An Overview of the Tanker Structure Cooperative Forum

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Abstract

Since its formation in the early 1980s the Tanker Structure Cooperative Forum (TSCF or Forum) has provided a venue for technical dialogue on structural aspects of tankers. Composed of naval architects and engineers from major oil companies, independent tanker operators, and classification societies, the TSCF encourages its members to share experiences and resolve technical issues common to all. Through various work group activities, the publication of a series of manuals and periodic meetings with shipbuilders it has achieved a respected position in the tanker industry. This paper will provide an overview of the history, organization and activities of the Forum and its contribution to the better understanding of tanker structural issues.

Background to Forum Activities

The TSCF was established in 1983 when Shell International Marine invited a group of owners and classification societies to meet to share experiences and hold technical dialogues on structural aspects of tankers. From an initial membership of 12 the Forum has grown to 27 members today. Membership is voluntary. The Forum maintains two bodies, the Steering Committee and the Work Group. The Steering Committee is responsible for oversight and direction of the Forum. It approves the work plans and product of the Work Group, and typically meets once per year. The Work Group develops and stewards the work program of the Forum, which typically consists of three to five topics of interest to the members. The Work Group meets at least once a year, sometimes more often. Smaller sub-work groups may meet more frequently.

Membership in the Forum is voluntary and anyone can ask to join. There are no membership fees. Members must be willing to share structural experiences with other members and actively participate in meetings and work activities. Meetings are hosted by members at their home locations around the globe, with a general rotation between Europe, the Americas and Asia.

Role of the TSCF

The role of the Forum is to advance maritime safety through improvements in the design and maintenance of tanker structures. This is achieved by sharing technical knowledge and experience in order to gain a better understanding of the safety performance of tanker structures in service. Specific topic areas of interest include corrosion, structural defects, inspection procedures, and criteria for determining renewal of damaged or corroded structure.

Membership

The membership of the TSCF is composed of Classification Societies, Major Oils and Independent Tanker Operators with about equal representation from all three groups. Typically, the member representatives are naval architects and engineers involved in the structural design and maintenance of tankers. The current membership of the Forum is as follows:

Class Members

American Bureau of Shipping
Bureau Veritas
China Classification Society
DNV GL Group
Korean Register of Shipping
Lloyd's Register
Nippon Kaiji Kyokai (ClassNK)
RINA S.P.A.
Russian Register of Shipping

Independent Companies

A.P. Moller-Maersk
Euronav Ship Management SAS
Hellespont Steamship Corp.
Mitsui OSK Lines Ltd
Nordic Tankers A/S
NYK Line
OSG Ship Management
Stena Rederi AB
Teekay Corporation
Thenamaris Ships Management Inc.

Oil Majors

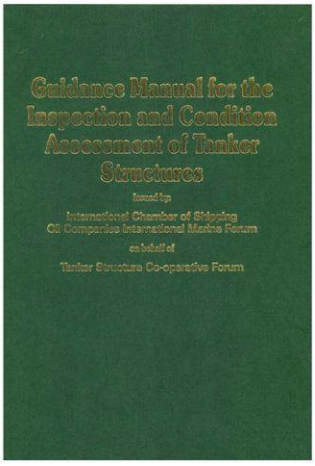
BP Shipping Limited
Chevron Shipping Company LLC
ConocoPhillips/Polar Tankers Inc.
ExxonMobil affiliates (IMT and SeaRiver)
Petrobras Transporte SA
Shell Shipping Technology
Statoil ASA
Total Trading & Shipping

Publications

Over the years the TSCF has been responsible for the issuance of six manuals intended to share knowledge and experience of tanker structures with the industry. The first five manuals were published by Witherby & Co. Its sixth manual, ***Guidance Manual for the Inspection and Maintenance of Tanker Structures***, was issued in conjunction with INTERTANKO. The manuals are briefly described below.

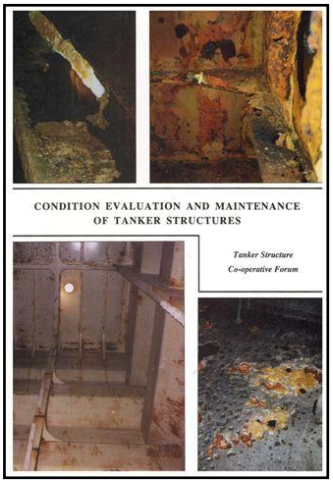
Guidance Manual for the Inspection and Condition Assessment of Tanker Structures, 1986

This original Guidance Manual, issued by ICS and OCIMF on behalf of the TSCF, was based on the collective experience of the members of the Forum in inspecting, assessing and repairing tanker structures, particularly large, single hull crude tankers. The early European-built VLCCs were going through third special surveys; Japanese-built VLCCs were completing second special survey and ULCCs were approaching second special survey. Some of the results from these surveys were unexpected and so the Forum decided it would be valuable to share inspection practices, findings and lessons learned with the industry.



The Manual provided important information on conducting general condition, detailed condition, corrosion rate and repair specification surveys. Analysis guidelines and maintenance criteria were included for determining and reporting the findings of the survey. Practical repair information was also included along with a Catalogue of Structural Detail Failures that could be used to understand the causes and make appropriate modifications to fatigue cracking.

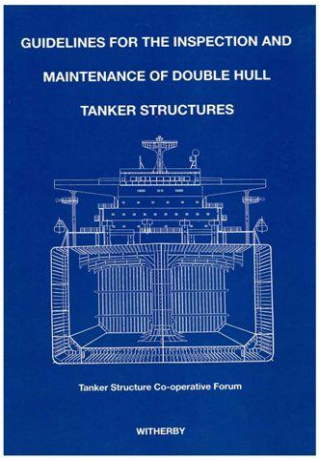
Condition Evaluation and Maintenance of Tanker Structures, 1992



In the ensuing years after publication of the original Guidance Manual, the industry became more concerned over structural durability with vessel age. As a result the Forum developed a second manual to address additional issues related to corrosion evaluation and structural maintenance of tanker structures.

The intention of this manual, therefore, was to assist the owner in a condition assessment of a tanker by providing information on the types of corrosion found in various tank structures, typical corrosion rates by tank service and structural component, and the extent of steel renewals that could be experienced. It also set out procedures for the assessment of structural integrity, and provided advice on available options for maintenance and repair.

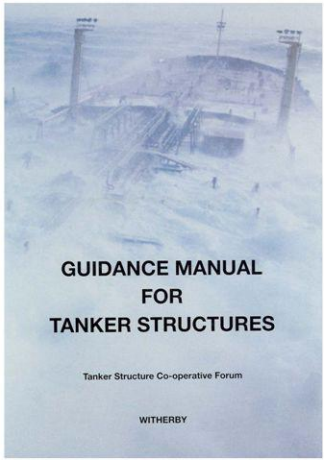
Guidelines for the Inspection and Maintenance of Double Hull Tanker Structures, 1995



With the passage of MARPOL Annex 1 Regulation 13F and OPA 90 in the U.S. the double hull tanker became a requirement for the carriage of oil. The members of the Forum recognized that there were some new and unique issues associated with double hull designs that needed to be addressed.

These guidelines, issued in association with IACS, contained information on general design aspects for double hull tankers and more specific information for critical areas affected by stress concentrations, fatigue and corrosion. Typical damages experienced by structures similar to those selected for double hull tankers were discussed and means to prevent internal structural corrosion were described. Recognizing the importance of adequate inspection, monitoring and maintenance, examples were given of permanent access facilities for inspectors and surveyors.

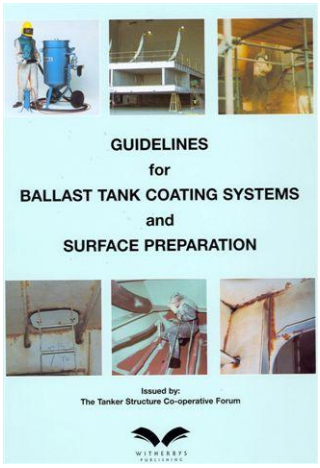
Guidance Manual for Tanker Structures, 1997



With this publication the Forum, in cooperation with IACS, combined and updated the information from the first two publications, i.e. the original ‘green book’ Guidance Manual and the Condition Evaluation Manual. The focus was primarily on assessing the condition of ballast and cargo tank structure of conventional single hull tankers and is a companion to the Double Hull Manual (the ‘blue book’).

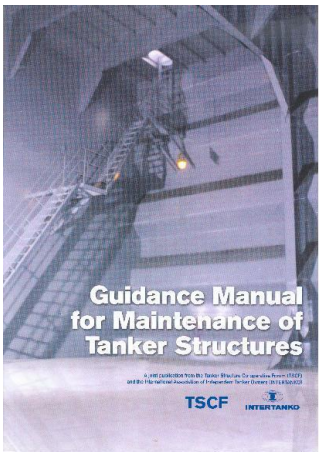
This Manual includes the latest ‘best practices’ from Forum members for survey preparation, safety, equipment, reporting requirements, and analysis and interpretation of the data. Basic maintenance and repair guidelines are incorporated and illustrated.

Guidelines for Ballast Tank Coating Systems and Surface Preparation, 2002



In response to increased regulatory oversight of the protective coatings for segregated ballast tanks and a general dissatisfaction with the performance of coating applications, the Forum drew on the collective experience of its members to develop guidelines for the coating of ballast tank spaces. Part 1 of this Manual is a general introduction to corrosion, coatings and cathodic protection. Part 2 addresses newbuild coating applications including coating selection, steel surface preparation, coating application and curing, inspection, testing, reporting, safety and guarantees. It also contains newbuild coating specification information based on a design life of 10, 15 or 25 years, designated as TSCF 10, TSCF 15 and TSCF 25. Finally, Part 3 provides information on the in-service maintenance of ballast tank coatings.

Guidance Manual for Maintenance of Tanker Structures, 2008



The TSCF collaborated with INTERTANKO to provide a Guide for maintenance of structural steel, pipelines, deck seatings, the rudder and rudder horn and the stern frame, and gives guidance on the minimum standard (acceptance criteria) for these components. It also addresses coatings and corrosion protection systems for these structural items. The Guide references the requirements of the ISM Code and proposes a methodology for the establishment of a systematic maintenance programme. The practices and procedures can be applied to both single and double hull tankers of all sizes and configurations.

Information Papers

More recently the TSCF has focused on producing information papers on specific topics of current interest to the membership. These papers are posted on the TSCF website (www.tscforum.org).

Outfitting Related Structural Defects, 2011

The paper reviews outfitting defects based on TSCF member experience and provides analysis on potential causes and repair proposals.

Information Paper on Cargo Tank Corrugated Bulkhead Damages of Double Hull Tankers, 2011

The paper reviews current corrugated bulkhead design practise and provides details of damage experience of TSCF members. Failure modes and critical areas of high stress or stress concentration are discussed and recommendations for design improvement offered.

Guidance Note on Fatigue for Double Hull Oil Tankers Complying with the Common Structural Rules, 2012

These guidance notes cover areas to consider in connection with specification of new contracts for double hull oil tankers with length of 150 meters or greater to which the IACS Common Structural Rules (CSR) apply. These guidance notes relate to specification of longitudinal elements and critical locations on transverse primary support members in the cargo region.

The guidance note includes an introduction to fatigue, details of additional items to include in a specification to take account of different design criteria for specific newbuilding contracts, and a practical explanation of the background of CSR fatigue requirements, including experience with design details prior to CSR.

Guidance Notes on High Tensile Steel, 2013

This paper discusses characteristics of high tensile steel, potential problems with the use of this material, and highlights items that may not be addressed in current regulations.

Meetings with the Shipbuilders

Periodically the TSCF has held meetings with the Shipbuilders. These meetings are intended to allow sharing of information on in-service experience and lessons learned between the shipyards, tanker operators and classification societies to improve the design and repair of tank vessels. Six of these meetings have been held:

- November 1987, American Bureau of Shipping, Paramus, New Jersey, USA
- October 1992, Lloyds Register, London, UK
- October 2000, ClassNK, NYK Line and Mitsui OSK Lines, Tokyo, Japan
- October 2007, Korean Register, Busan, Republic of Korea
- October 2010, ClassNK, Tokyo, Japan
- October 2013, China Classification Society, Shanghai, China

At each meeting, papers are presented by TSCF operators, Class Societies and shipyards on current topics of interest.

Conclusion

The TSCF serves as a valuable conduit for collection and dissemination of in-service experience of tanker structures. The body of published work by the Forum has provided valuable guidance to the industry in this important area. The Forum intends to continue this legacy of providing quality technical information on tanker structures through the ongoing sharing of experiences, the updating and publication of guidance manuals and information papers and periodic meetings with the shipbuilding industry.