

ISAF Offshore Special Regulations

Appendix K – Moveable Ballast

A submission from Yachting Australia

Proposal:

The following proposals to modify Appendix K are the result of Yachting Australia preparing its own Appendix covering stability in general as well as for boats with moveable and variable ballast. (See amendment 1 at

http://www.yachting.org.au/default.asp?MenuID=Racing/2/0,Racing_Rules/67/0)

In doing so, we had the benefit of ISAF Appendix K and of recent experiences in Australia and overseas with canting keels and as a result of those experiences the following submissions are presented.

(YA Special Regulations extend to the local Categories 5, 6 and 7 which are for inshore racing and the requirements and principles for movable and variable ballast are carried down to these, albeit with reduced stability minima.)

Current Position:

In the various submissions below, the current position is stated followed by the proposal and the reason.

1. Integration of Appendix K requirements into Special Regulations

YA are of the opinion that for an Appendix to have validity it should be called up by a Special Regulation and hence propose that in the revision of the Special Regulations the following sections of Appendix K be integrated into the body of the Special Regulations.

1.1 Definitions

a) Current Regulation:

Moveable Ballast: Lead or other material including water which has no practical function in the boat other than to increase weight and/or to influence stability and/or trim and which may be moved but not varied in weight while a boat is racing.

Proposal:

Delete the definition from Appendix K and insert in amended form in appropriate location under 1.03.1:

Moveable Ballast: Lead or other material including water which has no practical function in the boat other than to increase weight and/or to influence stability and/or trim and which may be moved **transversely** but not varied in weight while a boat is racing.

Reason:

Currently Appendix 'K' does not consider boats with vertical lift keels that might be raised partially for sailing (whilst still meeting stability requirements). Hence the addition of "transversely" to the definition.

- b) Delete the following 2 definitions from Appendix K and insert in appropriate location under 1.03.1:

Static Ballast: Lead or other material including water which has no practical function in the boat other than to increase weight and/or to influence stability and/or trim and which may not be moved or varied in weight while a boat is racing.

Variable Ballast: Water carried for the sole purpose of influencing stability and/or trim and which may be varied in weight and/or moved while a boat is racing.

Reason:

To have all definitions in one location in the regulations.

1.2 Appendix K - 3.2 Ballast Tanks, Valves and Sea Cocks

Current regulation:

Ballast tanks for variable ballast shall be securely and permanently fixed to a boat's structure and shall be connected through a system of isolating valves and pump(s) capable of manual operation. A plan of the plumbing system shall be kept aboard the boat.

Proposal:

Delete from the Appendix and add to regulation 3.04 Stability – Monohulls as new regulation 3.04.6:

3.04.6 ~~Ballast~~ Tanks for variable ballast shall be ~~securely and permanently installed fixed to a boat's structure~~ and shall be ~~connected through~~ **provided with** a system of isolating valves and pump(s) capable of manual operation **at any angle of heel**. A plan of the plumbing system shall be ~~kept~~ **displayed** aboard the boat.

Reason:

- 1) *The initial word "Ballast" is redundant.*
- 2) *Cannot be both "securely" and "permanently" installed as there are separate definitions. "Securely" would not be adequate and "permanently installed" – "Means the item is effectively built-in by bolting, welding, glassing etc and may not be removed while racing". SR 3.01 will provide for adequate strength.*
- 3) *What we are seeking to achieve is a set of plumbing for manual actuation which may or may not be part of the system normally used. The plan of the plumbing needs to be located near the equipment for quick reference, not kept in a locker "somewhere".*

1.3 Regulation 3.04 – Stability – Monohulls

Current regulation:

There is no current regulation.

Proposal:

Add a new regulation as follows:

3.04.5 For boats with movable or variable ballast the method of 3.04.4 plus the relevant additional requirement of Appendix K.

Reason:

To cross reference Appendix K in the regulations so as to ensure the Appendix has validity and to ensure that the FKR is an additional stability requirement for boats with moveable or variable ballast.

1.4 Appendix K – 3.1 Keel 'Wet Box'

Current regulation:

A canting keel pivot shall be completely contained within a watertight enclosure which shall comply with SR 3.02.2.

Proposal:

Delete from the Appendix and incorporate it into a new regulation 3.02.3 as follows:

3.02.3 Canting keels and the like, together with any control mechanism, shall be constructed in such a way that the watertight integrity of the hull is not compromised.

Reason:

The regulation needs to address the total package of a canting keel, not just the keel pivot.

1.5 Appendix K - 4 Control Systems, Actuators

Current regulation:

4.1 Manual Power

Moveable and variable ballast systems shall be fitted with permanently installed manual control and actuation systems which are immediately operable by a boat's crew with the boat at any angle of heel.

Proposal:

Delete from the Appendix and incorporate it into a new regulation 3.02.4 as follows:

3.02.4 Control Systems, Actuators, Restraint

Moveable and variable ballast systems shall be fitted with a manual control and actuation systems **secondary** system which **shall be capable of controlling the full sailing load of the keel in the event of failure of the primary system. Such failures would include electrical and hydraulic failure and mechanical failure of the components and the structure to which it mounts. The system must be capable of being operational quickly and** ~~which are immediately operable by a boat's crew with the boat~~ shall be operable at any angle of heel. **It would be desirable if this system was capable of securing the keel on the centreline.**

Reason:

- 1) *YA propose that the requirement be for a secondary system which can be manually operated, be this hydraulic or mechanical. The mounting of the secondary system is to be at a different location to that of the primary system.*
- 2) *In the case of the smaller boats with rope and pulley primary systems the secondary system could be as simple as a fixed length wire that attaches to the failed side and is then tensioned by the good side.*
- 3) *For the larger boats it is probable that only a completely independent secondary hydraulic system would be workable and this cannot be “immediately” actuated without a process of opening and closing circuits.*
- 4) *Any secondary system will have to withstand the same loads as the primary system which means for a maxi around 120 tonne. This will have to be taken out into the structure around the keelbox in an area away from the mountings for the primary system as to try to attach to other parts of the boat structure will surely result in failure of the structure.*

2. Appendix K 4.2 Keel Locking

Current Regulation:

Moveable ballast systems shall be fitted with a mechanical method of locking the keel on the centreline. The system shall be designed to be capable of withstanding the maximum designed keel sailing loads including appropriate factors of safety and shall remain operable even if the keel actuation system has failed.

Proposal:

Delete entirely.

Reason:

- 1) *Not necessary when requiring a secondary operating system (as above) which the Appendix K “lock” would need to incorporate to bring the keel under control and move it to the lock position.*
- 2) *Although desirable, it is not necessary to lock it to the centreline, as all we are looking for is to stop the keel swinging and destroying the keelbox and so long as it is locked from moving then this will be achieved. It will be “better” if it is locked on centre but we need to settle for what is achievable.*

If the above is agreed, the following is showing what has been deleted and what will remain of Appendix K

ISAF SPECIAL REGULATIONS

APPENDIX K

Moveable and Variable Ballast

~~Effective From 1st February 2005~~

This Appendix invokes International Standard ISO 12217-2, Small craft – Stability and buoyancy assessment and categorization – Part 2: Sailing boats of hull length greater than or equal to 6m. The functions KFR (Knockdown Recovery Factor) and FIR (Inversion Recovery Factor) are defined in ISO 12217-2, except as modified by this Appendix.

This Appendix applies to Monohull Yachts only. Unless specifically stated, a requirement applies to Special Regulations Categories 0, 1, 2, 3 and 4. This Appendix does not apply to boats racing under Category 5.

1 ~~Definitions~~

~~Static Ballast: Load or other material including water which has no practical function in the boat other than to increase weight and/or to influence stability and/or trim and which may not be moved or varied in weight while a boat is racing.~~

~~Moveable Ballast: Load or other material including water which has no practical function in the boat other than to increase weight and/or to influence stability and/or trim and which may be moved but not varied in weight while a boat is racing.~~

~~Variable Ballast: Water carried for the sole purpose of influencing stability and/or trim and which may be varied in weight and/or moved while a boat is racing.~~

2 1 Stability

~~2.1~~ 1.1 Boat Condition

In the calculation of stability data:

- (a) deck and other enclosed volume above the sheerline may be taken into account, in which case offsetting cockpit volume shall also be taken into account.
- (b) Mass shall be taken as Minimum Operating Mass as defined by ISO 12217-2, paragraph 3.5.3.

~~2.2~~ 1.2 General Standards

In the assessment of ISO category for yachts fitted with moveable and/or variable ballast, ISO 12217-2, paragraph 6.1.4 b) shall not apply. Boats shall comply with the requirements of ISO 12217-2 paragraphs 6.2.3, 6.3 (if appropriate) and 6.4. Calculations shall be made for the ballast condition that results in the most adverse result when considering each individual stability requirement.

~~2.3~~ 1.3 Knockdown Recovery

Boats with moveable/variable ballast shall comply with the following minimum values of Knockdown Recovery Factor (FKR) calculated in accordance with ISO 12217-2 paragraph 6.4.4 with the lesser of FKR₉₀ and FKR₋₉₀ used:

SR Category	0	1,2	3	4
FKR	1.0	0.9	0.8	0.7

Boats with age date prior to 11/04 may seek dispensation from this section 1.3 by application to ISAF.

~~2.4~~ 1.4 Capsize Recovery

For boats racing under Special Regulations Category 0, Regulation 3.04.1 is modified to read:

3.04.1 Either with, or without, reasonable intervention from the crew, a yacht shall be capable of self-righting from an inverted position. Self righting shall be achievable whether or not the rig is intact. Boats with moveable/variable ballast shall comply with this requirement in flat water using manual power only and shall demonstrate that any equipment to be used in re-righting the boat is ready for use at all times and will function and is useable by the crew with the boat inverted. Re-righting the boat shall not require flooding any part of the boat.

Boats with moveable/variable ballast shall comply with the following minimum values of Inversion Recovery Factor (FIR) calculated in accordance with ISO 12217-2:

SR Category	0
FIR	0.9

Boats with age date prior to 11/04 may seek dispensation from this section 1.4 by application to ISAF.

~~3 Structure~~

~~3.1 Keel 'Wet Box'~~

~~A canting keel pivot shall be completely contained within a watertight enclosure which shall comply with SR 3.02.2.~~

~~3.2 Ballast Tanks, Valves and Sea Cocks~~

~~Ballast tanks for variable ballast shall be securely and permanently fixed to a boat's structure and shall be connected through a system of isolating valves and pump(s) capable of manual operation. A plan of the plumbing system shall be kept aboard the boat.~~

~~4 Control Systems, Actuators~~

~~4.1 Manual Power~~

~~Moveable and variable ballast systems shall be fitted with permanently installed manual control and actuation systems which are immediately operable by a boat's crew with the boat at any angle of heel.~~

~~4.2 Keel Locking~~

~~Moveable ballast systems shall be fitted with a mechanical method of locking the keel on the centerline. The system shall be designed to be capable of withstanding the maximum designed keel sailing loads including appropriate factors of safety and shall remain operable even if the keel actuation system has failed.~~