Enhancing Tug Safety Through Internationally Harmonised Stability Regulations

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SYNOPSIS
Following the release of the Bureau Veritas Safety Guidelines for Design, Construction and Operation of Tugs at ITS 2014 in Hamburg, a push has been made to bring the newly developed stability requirements up to the level of the International Maritime Organization (IMO) in London. In 2016, IMO adopted the amendments to the 2008 Intact Stability (IS) Code, which include stability criteria for towing and escorting based on the Bureau Veritas guidelines.

This is a major milestone in the development of a much-needed, internationally harmonised standard to enhance tug safety and provides a clear answer to issues raised by the industry, including at ITS 2016 in Boston.

INTRODUCTION
It stands to reason that safety is one of the primary concerns of every professional working in the towing industry. Due to their very nature, towing operations entail a degree of risk which needs to be well understood and managed in order to prevent accidents. In this respect, stability of tugs has always been a key issue.

If the towline shifts to the side of the tug, usually as a consequence of an unexpected event or an unintended action, the towline force suddenly acts transversely to the tug’s centreline. As a consequence, a couple of transverse forces are generated – with the towline force being opposed by thrust and/or hull resistance forces – which cause the tug to heel and ultimately to capsize, a phenomenon called ‘girting’. Broadly speaking, there are two mechanisms which can cause a girting event. The tendency for the tow to veer off – for example, due to a loss of propulsion or steering on the tug – and drag the tug transversely along with it is called ‘tow-tripping’. This mechanism is the classic stability issue for tugs, whereby the towline pull is opposed by the hull resistance force of the tug to create a heeling moment.

As tugs have become increasingly powerful and manoeuvrable to meet demand for higher bollard pull and greater operational capability, a second mechanism called ‘self-tripping’ has gained importance, and has become a key design consideration. Self-tripping is characterised by the tendency of a tug to overturn itself under the influence of a heeling moment created by the opposing towline pull and the steering forces generated by – omnidirectional – propulsion units.

Over the past decade or so, tugs have been increasingly engaged in escort operations, wherein the tug is used for active steering, braking and otherwise controlling of the assisted ship travelling at speeds typically in the range of 6 to 10 knots. During escorting, the steering and braking forces are generated by the hydrodynamic forces acting on the tug’s hull and appendages and the thrust forces exerted by the propulsion units. As the towline is typically positioned at a large angle to the tug’s centreline, in particular when actively steering the assisted ship, escorting is often associated with the tug operating under a considerable heeling angle. This is the direct consequence of the heeling moment caused by the transverse components of the above mentioned forces in the quasi-static equilibrium position of the escort tug. As high transverse forces, heeling angles and speed through water are characteristic of the normal operation of escort tugs – as opposed to being an accidental situation on ship assist tugs – the stability criteria need to reflect the increased risk associated with escorting.

Given the fact that stability is a safety critical aspect of tugs and towing operations, it is somewhat surprising that no international regulations had been developed. The most probable explanation – which should not be confused with a justification! – lies in the fact that most tugs typically operate in national waters and have a gross tonnage of less than 500, both of which make them fall outside the scope of the SOLAS Convention and therewith international regulation. As a consequence, individual flag states and classification societies have developed and implemented their own standards based on their (geography-) specific