

New DNV Recommended Practice DNV-RP-C205 on Environmental Conditions and Environmental Loads

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ABSTRACT

In an ongoing Joint Industry Project, DNV Classification Note 30.5: Environmental Conditions and Environmental Loads is being updated in accordance with the present state-of-the-art and corresponding industry needs and at the same time converted into a DNV Recommended Practice DNV-RP-C205. The updates include topics on non-linear wave diffraction around large volume structures, higher-order wave loading, slamming, run-up and wave in deck loads. The new RP also includes an improved description and statistical modeling of wind and ocean waves. Other new topics are shallow water waves and their load effects. New and updated guidance is provided on vortex induced vibrations in current and waves, and vortex induced motions of floaters. The new RP also has a chapter on model testing.

KEY WORDS: Wind; currents; waves; offshore structures; loads, design;

INTRODUCTION

DNV Classification Note 30.5: Environmental Conditions and Environmental Loads (CN 30.5) is a central document in DNV's Ship Rules and Offshore Standards. It provides key information on main issues related to environmental loads on ships and offshore structures, including description on wave, wind and current conditions and methods for load prediction on various types of structures. The document is widely used internally in verification and advisory services and it serves as a basic reference for several other DNV rules, standards and recommended practices. CN30.5 is also widely used in the industry, since it gives practical guidance and support to designers and engineering companies. Availability of easily accessible recommended methods for prediction of loads and response due to wave, wind and current are essential for the industry. Since this document represents DNV's knowledge base within this field it is vital that it is continuously updated in accordance with the present knowledge and needs.

CN30.5 was first issued in 1991. It was based on Appendix A and B in "Rules for the design construction and inspection of offshore structures" from 1977. A revision of CN30.5 was issued in March

2000 based on work done in 1997-98. The updates then were related to wave statistics, coefficients for wind loading, methods for prediction of vortex induced vibrations and a general update in order to comply with other DNV standards. Parts of the document were left unchanged.

Since the last update of CN30.5 several new DNV offshore standards and RPs have been issued. Some of these new standards and RPs are based on recent research results carried out in Joint Industry Projects. Examples are DNV-OS-F201 Dynamic Risers and DNV-RP-F105 Free Spanning Pipelines. It was considered important to update CN30.5 in order to comply with these documents.

Since 1991 when the first CN30.5 was issued, new methods and computer tools have been developed for loads and response of ships and offshore structures. One example is the area of non-linear wave diffraction for large volume structures where both second-order theories and fully non-linear theories are now available. Accurate calculation tools have been developed and have already been used extensively for design of offshore platforms. Problem areas like springing and ringing of TLPs, slow drift motion of moored platforms, slamming, run-up and wave in deck loads, is covered to a very limited degree in the 2000-version of CN30.5. There was a need to update the document to benefit from the improved theoretical basis and increased knowledge originating from recent feedback and experience.

Extended exploration to new deep water locations has made available new data on waves and current. Recent EU research projects have focused on improved description and statistical modelling of ocean waves. Recently, increased emphasis has been put on the ability to predict rare or freak waves of extreme heights that can cause fatal damage to existing platforms. CN 30.5 needed updating to incorporate new knowledge on prediction of rare wave events.

Load effects due to breaking waves in shallow water areas are important for several applications, e.g. offshore wind mills. The 2000-version of CN30.5 lacks methods and guidelines on this. Similarly, other extreme wave structure interaction problems were not covered in great detail. The chapter on slamming has been updated to take into account developments during the last 10 years. The same applies to methods and tools for prediction of wave on deck, run-up on columns and wave in deck loads.