

PRESS RELEASE

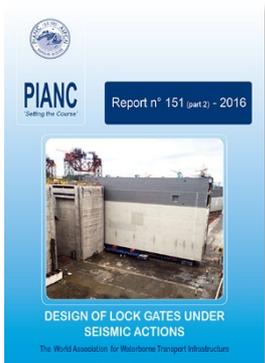


March 8, 2016

NEW PIANC PUBLICATION AVAILABLE

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Transport Infrastructure



Title: 'Design of Lock Gates under Seismic Actions'
Author's: InCom Working Group 151 (part 2)
Price: € 55.00 (47 pages)
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Introduction:

The document first sets out the nature of the seismic hazard and how it can be characterised for design purposes. Subsequently, some examples of lock gate structures, which have been designed for seismic actions, are described in certain detail, followed by discussion of considerations that should be included within the design process. This section includes a theoretical perspective on hydrodynamic effects and how they can be accounted for appropriately in the engineering design. The document concludes with a discussion of available analysis methods and the use of codes for design, followed by a list of references.

The design of lock gates and approach structures is a relatively standard activity for a suitably experienced engineering company provided that the design requirements, actions and the design situations are clearly specified.

Relevant, robust, reliable and effective software is available to assess the resistance (and other parameters such as stress, deformation, buckling, damage limitations, etc.) of lock gates and approach structures even if exceptional and accidental actions and design situations are to be considered. Functional requirements, such as opening and closing arrangements, service life, water tightness, sensitivity to vibrations, installation, maintenance, etc. are a matter relevant to the designer's specialisation and experience in hydraulic structures.

Steel gates share some design aspects with steel bridges and the design of the seismic resistance of the latter is reasonably well developed using numerical methods. Similarly, numerical techniques are applied for seismic analysis and design of building structures. These simple examples show that the numerical tools to study the effects of seismic actions on lock gate structures are available, provided they are adapted to include the loads, configurations and boundary conditions specific to lock gates.

In general terms the analysis and design issues to be considered in determining the effects of seismic actions on gate structures are:

- The level of damage that can be accepted whilst maintaining safety or preventing collapse
- The level of damage under which the gate or approach structure can continue to be operated
- Identification of the necessary measures to prevent or minimise damage
- An appropriate methodology to deliver a design with the required robustness and ductility levels
- The degree of rigour in the analysis and its validation
- The representation of physical effects such as hydrodynamic mass and contact surfaces

Finally, there are probabilistic issues in the definition of the seismic actions which need to be considered. The probability of a minor seismic event which causes no significant damages affecting negatively the lock operation is relatively high for most lock gates structures, but the probability of a major event which causes substantial damage and its potential ramifications is much more complex to assess.

NOTE: The objective of this report is to provide information and recommendations on good practice. Conformity is not obligatory and engineering judgement should be used in its application, especially in special circumstances. This report should be seen as an expert guidance and state of the art on this particular subject. PIANC disclaims all responsibility in case this report should be presented as an official standard.

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