Developments in Dutch FRP design guidance for FRP in infrastructure

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Summary

Around the world the number, size and level of complexity of FRP structures in infrastructure increases rapidly, and it is seen that also for traffic bridges and lock doors FRP is selected in commercial projects. The main challenge in design guidance is the fact that FRP can be made by many different processes with varying degrees of automation. So how can we deal with this variety? How do we take the limited experience branch wide into account? The CUR 96 [1] is the Dutch Design Guidance for FRP in Infrastructure (2003). It is currently being revised into Eurocode format and chapters are added dealing with aspects such as quality control and design verification by tests. The partial factors of the CUR96 guidance were compared to material test data on samples that have been exposed to water for 10 years. Due to the limited number of samples this cannot be considered as a full calibration but allows for a valuable assessment of the validity of the factors.

Keywords: FRP structures, design guidance, partial factors, FRP test, durability.

1. Introduction

Around the world different examples of Fiber Reinforced Polymer (FRP) bridges and buildings are realised, demonstrating FRP's potential. The size and level of complexity of FRP structures increases. In the Netherlands, at present FRP footbridges are a standard product, but also for traffic bridges, lock doors FRP is selected in commercial projects.

FRP can offer lightweight solutions where concrete and even steel are too heavy, reducing risks and traffic hindrance in the installation phase. FRP structures are very low maintenance and resistant to water and salt. Furthermore FRP's freedom in form and the translucency can inspire architects to new designs and FRP is seen among others in beautifully curved roofs, cladding, façade panels and viaduct edge elements.

The lack of design guidance results in additional effort and discussion and reduces the efficiency in the design and realisation process of FRP structures. Design guidance is called for by engineers and clients: a uniform design standard will contribute to increased transparency, reliability and efficiency of FRP designs.

The main challenge in design guidance is the fact that FRP is not just one material. It can be made by many different processes with varying degrees of automation. Worldwide, the FRP guidance for pultruded profiles is most complete. But what about moulding techniques? Looking at yacht building and wind energy, it is seen that FRP is well suited to create integrated (curved) shells structures. So how can we deal with all these different fibers, resins, lay ups and manufacturing

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