Do we need technical specifications for membrane structures?

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Abstract

Few national design codes for membrane structures are available today. They cover specific types, such as air halls, temporary structures or mechanically tensioned structures with specific constraints.

Since long time discussions are going on, how to create a commonly agreed design code. It should provide the common practice on verification, design approach and quality standards. Starting with the European project TensiNet a first step has been done into that direction. In 2008 the TensiNet organisation, the follow-up network that has been established after the European project, implemented a working group Specifications and Eurocode. This resulted in the standardisation committee CEN/TC 250 WG5, formed in 2010 with the target to elaborate an Eurocode on membrane structures. This working group has meanwhile prepared a SaP report, which is a background document of the actual state of the art in different countries, and is giving also an outlook on the future Eurocode. Now the next step towards this Eurocode for membrane structures, the preparation of a technical specification TS, is in progress.

The experts in the field are capable to develop membrane projects without such an Eurocode. So why should they work on the new standard, and at the same time help their competitors?

There are many different reasons and opinions. Probably as many as we have participants in that field.

- All agree on the fact that this helps to increase the market.
- We all want also to have our technology seen as an established building technology and not only a niche market with high risk.
- With harmonised safety levels, and commonly agreed quality standards, we improve the quality of our industry and we avoid doubts of our clients.
- Once all players respect the same high quality standards this will result in a fair competition.
- By being involved in this standardisation process, one can influence the result and later be content with the final result.

Membranes are often seen as cladding, treated as an add-on to a building or a structure. But this is neglecting as well the beneficial as the unfavourable impacts, as some examples show:

The structure of the Allianz Arena for example has been designed without taking into account the ETFE façade. Just the self-weight has been taken into account. This resulted in another 50 % of steel weight that was required to realize the secondary structure. With an integrated design we suppose that only half of this secondary steel would have been needed.

The same happened to the Unilever façade, which has been treated as a simple façade. It was then necessary to build stiff and heavy steel frames to couple the high tensile forces in the single layer ETFE façade which could not be carried by the concrete building

The proof engineer of the Dresden Castle ETFE roof answered to the engineers when they sent the analysis of the cushions: “I do not check the roof tiles either”

Integrated design is elementary in our business. Neglecting this will never end in excellent and economic structures. The ongoing standardisation process is needed to keep and to improve the quality. It helps that others treat our business with the required seriousness to the benefit of all.

Dresden Castle, canopy of the small courtyard, picture: Jürgen Lösel

Unilever Hamburg, ETFE foil façade, picture: formTL

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