduction

Weathering steel is a low alloy steel containing alloying elements such as copper, chromium, and nickel. A protective rust layer forms on the surface of weathering steel, which in a suitable corrosion environment, significantly reduces the corrosion rate. Since weathering steel has these properties, it can be used on steel structures such as bridges, without the need for painting. Normally, steel structures require anti-corrosion treatments such as painting or galvanizing. In the case of painting, initial painting and repainting costs are involved. On the other hand, if weathering steel is used, the initial costs are slightly higher than that of a combination of conventional steel and painting, but the initial painting and subsequent repainting

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