

SECTION 4

COMBINATION OF GLOBAL LOADS

1 General

1.1 Application

1.1.1 The global strength of the hull girder and the global strength of the platform of catamarans are checked according to:

- Ch 8, Sec 2 for steel or aluminium yachts
- Ch 9, Sec 2 for composites yachts.

1.1.2 The global loads to consider are defined in Ch 6, Sec 2 to Ch 6, Sec 3, taking account of combination as defined in [1.2].

1.1.3 The combination of global loads are mainly used to check:

- the strength of the decks and the upper part of side shell(s) against buckling
- the strength of the bottom of hull(s) against buckling
- the strength of the primary structure of the platform of catamarans, and particularly the transverse bulkheads connecting the floats
- the shearing strength of side shell(s) and longitudinal bulkheads.

1.2 Combination

1.2.1 The combinations of global loads (bending moments and shear forces) are to be made according respectively to Tab 1 and Tab 2.

Table 1 : Bending moments

Bending moments (kN.m)	Monohull		Catamarans	
	Motor	Sailing	Motor	Sailing
Hogging	$M_{SW} + M_{WV0^\circ}$	$M_{SW} + M_{WV0^\circ}$	$M_{SW} + M_{WV0^\circ}$	$M_{SW} + M_{WV0^\circ}$
Sagging	$M_{SW} - M_{WV0^\circ}$	$M_{SW} - M_{WV0^\circ} - 0,7 M_{RIG}$	$M_{SW} - M_{WV0^\circ}$	$M_{SW} - M_{WV0^\circ} - 0,7 M_{RIG}$
Quartering seas	–	–	M_{WV45°	$M_{WV45^\circ} + 0,7 M_{RIGT}$
Solid water over the bow	–	–	M_E	$M_E + 0,7 M_{RIGT}$

Note 1:
 M_{SW} : Still water bending moment (see Ch 6, Sec 2, [1])
 M_{WV0° : Wave bending moment in head sea (MWV,H or MWV,S) (see Ch 6, Sec 2, [2.2.2])
 M_{WV45° : Wave bending moment in quartering seas as calculated in Ch 8, Sec 2, [2.2] or Ch 9, Sec 2, [2.2]
 M_E : Bending moment due to loading induced by bow diving into waves as defined in Ch 6, Sec 3, [3]
 M_{RIG} : Hull girder vertical bending moment induced by the rig (see Ch 6, Sec 3, [2])
 M_{RIGT} : Rig torque induced by the unsymmetrical rig loads (see Ch 8, Sec 2, [2.1.7] or Ch 9, Sec 2, [2.1.8]).

Table 2 : Vertical shear force

Vertical shear force (kN)	Monohull		Catamarans	
	Motor	Sailing	Motor	Sailing
Hogging	$Q_{SW} + Q_{WV0^\circ}$	$Q_{SW} + Q_{WV0^\circ}$	$Q_{SW} + Q_{WV0^\circ}$	$Q_{SW} + Q_{WV0^\circ}$
Sagging	$Q_{SW} - Q_{WV0^\circ}$	$M_{SW} - Q_{WV0^\circ} - 0,7 Q_{RIG}$	$Q_{SW} - Q_{WV0^\circ}$	$Q_{SW} - Q_{WV0^\circ} - 0,7 Q_{RIG}$
Quartering seas	–	–	Q_{WV45°	$Q_{WV45^\circ} + 0,7 Q_{RIG}$
Solid water over the bow	–	–	Q_E	$Q_E + 0,7 Q_{RIG}$

Note 1:
 Q_{SW} : Still water vertical shear force (see Ch 6, Sec 2, [1])
 Q_{WV0° : Wave vertical shear force in head sea (QWV) (see Ch 6, Sec 2, [2.2.2])
 Q_{WV45° : Wave vertical shear force in quartering seas as calculated in Ch 8, Sec 2, [2.2] or Ch 9, Sec 2, [2.2]
 Q_E : Vertical shear force due to loading induced by bow diving into waves as defined in Ch 6, Sec 3, [3]
 Q_{RIG} : Vertical shear force induced by the rig (see Ch 6, Sec 3, [2])

