TSCF 2010 Shipbuilders Meeting

An Overview of the Tanker Structure Cooperative Forum

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Background to Forum Activities

- Established in 1983
- Brings together classification societies, major oils and independent tanker operators to discuss structural experiences
- 27 member companies
- Steering Committee – guides work activities
- Work Group – pursues topics of interest to members

Role of the TSCF

- Share knowledge and experience to advance maritime safety through improvement in design and maintenance of tanker structures
- Work Areas:
  - Corrosion
  - Structural defects
  - Inspection procedures and access
  - Criteria for renewal of damaged or corroded structure

Membership

Class Members (10)

American Bureau of Shipping
Bureau Veritas
China Classification Society
Det Norske Veritas
Germanischer Lloyd AG
Korean Register of Shipping
Lloyd's Register
Nippon Kaiji Kyokai (ClassNK)
RINA S.P.A.
Russian Maritime Register of Shipping

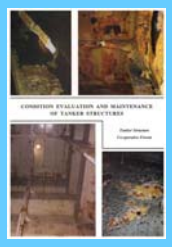
Oil Majors (8)

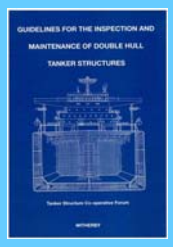
BP Shipping Limited
Chevron Shipping Company LLC
ConocoPhillips/Polar Tankers Inc.
ExxonMobil affiliates (IMT and SeaRiver)
Petrobras Transporte SA
Shell Shipping Technology
Statoil ASA
Total Trading & Shipping

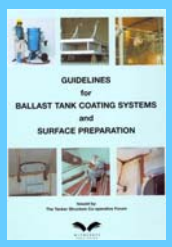
Independent Companies (9)

A.P. Moller-Maersk
Euronav Ship Management SAS
Hellespont Steamship Corp.
Mitsui OSK Lines Ltd
NYK Line
OSG Ship Management
Stena Rederi AB
Teekay Marine Services
Thenamaris Ships Management Inc.

Publications

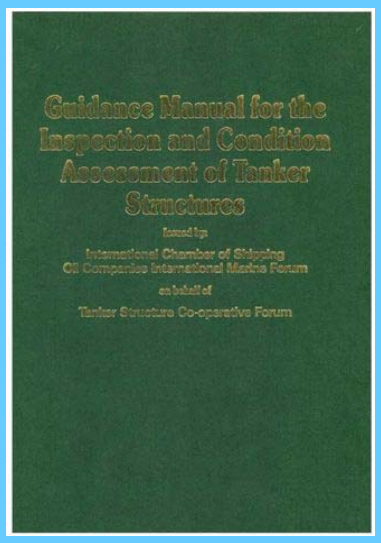






Guidance Manual for the Inspection and Condition Assessment of Tanker Structures

1986



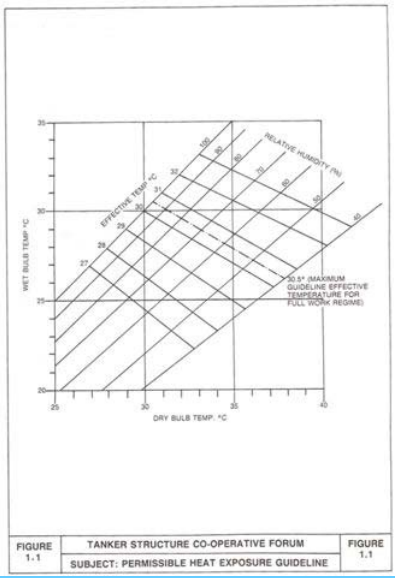


FIGURE 1.1	TANKER STRUCTURE CO-OPERATIVE FORUM SUBJECT: PERMISSIBLE HEAT EXPOSURE GUIDELINE	FIGURE 1.1

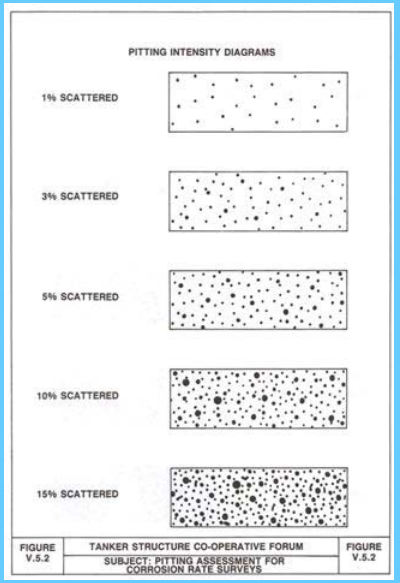


FIGURE V.5.2	TANKER STRUCTURE CO-OPERATIVE FORUM SUBJECT: PITTING ASSESSMENT FOR CORROSION RATE SURVEYS	FIGURE V.5.2

TABLE 1. GUIDELINES FOR CORROSION WASTAGE

The following Table provides guidance for the assessment of wastage data for local strength of structural components. The section modulus for overall strength must also be checked.

STRUCTURAL COMPONENT	% CORROSION (1) LOSS INDICATOR		BUCKLING GUIDELINES (LONGITUDINAL FRAMING)	
	A(2)	B(3)	Mild Steel	HTS 36
Deck and bottom plating and longitudinal girders	10	25	s/t = 55 to 60	s/t = 49 to 52
Webs of deck and bottom longitudinals	15	30	h/t = 50 to 65	h/t = 45 to 55
Flat bar longitudinal at deck and bottom (4)	10	25	h/t = 15 to 20	h/t = 15 to 17
Face plates and flanges of longitudinals and longitudinal girders	15	25	b/t = 10	b/t = 10
Side shell	—	20	(5)	
Longitudinal bulkhead plating	15	25	s/t = 70 to 75	s/t = 60 to 79
Webs of side shell and longitudinal bulkhead longitudinals	—	25	(5)	(5)
Transverse bulkhead structure, transverses and side stringers	15	25	(6)	(6)
Remaining secondary structure	—	30	—	—

Notes

(1) Percentages are to be applied to original Rule thicknesses without corrosion allowance reductions for corrosion control notation.

(2) Column A refers to percent reductions above which further assessment is required.

(3) Column B refers to percentage reductions where steel renewals may be required.

(4) The deck and bottom plating and associated longitudinals are to include side and longitudinal bulkhead plating and associated longitudinals within 10% of the depth of ship from the deck and bottom respectively.

(5) No buckling guidelines are given as the components are not usually limited by this.

(6) Due to the wide variation in stress levels and stiffening arrangements, no general guidance figure can be given. Individual guidance should be sought from the Classification Society concerned.

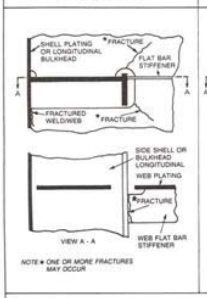
Definitions

t = thickness of structure after corrosion.
s = spacing between longitudinal stiffeners.
h = web depth of longitudinal stiffeners.
b = half-breadth of flange for symetrical sections, and the flange breadth for asymetrical sections.

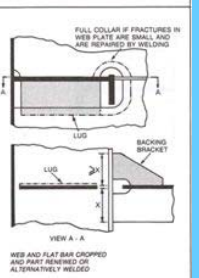
LOCATION: Connection of longitudinals to transverse webs

EXAMPLE No. 1 : Web and flat bar fractures at cut-outs for longitudinal stiffener

TYPICAL DAMAGE



PROPOSED REPAIR



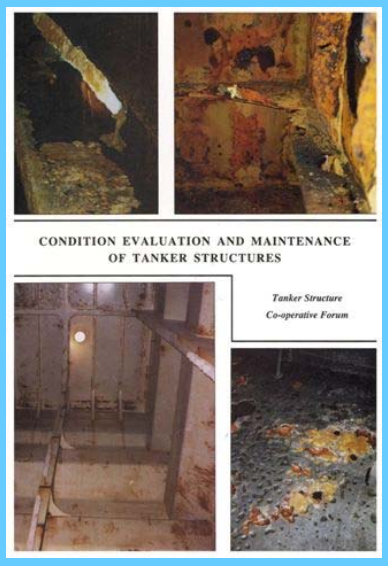
FACTORS CONTRIBUTING TO DAMAGE

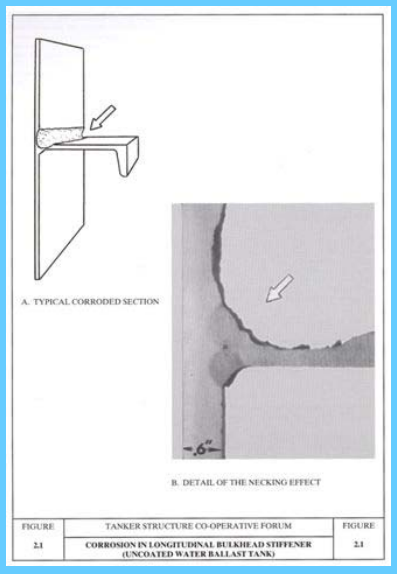
1. Asymmetrical connection of flat bar stiffener resulting in high peak stresses at the heel of the stiffener under fatigue loading.
2. Insufficient area of connection of longitudinal to web plate.
3. Defective weld at return around the plate thickness.
4. High localised corrosion at areas of stress concentration such as flat bar stiffener connections, corners of cut-out for the longitudinal and connection of web to shell at cut-outs.
5. High shear stress in the web of the transverse.
6. Dynamic sea way loads/ship motions.

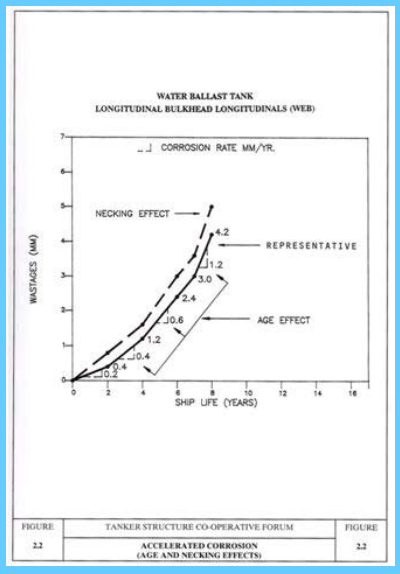
FIGURE 1	TANKER STRUCTURE CO-OPERATIVE FORUM SUBJECT: CATALOGUE OF STRUCTURAL DETAILS	FIGURE 1

Condition Evaluation and Maintenance of Tanker Structures

1992







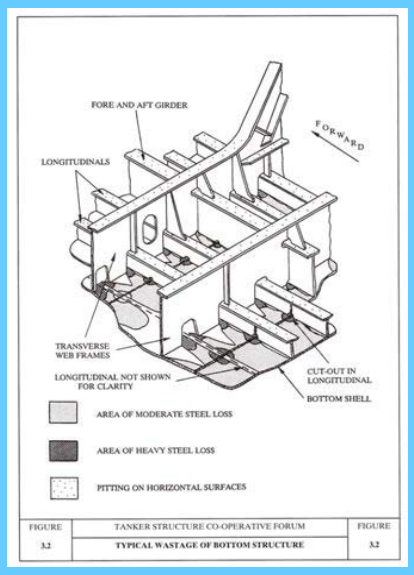


FIGURE	TANKER STRUCTURE CO-OPERATIVE FORUM	FIGURE
3.2	TYPICAL WASTAGE OF BOTTOM STRUCTURE	3.2

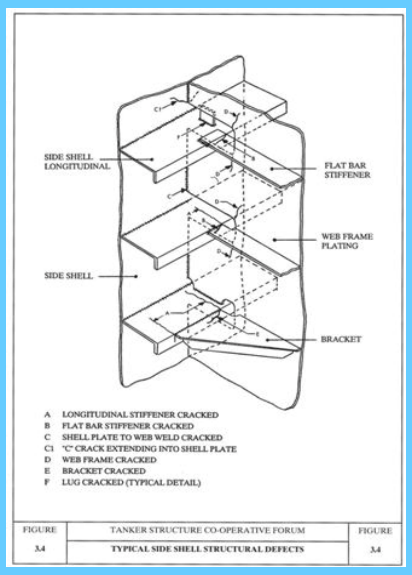


FIGURE	TANKER STRUCTURE CO-OPERATIVE FORUM	FIGURE
3.4	TYPICAL SIDE SHELL STRUCTURAL DEFECTS	3.4

SEGREGATED BALLAST TANK CORROSION RATE (MM/YY)

Location	*Side*	*General*	*Pit/Groove*	*Remark*
1. Longitudinal elements:				
a. Deck Plating	*1*	*0.10 - 0.50 (1)*		*Uncoated*
Deck Longitudinals (Web)	*2*	*0.25 - 1.00 (1)*	*0.35 - 1.70 (2)*	*Uncoated*
Deck Longitudinals (Face Plate)	*2*			
b. Side Shell Plating	*1*	*0.06 - 0.10 (1)*		*Uncoated*
Side Shell Longitudinals (Web)	*2*	*0.10 - 0.25 (1)*		*Uncoated*
Side Shell Longitudinals (Face Plate)	*2*			
c. Bottom Shell Plating	*1*	*0.04 - 0.10 (1)*		*Uncoated*
Bottom Shell Longitudinals (Web)	*2*			
Bottom Shell Longs (Face Plate)	*2*			
d. Longitudinal Bulkhead Plating	*1*	*0.10 - 0.30 (1)*	*1.00 - 3.00 (2)*	*Uncoated*
			1.00 - 3.00 (2)	*Coated*
Long. Bulkhead Longs (Web)	*2*	*0.20 - 1.20 (1)*	*1.00 - 3.00 (2)*	*Uncoated*
Long. Bulkhead Longs (Face Plate)	*2*	*0.20 - 0.60 (1)*		
2. Transverse Web Frames:				
a. Deck Transverse Web Plating	*2*	*0.30 - 0.70 (1)*	*0.40 - 1.70 (2)*	*Uncoated*
Deck Transverse Ring Face Plate	*2*			
b. Horizontal Tie Beam Web Plating	*2*	*0.20 - 0.35 (1)*		*Uncoated*
Horizontal Tie Beam Ring Face Plate	*2*			
c. Bottom Transverse Web Plating	*2*	*0.10 - 0.20 (1)*		*Uncoated*
Bottom Transverse Ring Face Plate	*2*			
d. Side Shell Transverse Web Plating	*2*	*0.15 - 0.25 (1)*		*Uncoated*
Side Shell Transverse Ring Face Plate	*2*			
e. Long. Bhd Transverse Web Plating	*2*	*0.20 - 0.65 (1)*	*1.00 - 3.00 (2)*	*Uncoated*
Long. Bhd Transverse Ring Face Plate	*2*			
3. Transverse Bulkheads:				
a. Trans. Bhd Plating	*1*	*0.30 - 0.50 (1)*		*Uncoated*
Trans. Bhd Vertical Stiffener (Web)	*2*	*0.20 - 0.60 (1)*		*Uncoated*
Trans. Bhd Vertical Stiffener (Face Plate)	*2*			
b. Trans. Bhd Horizontal Stringer Web Plating	*2*	*0.30 - 0.80 (1)*		*Uncoated*
c. Trans. Bhd Vertical Girder Web Plating	*2*			
4. Swash Bulkheads:				
a. Swash Bhd Web Plating	*2*	*0.15 - 0.25 (1)*		*Uncoated*
b. Swash Bhd Horizontal Stringer Web Plating	*2*	*0.15 - 0.25 (1)*		*Uncoated*
c. Swash Bhd Vertical Girder Web Plating	*2*	*0.15 - 0.25 (1)*		*Uncoated*

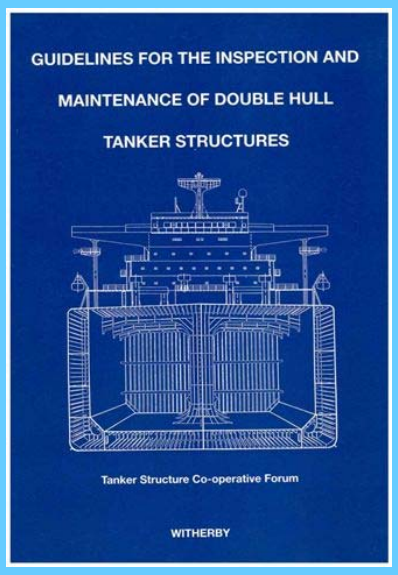
NOTE: (1) Age effect
(2) Necking effect

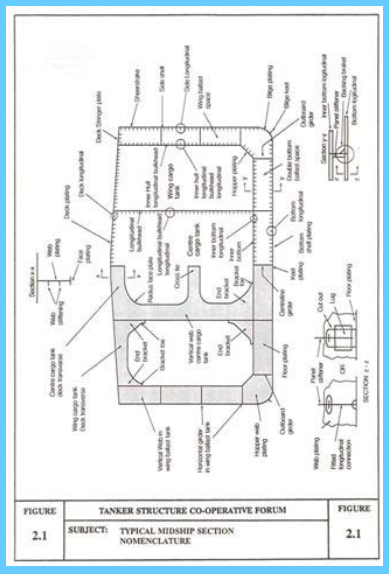
TABLE	TANKER STRUCTURE CO-OPERATIVE FORUM	TABLE
1.1	SEGREGATED BALLAST TANK CORROSION RATE	1.1

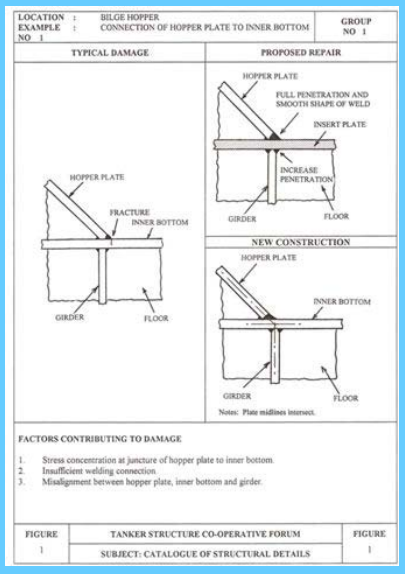
FIGURE	TANKER STRUCTURE CO-OPERATIVE FORUM	FIGURE
V.3	CONDITION 2 FAIR CONDITION, LIGHT RUSTING OVER 5% AREA	V.3

Guidelines for the Inspection and Maintenance of Double Hull Tanker Structures

1995

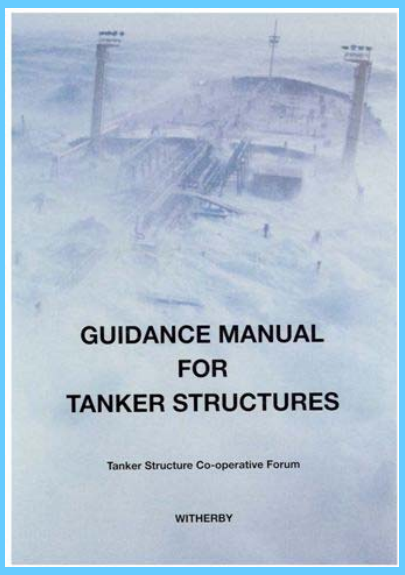


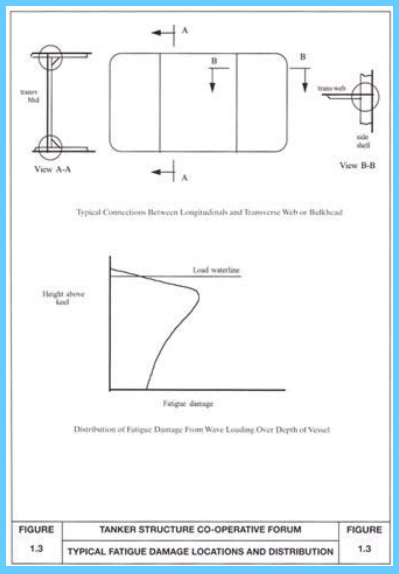


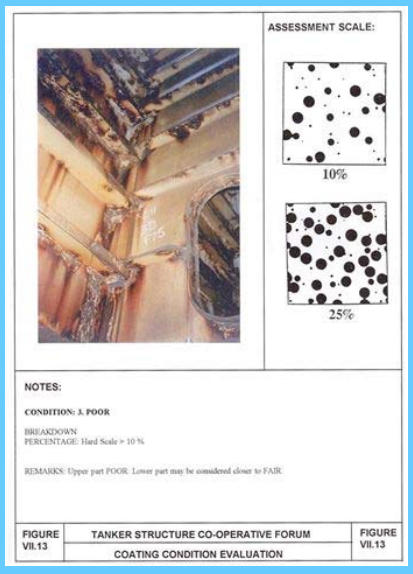


Guidance Manual for Tanker Structures

1997

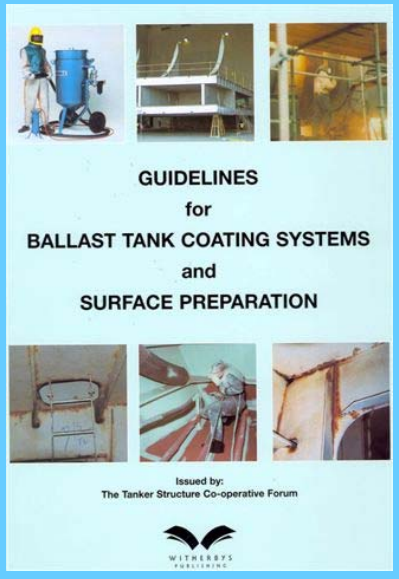






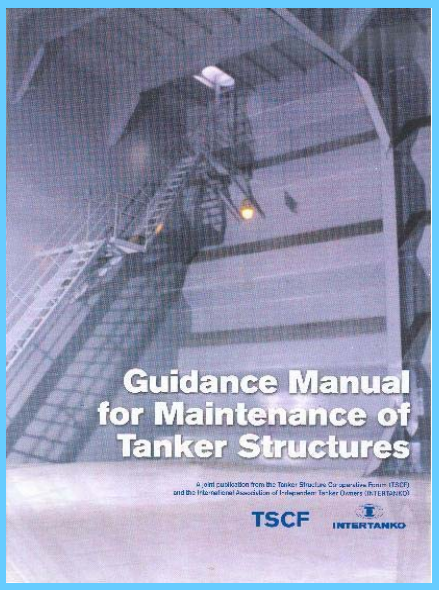
Guidelines for Ballast Tank Coating Systems and Surface Preparation

2002



Guidance Manual for Maintenance of Tanker Structures

2008

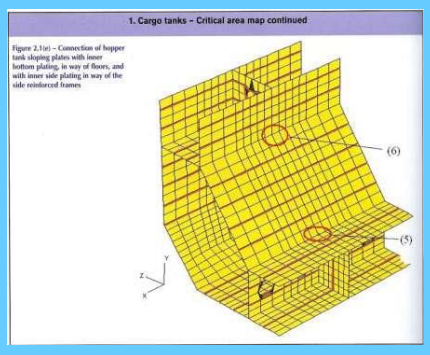


Guidance Manual Contents

- Regulatory Requirements for Maintenance
- Review of Typical Defects
- Inspection and Maintenance Objectives
- Inspection Programmes
- Maintenance and Repair of the Hull Structure
- Protection Against Corrosion
- Appendices

Example Inspection and Maintenance Plan

- Critical area maps
- Inspection forms



Meetings with the Shipbuilders

- Allow sharing of information on in-service experience and lessons learned
- Improve the design and repair of tank vessels.

- Five of these meetings have been held:
  - November 1987, ABS, 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

The Tanker Structure Cooperative Forum

Guidance to the industry through sharing of experiences.

Thank You!