

## Wrinkling and Bridging – Can it be kept to a minimum? Best practices

Catrin Tarnowski

*GSE Lining Technology, Germany ([ctarnowski@gseworld.com](mailto:ctarnowski@gseworld.com))*

ABSTRACT: Wrinkling does occur - but can it be minimized? There are a lot of good cases with laying flat liners all around the world. Therefore, some most do better than others. Thus can we not accomplish the same on more projects and learn from each case?

Not only wrinkling but bridging also has to be addressed. Is it the correct approach to cut the liner in case of bridging and to install an additional patch in such an area? When is bridging really an issue? It is an issue specifically in cold climates and with inferior liner quality. In many cases the liner has the ability to relax and to overcome the bridging.

Some good practices to overcome the problems are summarized below:

The liner property:

The thermal elongation is a reversible effect and can be controlled. Thus the question is to design with additional slack or to design with anchoring and ballasting. Waviness and dimensional stability belong together. The more “frozen” tension is into the product, the higher the variance in dimensional stability - developing to waves when temperature changes do occur. If the dimensional stability is controlled liners keep flat or waves which occur can again disappear.

Color:

In case of hot climates a light surface color does help to reduce wrinkling caused by thermal elongation.

Design:

Large liner areas are sometimes built with insufficient anchor design. If those areas are left uncovered, bridging and wrinkling will occur due to wind uplift possibilities, temperature changes and thus movement of the liner. Opposite to this there are also projects where utmost care is taken – for example large dam applications or pumped storage ponds - designs with intermediate anchoring keeping the whole liner flat. Are there enhancement possibilities for other projects as well?

Installation:

It needs to be considered that liner panels welded to each other shall have the same temperature to avoid wrinkling. Thus the panel just unrolled shall not be welded to that installed the prior day or one which has heated up for a while already. Diagonal waves and waves just in the weld area can be avoided by this.

## EuroGeo 6 25-28 September 2016

### Ballasting:

Shall ballasting be left to the liner installer only - or are there appropriate methods which can already be specified to keep the liner flat? The "Riegelbauweise" = anchor bar method = is an installation procedure keeping the geomembrane completely flat.

There are a variety of measures to keep liners flat and some of them would not even influence installation progress. Why not better utilize them?

