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Repair of a Swimming Pool after Design Errors

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Summary

Due to its specific features, designing of indoor swimming pools and baths requires great experience from both: the designer and the contractors, otherwise the mistakes committed in the phase of designing or erection contribute to various defects. The paper illustrates some characteristic and common errors in designing and execution of indoor swimming pools which have induced emergency situations and the need of making costly repairs.

1. Introduction

Building of indoor swimming pools requires great experience from the designer and the contractors. Unfortunately, the designing of such facilities is often entrusted to persons who have an inadequate practice in this matter. Things being as they are, the designer, whilst designing the facilities is not well aware of the specific problems and circumstances which are vital for usefulness, durability and reliability of the facilities to be constructed. Considering a poor workmanship, frequent lack of appropriate engineering supervision and an usual poor quality of building materials, practically inevitable is a high failure frequency of such constructions. The paper exemplifies some characteristic and common errors and irregularities in designing, which have lead to critical situations with many indoor swimming pools in the Upper Silesia. All facilities have been built in the period of last 25 and required costly repairs in order to eliminate great building damages, such damage being occurred after a drastically short period of use.

2. Design mistakes

2.1 Mistakes in designing of basin of the swimming pools

Reinforced concrete, monolithic basins of the swimming pools usually constitute spatial, statically indeterminate load-carrying structures. The brief foredesigns adopted by the designers

at the stage of structural analysis to reduce the real structure to the equivalent ones i.e. the plain bar & plate structures very often produce too big errors. As a result of oversimplifications and of the errors in adoption of equivalent static diagrams, loads and bar rigidity factors, the values of the internal forces in the some of elements of the main frame structures are underrated.

Neglecting of certain components of the real construction when adopting equivalent calculation schemes constitutes the other, but also quite typical example of errors committed at the stage of construction designing. The effects of such approach appear as the defects and failure conditions of the structure.

2.2 Faulty solution for expansion joints

The use of expansion joints between the basin structure and the surrounding roof is foreseen as a rule for the reinforced concrete basins of swimming pools. Sometimes, the designer has foreseen the execution of expansion joints between the basin and the roof structure components, but consequently has not used them for the finish layers. The gap created at the level of the overflow gutter was as wide as 30 mm. In order to eliminate the damage completely, necessity arose to remove away the finish layers surrounding the basin crest and remake them, ensuring a hermetic expansion joint of the newly laid finish.

2.3 Errors related to the shrinkage

In the real reinforced concrete structures of the basins of swimming pools often shrinkage cracks occur. As a result of the shrinkage, at the side walls of the basin there are developed vertical, through cracks. The shrinkage effect has been developed under the circumstances of limited deformation freedoms resulted from a monolithic linkage of the walls to the bottom plate, where the shrinkage phenomena had been established a considerable long time ago. It is typical situation, when the walls of basin have been embedded in concrete much later after the bottom of the swimming pool had been made

2.4 Improper solutions for deck roof structures or outer walls

There are many damages of the swimming pool buildings connected with faulty solutions of the deck roofs and walls, especially outer walls. Most of swimming pool halls have steel girders of the hall with a suspension roof of steel and timber structure. When there is no adequate ventilation and protection, the corrosion has attacked improperly protected steel girders and suspension rods of the hall roof. Practically, the wooden components of the roof has been biologically destroyed. Moreover, some common mistakes were committed and they still exist as it concerns the structural-material solutions for the outer division walls of the swimming pool structure. It applies for blink walls as well as for those provided with window systems. Often, when designing, inadequate attention is paid to the aspects related to the building physics.

3. Conclusion

The authors hope for the fact, that the examples of frequent failures of swimming pools presented in the paper induce the future and actual designers towards a penetrating approach and a careful analysis of these facilities. Moreover, investors should try to make a proper choice of designers and specially to ensure for a professional, independent and may be a multistage verification of the design.