



Weathering Steel Bridges – the New European ECCS Design Guide

Dieter Ungermann, Peter Hatke

TU Dortmund University, Institute of Steel Construction, Dortmund, Germany

Dennis Rademacher

ArcelorMittal, Steligen, Esch-sur-Alzette, Luxembourg

Contact: peter.hatke@tu-dortmund.de

Abstract

Modern bridge structures should not only be efficient in terms of planning and construction, but require also low maintenance efforts. Weathering steel is therefore the ideal material for steel and composite bridges. It does not require any corrosion protection to permanently withstand the effects of the weather. The typical renewal measures for protective paintings can be omitted, which leads to significantly lower life cycle costs and interventions in the traffic flow. When designed and detailed correctly and used in the correct environment, weathering steel performs excellently. To gather the existing experiences and recommendations from different countries and make them available to all designers, the European ECCS design guide for weathering steel bridges has been renewed and supplemented with the latest research results to an efficient tool for a good design of weathering steel bridges. This article will present a selection of extracts from the document, which was recently published.

Keywords: weathering steel; bridges; design guide; corrosion protection; sustainability; EN 10025

1 Introduction

Bridges are an important part of Europe's transport infrastructure. Corrosion damage is a frequent cause of limited serviceability of bridges. This can be observed across a large number of bridges, regardless of the construction material. Therefore, the durability and economic efficiency of the corrosion protection system for steel components are a decisive factor.

When designing steel and composite bridges, in most cases weathering steel offers the most economic and environmental advantages over non-alloyed structural steel with an additional multi-layer protective paint system.

Weathering steel is a structural steel with low content of some additional alloying elements, such as Copper and Chromium. The almost universally applicable weathering steel was invented in the 1920s and has been continuously developed. In suitable environments, it forms an adherent protective oxide layer, also called “patina”, which minimises further corrosion, so weathering steel may be used without an additional painting. Therefore, it is almost maintenance-free, if properly designed and constructed, and does not lead to consequential costs or traffic disruption. At the same time, weathering steel provides similar mechanical properties as usual structural steel. Hence the same codes for design, fabrication and erection apply and no extra effort arises. In some