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Design of liners for circular & non-circular shapes according to the new French ASTEE 3R-2014 V2.0 method - Influence of geometrical imperfections of host pipe & liner.

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ABSTRACT

After a brief presentation of the new French recommendation 3R-2014 V2.0 for the design of liners (published in 2017 by ASTEE Scientific and Technical Association for Water and the Environment), the influence of geometrical imperfections on the resistance of linings to the groundwater pressure is presented.

In the 3R2014 method, imperfections are treated using single analytical reduction factors or combined analytical reduction factors. Imperfections are classified in two types: global imperfections like gap or ovality and local imperfection like intrusion. Global imperfections are uniformly distributed around the perimeter. Local imperfections are distributed on a limited angular sector. It is shown that geometrical imperfections dramatically decrease the buckling resistance of lining and increase the stresses. For egg-shaped lining, variation of the radius at the sides and annular remaining gap may also have a big influence on the buckling resistance.

Since it is not always possible to estimate imperfections, the default values play an important role, since they limit overly optimistic behaviour and ensure coherence between the different methods of calculation. For common circular and 3 x 2 egg shape pipes & liners and prefixed imperfections it has been established a good correspondence between the DWA A 143-3 calculation

tables and the French method calculations result.

European Standardization working covering the liner design is starting now and the new French method will provide a good basis of discussion within the dedicated working group.