

Common Structural Rules for Bulk Carriers and Oil Tankers

Technical Background for Urgent Rule Change Proposal 1 to 01 JAN 2021 version

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Pt. 1, Ch. 1, Sec. 3, [2.2.3]

1. Reason for the rule change

See reason for Pt. 1, Ch. 11, Sec. 3.

2. Background

See background for Pt. 1, Ch. 11, Sec. 3.

3. Impact in scantlings

See impact for Pt. 1, Ch. 11, Sec. 3.

Pt 1, Ch 8, Sec2, [3.1.2]: Ratio of b_f to h_w for Angle, L2 and T-bars

1. Reason for the Rule Change

Feedback from the industry, designers and class societies indicates that for some special cases with relatively tall stiffeners, the ratio $b_f/h_w \geq 0.25$ will result in large slots in the floors/girders and consequently reduced shear capacity of the web of the floors/girders.

2. Background

In the current CSR, there is a requirement on the ratio $b_f/h_w \geq 0.25$, which came originally from CSR OT (July 2010) and takes as a general requirement to prevent torsional instability of angle and T profile stiffeners. However, since torsional buckling of stiffeners is also checked against specific design loads in the buckling capacity closed-form interactive formula (CFM) of CSR Pt 1, Ch 8, Sec 5, [2.3.4], it is proposed to introduce a modest relaxation on this general requirement as $b_f/h_w \geq 0.2$.

The effect of the relaxation is verified by comparisons with nonlinear FE calculation(Abaqus). For these comparisons, calculated results are shown in Figure 1 for some selected stiffened panels with T-bar stiffeners. The dimensions of the panels are given in Table 1, where the thicknesses for the plate and web are close to the minimum rule required thicknesses in order to minimize the rotational restraint as expected for this specific investigation. The plates are loaded with a uniaxial load in the stiffener direction which is the most critical load case for torsional buckling.

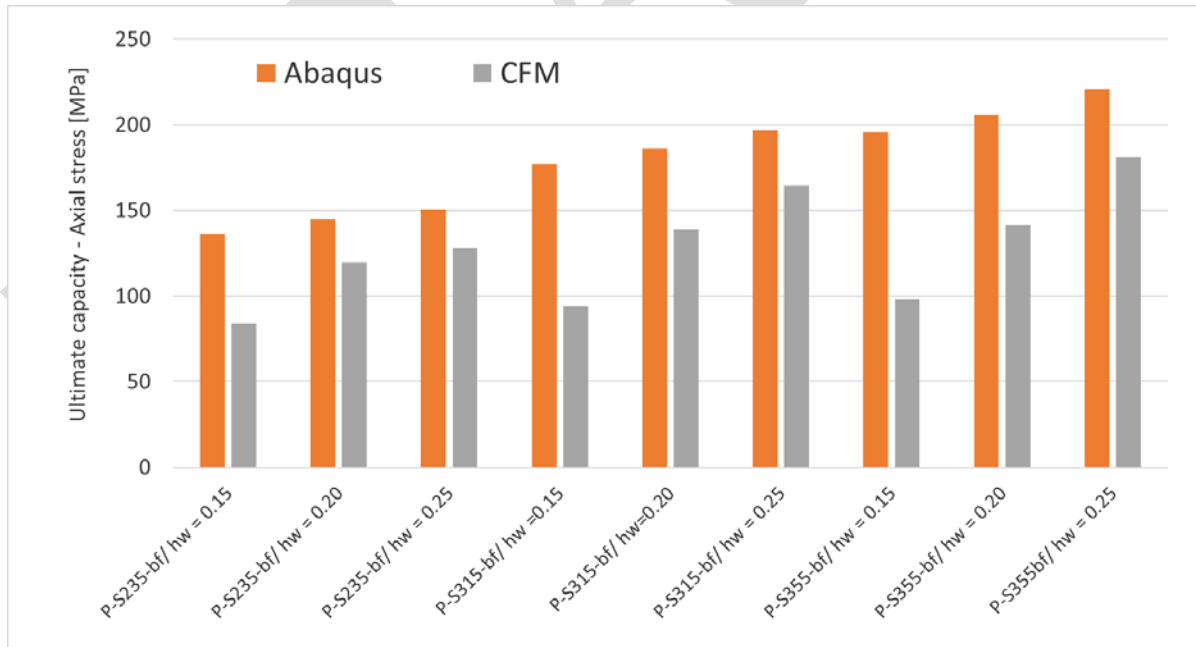
In Figure 1, it shows that with a smaller ratio of b_f/h_w , the CFM formula becomes more conservative, which means that even with this proposed relaxation the rule as a whole is still on the safe side. However, further relaxation of the proposed ratio $b_f/h_w \geq 0.2$ is yet to be investigated more extensively since the slenderness requirements on the stiffener webs of T and angle bars are dependent on the assumed simply-supported restraint from flange plate.

Table 1: Dimensions of stiffened plates

Panel Id.	L (mm)	s (mm)	h (mm)	bf (mm)	t_p (mm)	t_w (mm)	t_f (mm)	R_{eH} (N/mm ²)
P-S235-bf/ $h_w = 0.15$	5000	850	500	75	8.5	6.5	12	235
P-S235-bf/ $h_w = 0.20$	5000	850	500	100	8.5	6.5	12	235
P-S235-bf/ $h_w = 0.25$	5000	850	500	125	8.5	6.5	12	235
P-S315-bf/ $h_w = 0.15$	5000	850	500	75	10	7.5	12	315
P-S315-bf/ $h_w = 0.20$	5000	850	500	100	10	7.5	12	315
P-S315-bf/ $h_w = 0.25$	5000	850	500	125	10	7.5	12	315
P-S355-bf/ $h_w = 0.15$	5000	850	500	75	10.5	8	12	355
P-S355-bf/ $h_w = 0.20$	5000	850	500	100	10.5	8	12	355
P-S355bf/ $h_w = 0.25$	5000	850	500	125	10.5	8	12	355

3. Impact in Scantlings

There is no impact on scantlings.

Figure 1: Results for some stiffened panels with varying ratios of b_f/h_w 

Pt. 1, Ch. 11, Sec. 3, SYMBOL, [1.1.2], [1.1.3], [2] and [3] [To be deleted]**1. Reason for the rule change**

This proposal is made to avoid any possible discrepancy between CSR and UR A1, A2 and Rec.10. for long term maintenance considering different enter into force date and revision control. The supporting structure and foundations for deck equipment and fittings shall be considered by individual Society in addition to the requirements in this section.

2. Background

This RCP is to delete Sec 3 Symbol, [2] & [3] and Sec 4 Symbol, [3] & [5] from CSR Jan 2021 since UR A1, A2 and Rec.10 are to be uniformly implemented by all IACS societies to ships without exemption of CSR ships. In addition, Sec 3 [1.1.1] and Sec 4 [1.1.1] are improved to address that the supporting structure and foundations for deck equipment and fittings shall be considered by individual Society in addition to the requirements in this section

3. Impact in scantlings

For detailed technical background as well as the consequence assessment result, refer to Technical background (TB) document for UR A1, A2 and Rec.10.

Pt. 1, Ch. 11, Sec. 4, SYMBOL, [3] and [5] [To be deleted]**1. Reason for the rule change**

See reason for Pt. 1, Ch. 11, Sec. 3.

2. Background

See background for Pt. 1, Ch. 11, Sec. 3.

3. Impact in scantlings

See impact for Pt. 1, Ch. 11, Sec. 3.

Pt. 1, Ch. 11, Sec. 3, [1.1.1] and Sec. 4, [1.1.1]**1. Reason for the rule change**

See reason for Pt. 1, Ch. 11, Sec. 3.

2. Background

See background for Pt. 1, Ch. 11, Sec. 3.

3. Impact in scantlings

See impact for Pt. 1, Ch. 11, Sec. 3.