Further recommendations and conditions of class may be forthcoming as a result of the following survey(s) which was (were) conducted on the date(s) indicated:

Type of Survey: (N/A)

Date of Survey: (N/A)

Anticipated date of receipt of report survey: (N/A)

Remarks: Any outstanding recommendations or conditions of class which may be pointed out in reports of surveys carried out by a branch office after the date of this notice or of which this office is not yet aware shall be forwarded immediately upon receipt from the branch office concerned.

Please refer to the Survey Status Report for this ship attached separately.

The followings are the diminution limits to hull structural members. These limits are specified subject to the condition that the ship is registered with this Society and undergoing the surveys by this Society's surveyor(s). These limits are also determined subject to the condition of a stand-alone corrosion of the structural member in question. In case of the corrosion associated with other structural members special consideration may be paid. This Society does not hold the responsibility for the application of these diminution limits to the ship not registered with this Society in order to make the judgement of renewals or repairs.

Diminution Limits and Judgement of Steel in Hull Structure and Equipment

-1. General rules

(1) These internal rules conform to the requirements of **[1.4.5-3.]** of Part B of the Rules, indicate the standard values for the diminution limit, and are to be used to judge the necessity of repairing important structural members and important equipment subject to wear and tear.

(2) If wear to structural members of hull or equipment exceeds the permissible diminution limit indicated in these rules, detailed inspections may be carried out, if necessary, and the defective items replaced by the date specified by the Surveyor.

(3) The diminution limits prescribed in these rules correspond to requirements during construction of members and dimensions given in the drawings, except where specifically stated. Therefore, if members with scantlings that significantly exceed the requirements and have a wide safety margin for strength are used during construction, the diminution limits of these members may be modified appropriately. The current rules may be used for the items below.

  (i) Longitudinal strength

  (ii) Equipment Number

  (iii) Direct strength calculations

(4) The diminution limits of structural hull members and equipment, which are not prescribed in these internal rules, are to be decided at the discretion of the Surveyor.

(5) These rules are applicable to structural members made of mild steel and

high-tensile steel.

(6) In addition, regarding Bulk Carriers, please confirm our guidance "BULK CARRIER SAFETY Retroactive Requirements for existing bulk carriers".

-2. Diminution limits

(1) Principal structural hull members other than below (2)

(i) The diminution limits for plates and stiffeners are shown in **Table 1**.

(ii) The diminution limits for longitudinal strength members given in **Table 1**. are based on the condition that the diminution limit of longitudinal strength of the hull has not been reached.

(iii) The values of the diminution limit indicate limit values in case of uniform wear of members (Uniform wear is judged according to -3.)

(iv) Notwithstanding **Table 1**, the diminution limits for local corrosion such as stress corrosion and pitting are to be decided at the discretion of the Surveyor. The standard diminution limit for local corrosion other than stress corrosion is to be taken as 40% of the original thickness.

(2) Structural members stipulated in 1.3.1(6), Part B of the Rules

(i) The diminution limit for transverse bulkhead plates in cargo holds, to which the "t_{net}"concept applied, is given by the following formula. The values of the diminution limit indicate limit values in case of uniform wear of members (Uniform wear is judged according to (3).).

$t_{renewal}$ (diminution limit)= $t_{as\ built} - 3.0$ (mm)

$t_{as\ built}$: as built thickness

(ii) The diminution limit for hatch cover and hatch coaming of bulk carriers, to which the "t_{net}" concept applied, is given by the following formula. The values of the diminution limit indicate limit values in case of uniform wear of members (Uniform wear is judged according to (3).).

$t_{renewal}$ (diminution limit)= $t_{as\ built} - t_c + 0.5$ (mm)

$t_{as\ built}$: as built thickness

t_c: Corrosion addition specified in following Table

Structural Member		Corrosion addition t_c (mm)	
Steel Hatch Cover	Type of structure	For the top, side and bottom plating	For the internal structures
	Single plating type	2.0	
	Double plating type	2.0	1.5
Hatch Coaming		1.5	

(iii) The diminution limit for hatch cover and hatch coaming of ships other than bulk carriers, to which the "t_{net}" concept applied, is given by the following formula. The values of the diminution limit indicate limit values in case of uniform wear of members (Uniform wear is judged according to (3).).

$t_{renewal}$ (diminution limit)= $t_{as\ built} - t_c + 0.5$ (mm)

$t_{as\ built}$: as built thickness

t_c: Corrosion addition specified in following Table

In case of corrosion addition is 1.0 (mm), renewal thickness may be given by the

formula of $t_{renewal} = t_{as\ built} - t_c$ (mm)

Structural Member		Corrosion addition t_c (mm)	
Steel Hatch Cover	Type of structure	For the top, side and bottom plating	For the internal structures
	Single plating type	2.0 (1.0 for the container carrier)	
	Double plating type	1.5 (1.0 for the container carrier)	1.0
Hatch Coaming		1.5	

Table 1

Structural Member		Permissible diminution level
-Shell plates -Strength deck plates -Longitudinal beams (flat bar) on shear strake and strength deck - Tight bulkheads in deep tanks -Inner bottom plates		20% of original thickness + 1 mm
-Floors and girders in double bottom		25% of original thickness
-Primary members (web & face)	(Example) deck girder, hatch side girder, horizontal girder, web frame, web beam, (strong beam), deck transverse, side transverse, bottom transverse, vertical web on longitudinal bulkhead, side stringer, cross tie, strut, pillar	
-Web, face and bracket of hold frames -Watertight bulkhead plates		
-Frames (excluding hold frames) -Beams -Stiffeners -Brackets (web & face)	(Example) bottom longitudinal, inner bottom longitudinal, side longitudinal, deck longitudinal, deck beam,	30% of original thickness
-Effective deck plates -Hatch cover and hatch beam		

For each original thickness of steel, calculated value for the allowable diminution is shown to **Table 2**.

Table 2　Allowable Thickness of Steel

diminution / original t	(20% original) + 1.0mm		25% original		30% original	
	Limit for Renewal	Substantial Corrosion	Limit for Renewal	Substantial Corrosion	Limit for Renewal	Substantial Corrosion
8.0	5.4	6.0	6.0	6.5	5.6	6.2
9.0	6.2	6.9	6.7	7.3	6.3	7.0
10.0	7.0	7.7	7.5	8.1	7.0	7.7
11.0	7.8	8.6	8.2	8.9	7.7	8.5
12.0	8.6	9.4	9.0	9.7	8.4	9.3
13.0	9.4	10.3	9.7	10.6	9.1	10.1
14.0	10.2	11.1	10.5	11.4	9.8	10.8
15.0	11.0	12.0	11.2	12.2	10.5	11.6
16.0	11.8	12.8	12.0	13.0	11.2	12.4
17.0	12.6	13.7	12.7	13.8	11.9	13.2
18.0	13.4	14.5	13.5	14.6	12.6	13.9
19.0	14.2	15.4	14.2	15.4	13.3	14.7
20.0	15.0	16.2	15.0	16.2	14.0	15.5
21.0	15.8	17.1	15.7	17.1	14.7	16.3
22.0	16.6	17.9	16.5	17.9	15.4	17.0
23.0	17.4	18.8	17.2	18.7	16.1	17.8
24.0	18.2	19.6	18.0	19.5	16.8	18.6
25.0	19.0	20.5	18.7	20.3	17.5	19.4
26.0	19.8	21.3	19.5	21.1	18.2	20.1
27.0	20.6	22.2	20.2	21.9	18.9	20.9
28.0	21.4	23.0	21.0	22.7	19.6	21.7
29.0	22.2	23.9	21.7	23.6	20.3	22.5
30.0	23.0	24.7	22.5	24.4	21.0	23.2
31.0	23.8	25.6	23.2	25.2	21.7	24.0
32.0	24.6	26.4	24.0	26.0	22.4	24.8
33.0	25.4	27.3	24.7	26.8	23.1	25.6
34.0	26.2	28.1	25.5	27.6	23.8	26.3
35.0	27.0	29.0	26.2	28.4	24.5	27.1
36.0	27.8	29.8	27.0	29.2	25.2	27.9
37.0	28.6	30.7	27.7	30.1	25.9	28.7
38.0	29.4	31.5	28.5	30.9	26.6	29.4
39.0	30.2	32.4	29.2	31.7	27.3	30.2
40.0	31.0	33.2	30.0	32.5	28.0	31.0
41.0	31.8	34.1	30.7	33.3	28.7	31.8
42.0	32.6	34.9	31.5	34.1	29.4	32.5
43.0	33.4	35.8	32.2	34.9	30.1	33.3
44.0	34.2	36.6	33.0	35.7	30.8	34.1
45.0	35.0	37.5	33.7	36.6	31.5	34.9
46.0	35.8	38.3	34.5	37.4	32.2	35.6
47.0	36.6	39.2	35.2	38.2	32.9	36.4
48.0	37.4	40.0	36.0	39.0	33.6	37.2

(2) Hold frames

The minimum plate thickness of web and brackets of hold frames is to conform to **Table 3**.

Table 3

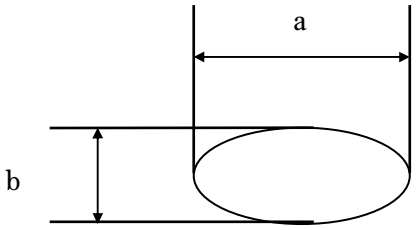
Length of ship (m)	L < 150	150 ≤ L < 200	200 ≤ L
Min. Thickness (mm)	6	7	7.5

(3) Minimum thickness for high tensile steel members

If high-tensile steel is used in bottom longitudinals of tankers with a single bottom construction, the wear and tear limit of the web is taken as 25% of the original thickness. If high-tensile steel is used in other structural members, the wear and tear limit is to be in accordance with (1) and (2) above.

(4) Anchor chain cable

The diminution limit is to be taken as 12% of the original diameter. If a diameter that is one step above the prescribed diameter is used, a diameter that is one step below the diameter actually used may be taken as the original diameter when deciding the wear and tear limit (refer to Part C, Table **[27.1]** of the Rules). The wear and tear limit is to be judged by measuring the mean diameter of the chain cable and the shackle at locations which have been subjected to maximum wear. The mean diameter is to be calculated as shown in the figure below.



$$\text{average diameter} = \frac{a + b}{2}$$

Section of anchor chain cable or shackle

-3. Uniform corrosion of steel plates

The status of corrosion mentioned below is to be treated as uniform corrosion

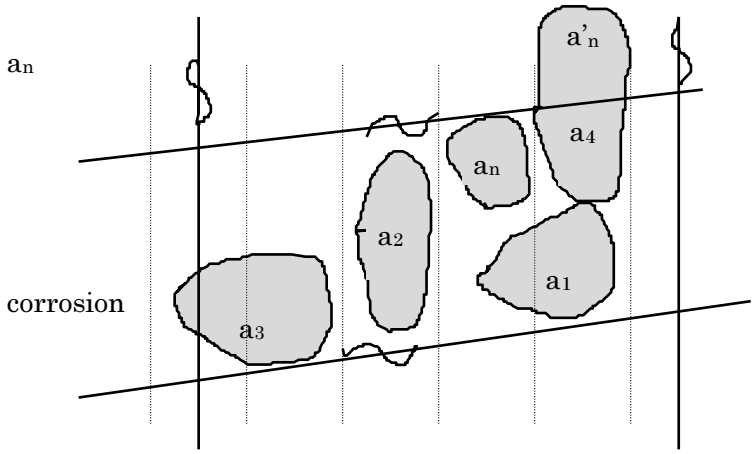
(1) Corrosion extending throughout frame

(2) Corrosion extending through the width of the plate (line corrosion in frames, floors, and beams, and linear corrosion in the area between floors, frames and beams)

(3) Pitting and local corrosion extending for more than 70% of the area of the plate

(refer to the figure below)

(i) If the entire plate is found uniformly corroded



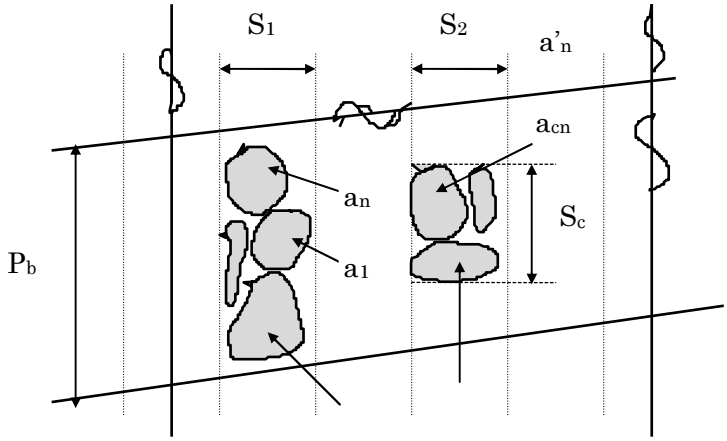
(total plate area) × 0.7 < ∑

:area of local

a : area

Figure 1

(ii) If a part of the plate is treated as being uniformly corroded



$P_b \times S_1 \times 0.7 < \sum a_n$

or

$S_c \times S_2 \times 0.7 < \sum a_{cn}$

a_2 a_{c1}

Figure 2

-4. Measure against corrosion

When remarkable corrosion is found in the results of thickness measurement, the Surveyor should examine the pattern and extent of the corrosion through intensive inspection or thickness measurement and take a necessary measure such as (1) & (2) below. Especially, in the case of oil tankers, chemical carriers and bulk carriers (including ore carriers), where *substantial corrosion* is found, the additional thickness measurement is required as shown in **Appendix 4-3**. *Substantial corrosion* is an extent of corrosion such that assessment of corrosion pattern indicates a wastage in excess of 75% of allowable margins, but within acceptable limits.

(1) Corrosion exceeding acceptable limit

Repair such as renewal of the corroded plate exceeding acceptable limit should be required. However, special consideration may be given for structural members whose actual scantling surpasses much the Rule requirements.

(2) *Substantial corrosion*

Necessary instruction for further inspection of corrosion which does not exceed acceptable limit, but where continuous monitoring is deemed necessary should be given. *Substantial corrosion* in excess of 75% of allowable margin is to be nominated as *suspect areas* and thickness measurement and necessary inspections of the area is to be carried out at subsequent Survey (Annual[except cargo tanks], Intermediate and Special Survey).

-5. Diminution limits on longitudinal strength

(1) Bending strength

(i) According to the Rules, transverse sections are to be gauged during the Special Survey No.2 for oil & chemical tanker, and during the Special Survey No.3 for the other ship. The results are to be entered in the survey record. Thickness measurements are mainly carried out to evaluate uniform corrosion in longitudinal strength members. The diminution limit (section modulus of hull calculated from measured values of dimensions or members) is given in **Table 4**.

(ii) During measurement of longitudinal members at the cross section in the 0.5L amidship required by the rules, if the transverse sectional areas of deck flange (deck plating and deck longitudinals. For Oil & Chemical Tanker, all deck platings, longitudinals and girders within 0.1D (where D is the ship's depth)) and bottom flange (bottom shell plating and bottom longitudinals. For Oil & Chemical Tanker, all bottom shell platings, longitudinals and girders within 0.1D) exceeds 10% of the as-built area, NK branch office has to calculate the section modulus of hull by using the thickness of structural members measured and confirm them within the

diminution limits, as shown in **Table 4**.

(iii) Evaluation of longitudinal strength of the hull girder of oil tankers of 130 m in length and upward and of over 10 years of age is as follows;

(a) Longitudinal strength should be evaluated by using the results of thickness measurements of the ship's transverse sectional areas within 0.4L amidships for the extent of the hull girder length that contains ballast tanks and cargo tanks therein and between 0.4L and 0.5L amidships for adjacent ballast tanks and cargo tanks which may extend beyond 0.4L amidships.

(b) The final result of evaluation of the ship's longitudinal strength for the oil tankers of 130 m in length and upward and of over 10 years of age are to be reported in the condition evaluation report.

Table 4

Ship's length for freeboard L_f(m)	Hull section modulus			
	Applied rule			
	1964 version to 1972version (except case where "*fdB*" formula applied)		1973 version to 1986 version	Others
	Oil Tanker	Other ship		
$L_f \leq 60$	Rule requirement	Rule requirement	80% of rule requirement (77% for oil tankers and chemical tankers)	80% of rule requirement
$60 < L_f < 130$			To be determined by interpolation	To be determined by interpolation
$L_f \geq 130$	Rule requirement or 0.9 $W_{min} \times k$, whichever is greater. where: W_{min}: Hull section modulus specified in **15.2.1-2, Part C of the Rules** k: Material factor specified in **1.1.7-2, Part C of the Rules.**		90% of rule requirement (87% for oil tankers and chemical tankers)	90% of rule requirement

(2) Shear strength

Shear strength is to be calculated in case of the following (i) or (ii):

(i) Average corrosion of any strake in side shell or longitudinal bulkhead of oil tankers or chemical tankers exceeds 3.0mm, or

(ii) Average corrosion of any strake in side shell or longitudinal bulkhead of ore carriers or bulk carriers intended for alternate loading exceeds 2.5mm.