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Application of the IACS Common Structural Rules for Oil Tankers to FPSOs

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Abstract

In April 2006 the International Association of Classification Societies (IACS) introduced Common Structural Rules (CSR) for double hull oil tankers. This paper explains how these rules can be adapted to provide common structural Rules for FPSOs (single or double hull) and why this approach offers several advantages over the current Rules for FPSOs.

Each Classification Society maintains its own rules for FPSOs and the requirements for hull structure are based on their Rules for oil tankers. Until recently, each Society's Rules for oil tankers were different, resulting in different design requirements for FPSOs. However the new IACS Common Structural Rules for double hulled oil tankers replace the tanker Rules of individual Classification Societies and provide a uniform standard for all new oil tankers. The CSR are more transparent than the previous Rules for oil tankers with the loads based on the design wave approach and the strength based on net scantlings.

This paper explains how to derive vessel specific design loads for FPSOs using the design wave approach. This takes account of the FPSO specific loading conditions, the environment and the type of mooring system. The paper also addresses how the CSR can be employed for single hulls. The net scantlings approach is discussed with reference to both conversions and newbuilds.

Nomenclature

Rules	Generic classification rules
Ship Rules	Generic classification rules for ships
FPSO Rules	Generic classification rules for FPSOs
IACS	International Association of Classification Societies
CSR	IACS Common Structural Rules for Double Hull Oil Tankers

Application of Tanker Rules to FPSOs for Hull Structures

Almost all FPSOs are manufactured by shipyards. Those which begin life as oil tankers before being converted to FPSOs were designed and built entirely to Ship Rules. Newbuild FPSOs are usually designed to FPSO Rules which are based extensively on the Ship Rules for the hull structure. The advantages of basing the design of FPSO hull structure on oil tanker technology include:

- Proven technology based on extensive tanker industry experience.
- The ability to convert existing oil tankers with associated benefits in both time and money.
- Fast and economical production by shipyards with highly developed design and build facilities.

The Rules for oil tankers imply a level of performance which is acceptable to the tanker industry. However the operation of an FPSO is not the same as an oil tanker and the expectations of the oil and gas industry are different from those of the tanker industry. Differences between tanker and FPSO hull structures include:

- Costs of lost FPSO production are much larger than tanker off hire costs.
- Tankers will dry dock for survey and repairs every five years. FPSOs will be surveyed and repaired on station, which is far more expensive.
- Tanker owners pay for the steel weight of the hull structure twice: once at build and then again in fuel during the life of the vessel. FPSO owners only pay for the steel weight of the hull structure once, at build, so there is less advantage in reducing steel.

It is possible to meet the expectations of FPSO operators using tanker technology but in practice this often does not happen for the following reasons:

- Pressure to minimize CAPEX especially for conversion projects results in a failure to optimize lifecycle costs.
- Many FPSO operators do not have sufficient understanding of tanker technology to know how to ask for the enhancements they want. This is aggravated by the plethora of different Rules being used to design tankers and FPSOs.