Introduction of CSR Rule Change
Contents

- Introduction of Rule Change Proposal 2018 (RCP2018)

- Introduction of the problem of Rule Change 2017
  Expansion of full penetration welding extent
History of CSR-BC&OT

- Original CSR BC&OT was effective on 1st July 2015.
- URCP was effective on 1st July 2017.
- RCP2017 was effective on 1st July 2018.
- RCP2018 will be effective on 1st July 2019.

ASEF made technical feedback to IACS on each stage.
Overview of RCP2018

Rule Change Proposal 2018 (RCP2018)
- 9 proposals
- Mainly the clarification of requirements
- Impact in design works & building work is small
- Impact in hull weight is almost neglect

Schedule for application
- Current situation: TC review
- 1st July 2019: Taking effect

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Industry Review → TC Review → **RCP2018 will be adopted by IACS** → **RCP2018 will be effective.**

ASEF Forum in Dalian on 23rd October 2018
Examples of requirements on RCP2018

1. The clarification of sniped stiffener for BC & OT

- The original rules require that the snipped stiffeners are not to be more than 30\textdegree.

- The original rules require the stiffener to be triangle at the narrow space as shown in left figure.

- RCP2018 consider alternative arrangement for the snipped stiffeners at the narrow space as shown in right figure.

Reasonable & No Impact on Scantling
Examples of requirements on RCP2018

2. Add location of the mandatory fine mesh analysis for OT

Brackets at the heel of horizontal stringer;

- **Original Rule**
  Fine mesh analysis is **no required**.

- **RCP2018**
  Fine mesh analysis is **required**.

These brackets are usually made for the fine mesh analysis voluntarily by the Shipbuilder. Although the shape of bracket may need to be improved by results of fine mesh analysis, the impact on hull weight is small.
Examples of requirements on RCP2018

3. Full penetration welding at corners of hatchway for BC

The extent of full penetration welding of the connection of the longitudinal hatch coaming to deck plating at corners of hatchway:

- **Original Rule**
  At corners of hatchways for 15% of the hatch length.

- **RCP2018**
  Longitudinal hatch coaming at corners of hatchways on a length of 15% of the hatch coaming height.

The extent of full penetration welding is reduced.
Review of RCP2018

- Mainly the clarification of requirements
- Impact in design works & building work is small
- Impact in hull weight is almost neglect

ASEF SWG4 (GBS and CSR maintenance) decided not to send any comment for RCP2018 to IACS.

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<td>RCP2018 will be adopted by IACS</td>
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<td>RCP2018 will be effective.</td>
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ASEF Forum in Dalian on 23rd October 2018
ASEF sent 2 comments for RCP2017 to IACS in the industrial review period last year.

Overview of RCP which ASEF commented

- Expansion of full penetration welding extent of Corrugated BHD in cargo hold part
  - IACS didn’t accept ASEF Comments. However IACS will carry out further consideration.

- No acceptance for Hatch Cover with continuous skirt plates as supports
  - IACS accepted ASEF Comments.
Rule Change 2017

CSR-B&T, Pt.1 Ch.12 Sec.3

2.4.5 Location required for full penetration welding

Full penetration welds are to be used in the following locations and elsewhere as required by the rules, see Figure 3:

a) Floors to hopper/inner bottom plating in way of radiused hopper knuckle.

b) Radiused hatch coaming plate at corners to deck.

c) Connection of vertical corrugated bulkhead to the lower hopper plate and to the inner bottom plate within the cargo hold region, when the vertical corrugated bulkhead is arranged without a lower stool.

d) Connection of structural elements in the double bottom in line with corrugated bulkhead flanges to the inner bottom plate, when the vertical corrugated bulkhead is arranged without a lower stool.

e) Connection of vertical corrugated bulkhead to the lower hopper plate, and connection of structural elements in the lower hopper area in line with corrugated bulkhead flanges to the lower hopper plate, where connections are clear of lower stow.

f) Connection of vertical corrugated bulkhead to top plating of lower stool.

g) Corrugated bulkhead lower stool side plating to lower stool top plate.

h) Corrugated bulkhead lower stool side plating to inner bottom.

i) Connection of structural elements in double bottom to the inner bottom plate in holds intended for the carriage of liquid at sea with a distance of 1600 mm from the side plating of the lower stool, see Figure 3a.

j) Edge reinforcement or pipe penetration both to strength deck, sheer strake and bottom plating within 0.0 L amidships, when the dimensions of the opening exceeds 300 mm.

k) Abutting plate panels with as-built thickness less than or equal to 12 mm, forming outer shell boundaries below the scantling draught, including but not limited to: sea chests, rudder trunks, and portions of transom. For as-built thickness greater than 12 mm, partial penetration in accordance with [2.4.2].

l) Crane pedestals and associated bracketing and support structure.

m) Per toe connections of longitudinal hatch coaming and bracket to the deck plating, full penetration weld for a distance of 0.15 Lc from toe of side coaming termination bracket is required, where Lc is the hatch coaming height.

n) Rudder horns and shaft brackets to shell structure.

o) Thick flanges of long transverse web frames to side web frames. Thick flanges of long longitudinal girder to bulkhead web frames.
Rule Change 2017

CSR-B&T, Pt.1 Ch.12 Sec.3

2.4.5 Location required for full penetration welding

d) Connection of structural elements in the double bottom in line with corrugated bulkhead flanges to the inner bottom plate, when the vertical corrugated bulkhead is arranged without a lower stool.
Rule Change 2017

CSR-B&T, Pt.1 Ch.12 Sec.3

2.4.5 Location required for full penetration welding

e) Connection of vertical corrugated bulkhead to the lower hopper plate, and connection of structural elements in the lower hopper area in line with corrugated bulkhead flanges to the lower hopper plate, where connections are clear of lower stools.
Rule Change 2017

CSR-B&T, Pt.1 Ch.12 Sec.3

2.4.5 Location required for hull penetration welding

- g) Corrugated bulkhead lower stool side plating to lower stool top plate.
- h) Corrugated bulkhead lower stool side plating to inner bottom.
2.4.5 Location required for hull penetration welding

i) Connection of structural elements in double bottom to the inner bottom plate in holds intended for the carriage of liquid at sea with a distance of **150** mm from the side plating of the lower stool, see Figure 3a.

![Diagram showing the location requirements for hull penetration welding with minimum distances of 150mm and 300mm.]
Impact due to this change

Estimated vessel:
Post Panamax BC, 7 cargo holds, 6 bulkheads

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<thead>
<tr>
<th></th>
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<tr>
<td>Deep Pene.</td>
<td>490 m</td>
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<tr>
<td>Full Pene.</td>
<td>255 m</td>
<td>745 m</td>
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Welding length will triple from the original rules.
Fatigue strength Review

The comparison of fatigue life at the lower stool connection between ballast hold and dry cargo hold of bulk carrier

Fatigue life
(The result of the fatigue evaluation in accordance with CSR BC&OT)

<table>
<thead>
<tr>
<th>Hold</th>
<th>Position</th>
<th>Fatigue Life</th>
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<tr>
<td>Ballst Hold</td>
<td>A</td>
<td>36 years</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>1159 years</td>
</tr>
<tr>
<td>Dry Hold</td>
<td>A</td>
<td>640 years</td>
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<tr>
<td></td>
<td>B</td>
<td>4787 years</td>
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ASEF Forum in Dalian on 23rd October 2018
Further Action of IACS

IACS reply to ASEF comments for RCP2017

Furthermore, the Hull Panel has also been tasked to develop a set of criteria for when the extent of full penetration weld can be reduced to partial penetration. This task will be prioritized and the output is intended to be included in the 2019 RCP.
Needs for follow-up by ASEF

ASEF should keep raising the issue of full penetration welding against IACS

- Should remind IACS to develop a set of criteria for when the extent of full penetration weld can be reduced to partial penetration.

- Should remind IACS to include this issue in the 2019 RCP.
THANK YOU
for your attention.