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The potential of cast glass in structural applications. Lessons learned from large-scale castings and state-of-the art load-bearing cast glass in architecture.

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Abstract

This paper investigates the potential of cast glass structural components in architectural applications. Initially, the commonly applied casting methods, glass types and mould types are discussed. To address both the possibilities and limitations in the size and form of cast glass components, an overview of the largest monolithic pieces of cast glass ever made is presented, from giant telescope mirrors and nuclear glass blocks to massive artifacts. Weighing several tons each, these cast glass pieces are assessed with comparative charts of technical data collected from literature, industry and field research, regarding their geometry, materialization, manufacturing method and annealing process. The data highlight not only the potential but also the practical implications involved due to the meticulous and time-consuming casting and annealing process of three-dimensional glass elements. Learning from the extreme, proposals are made for optimizing the size, shape and casting process of cast glass components suitable for architectural applications. Subsequently, the state-of-the-art architectural examples employing cast glass are analyzed and evaluated in terms of manufacturing, structural system, level of transparency, ease of assembly and disassembly. Based on the findings the authors suggest new design concepts for cast glass components that can take full

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