



Tug performance: Bollard Pull and Escort Trials



Bollard pull trials

The direct towing performance of a tug is often expressed in tons bollard pull. Bollard pull trials are ideally conducted in deep, unrestricted water in stationary conditions. The line force between tug and bollard ashore is measured using a load cell. In practice environmental conditions and harbour restrictions may be different from environmental conditions. In addition, operational aspects and incorrect use and calibration of load cells result in uncertainties in bollard pull execution and results.

To address these issues MARIN initiated the Bollard Pull Joint Industry Project. Together with thirty leading ship yards, owners and propulsion system providers, an extensive research programme was setup to understand the factors affecting a bollard pull test. This resulted in a deep understanding of vessel performance in bollard pull conditions and the development of the 'harmonized bollard pull test procedure', an international standard for the execution of bollard pull trials. MARIN performs, analyses and reports Bollard Pull trials according to this standard which is set up in collaboration with several class societies (ABS, BV, LR). This results in transparent, repeatable and reliable performance figures.

Escort notation trials

For the escorting of tankers and LNG carriers into ports and alongside terminals dedicated escort tugs are used. Tugs are required to have the 'escort tug notation', as issued by Class. To receive this escort tug notation the maximum braking and steering forces that can be produced by the tug on the vessel as well as the time it takes to swing from board to board, have to be established. For this purpose escort trials are conducted where the escort tug is connected to the stern of a large vessel. While the vessel maintains course and pre-set speed, the tug applies maximum braking and steering force. By evaluating several towing angles relative to the towed vessel at several speeds, a complete performance map can be created.



MARIN conducts, measures, analyses and reports such trials according to the Escort Tug Notation described in the Rules and Regulations for Classification of Ships as published by class societies (DNV-GL, BV and LR).

Equipment

To conduct the required measurements during bollard pull and escort trials MARIN Performance at Sea operates the following equipment:

- Load cells calibrated and certified in the range of 5 to 250 ton
- High range wireless data transmission for on-board towing force indication
- Motion sensor units recording the tug heel and motions in 6 degrees of freedom
- Differential / RTK GPS at the tug (and on the escorted vessel for escort trials)
- High frequent shaft power measurement system, measuring the shaft torque and RPM on the propeller shafts
- Wind, wave and current sensors when required
- Compact data acquisition system for synchronous logging of all data

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