This paper summarizes the findings from Phase Ib of the Offshore Code Comparison, Collaboration, Continued with Correlation (OC5) project. OC5 is a project run under the International Energy Agency (IEA) Wind Research Task 30, and is focused on validating the tools used for modelling offshore wind systems through the comparison of simulated responses of select offshore wind systems (and components) to physical test data. For Phase Ib of the project, simulated hydrodynamic loads on a flexible cylinder fixed to a sloped bed were validated against test measurements made in the shallow water basin at the Danish Hydraulic Institute (DHI) with support from the Technical University of Denmark (DTU). The first phase of OC5 examined two simple cylinder structures (Phase Ia and Ib) to focus on validation of hydrodynamic models used in the various tools before moving on to more complex offshore wind systems and the associated coupled physics. Verification and validation activities such as these lead to improvement of offshore wind modelling tools, which will enable the development of more innovative and cost-effective offshore wind designs. (C) 2016 The Authors. Published by Elsevier Ltd.