

PRESS RELEASE

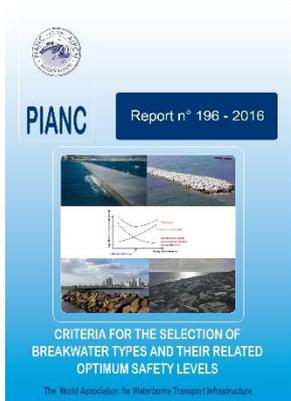


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NEW PIANC PUBLICATION AVAILABLE

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The World Association for Waterborne
Transport Infrastructure



Title: "Criteria for the Selection of Breakwater Types and their Related Optimum Safety Levels"

Author's: MarCom Working Group 196

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Introduction:

Following the PIANC PTC II Working Group 12 on 'Analyses of Rubble Mound Breakwaters' and the MarCom Working Group 28 on 'Breakwaters with Vertical and Inclined Concrete Walls' and Working Group 40 on 'Guidelines for the Design and Construction of Berm Breakwaters', MarCom decided to set up a Working Group 47 with the scope of providing guidance to designers on the choice of type of breakwater and related safety levels. In the reports of WGs 12 and 28, safety coefficients related to the most important failure mode design equations corresponding to a range of safety levels are presented. However, no advice on choice of safety level is included in the reports. Therefore, a major task of WG 47 was to advise on the choice of safety levels.

This report is intended to be used by designers to obtain guidance when selecting the type of breakwater and related safety levels appropriate to a particular project, taking into consideration the performance requirements of the project, the location and the type of breakwater selected. It is not intended to provide details of how a designer can perform such analysis for alternative designs and safety levels for a particular project and location.

The report addresses the design of the cross section of breakwaters. The length and layout of a breakwater for a specific harbour is a separate subject outside the scope of this report. Breakwaters are of vital importance, especially to ports on exposed locations. Moreover, the costs of breakwaters are quite often very large. The costs depend not only on the type of breakwater, the water depth and the wave climate, but also on the safety level applied for the design. When the design is safer, the expected cost of repair during structure service lifetime will be smaller. Damage to a breakwater can cause downtime for port operation. This is certainly the case if berths for vessels are located along the inner side of a breakwater. But also a breach in a breakwater might cause wave disturbance enough to affect operation, for example of a container berth. The optimum safety level of a breakwater should be the one that gives minimum total costs during the structure service lifetime. The total costs are the sum of initial (construction) costs, repair costs, and downtime costs. The relation between damage cost and safety level is different for each breakwater type, so the optimum is also different for each breakwater type. In the past the optimisation studies have been performed for rubble mound breakwaters, taking into account initial costs and direct maintenance costs. Indirect costs (downtime costs) have seldom been included. It is expected that the cost curves, showing the optimum design, have different shapes for the various types of breakwaters (rubble mound, caisson, berm breakwater). Apart from the overall financial aspects, there is also the cash-flow problem related to repairs, the amount of which depends on structure safety. For a port authority financing regularly the repair of small damage may be much easier than financing a large repair work. Also the financial resources are usually different. A second point is that there is also damage to third parties, which is not included in the budgeting plan of the port owner. The design specifications given in national standards and recommendations are not based on cost optimisation analyses but simply reflect common practice. There is a need for more stringent investigation of the optimum safety levels for breakwaters reflecting the circumstance for the individual breakwaters.

Typical cases should be selected for analyses of optimum safety levels as a basis for more thorough standards. In doing so, the more difficult steps will be to assess down-time costs and to define structure service lifetime. This topic had been discussed during the special MarCom session at the Sydney conference. It was suggested to start, as a follow up, a new working group which should report on criteria for the selection of breakwater types and their optimum safety levels. The aim of the present work is, to facilitate better selection of type of breakwater, on the basis of local conditions, and to provide information on optimum safety levels. The main target readers are designers of breakwaters.

Because the report does not deal with general explanations of design of breakwaters, it is necessary for the users of the report to be familiar with design of breakwaters in beforehand. Professionals dealing with codes and design recommendations for marine structures are also target readers of the report, in particular Chapter 15 on safety aspects.

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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