

## CHAPTER 16

### STABILIZATION SYSTEMS

#### ***EU Directive on Electromagnetic Compatibility (2004/108/EC)***

*Electrical and electronic equipment fitted to Community Craft that may either generate or be affected by electromagnetic disturbance shall meet the requirements of EU Directive 2004/108/EC, as amended. Equipment complying with this directive should have an EC mark or CE marking in accordance with EU Directives 2004/108/EC or 93/68/EEC (with Corrigendum), as amended.*

#### ***EU Directive on Electrical Equipment designed for use within certain voltage limits (2006/95/EC)***

*Electrical Equipment designed for use with a voltage rating of between 50 and 1000 volts for alternating current and between 75 and 1500 volts for direct current shall meet the requirements of EU Directive 2006/95/EC, except for specialised electrical equipment, for use on ships, which comply with the safety provisions drawn up by international bodies in which the Member States participate.*

### 16.1 Definitions

16.1.1 "Stabilization control system" is a system intended to stabilize the main parameters of the craft's attitude: heel, trim, course and height and control the craft's motions: roll, pitch, yaw and heave. This term excludes devices not associated with the safe operation of the craft, e.g. motion-reduction or ride-control systems.

The main elements of a stabilization control system may include the following:

- .1 devices such as rudders, foils, flaps, skirts, fans, water jets, tilting and steerable propellers, pumps for moving fluids;
- .2 power drives actuating stabilization devices; and
- .3 stabilization equipment for accumulating and processing data for making decisions and giving commands such as sensors, logic processors and automatic safety control.

16.1.2 "Self-stabilization" of the craft is stabilization ensured solely by the craft's inherent characteristics.

16.1.3 "Forced stabilization" of the craft is stabilization achieved by:

- .1 an automatic control system; or
- .2 a manually assisted control system; or
- .3 a combined system incorporating elements of both automatic and manually assisted control systems.

16.1.4 "Augmented stabilization" is a combination of self-stabilization and forced stabilization.

16.1.5 "Stabilization device" means a device as enumerated in 16.1.1.1 with the aid of which forces for controlling the craft's position are generated.

16.1.6 "Automatic safety control" is a logic unit for processing data and making decisions to put the craft into the displacement or other safe mode if a condition impairing safety arises.

## **16.2 General requirements**

16.2.1 Stabilization systems shall be so designed that, in case of failure or malfunctioning of any one of the stabilization devices or equipment, it would be possible either to ensure maintaining the main parameters of the craft's motion within safe limits with the aid of working stabilization devices or to put the craft into the displacement or other safe mode.

*In the event of failure of a stabilization system it should be possible to manually move the device into a neutral position and lock it there.*

*Means, such as automatic movement and locking of the device in a neutral position, should be provided to safeguard the stabilization system when the craft is going astern.*

16.2.2 In case of failure of any automatic equipment or stabilization device, or of its power drive, the parameters of craft motion shall remain within safe limits.

16.2.3 Craft fitted with an automatic stabilization system shall be provided with an automatic safety control unless the redundancy in the system provides equivalent safety. Where an automatic safety control is fitted, provision shall be made to override it and to cancel the override from the main operating station.

16.2.4 The parameters and the levels at which any automatic safety control gives the command to decrease speed and put the craft safely in the displacement or other safe mode shall take account of the safe values of heel, trim, yaw and combination of trim and draught appropriate to the particular craft and service; also to the possible consequences of power failure for propulsion, lift or stabilization devices.

16.2.5 The parameters and the degree of stabilization of the craft provided by the automatic stabilization system shall be satisfactory, having regard to the purpose and service conditions of the craft.

16.2.6 Failure mode and effect analysis shall include the stabilization system.

*The FMEA should comply with the requirements of Annex 3 and Annex 4. Normally compliance will be achieved by provision of redundant systems as detailed in 4.5 of Annex 4, and numerical assessment will not be required. Consideration should be given to the independence of redundant systems as required by 4.5.2 of Annex 4. It is recommended that FMEA's should be forwarded to MCA Headquarters for advice, particularly those that comply by means of numerical assessment.*

## **16.3 Lateral and height control systems**

16.3.1 Craft fitted with an automatic control system shall be provided with an automatic safety control. Probable malfunctions shall have only minor effects on automatic control system operation and shall be capable of being readily counteracted by the operating crew.

16.3.2 The parameters and levels at which any automatic control system gives the command to decrease speed and put the craft safely into the displacement or other safe mode shall take account of the safety levels as given in section 2.4 of annex 3 and of the safe values of motions appropriate to the particular craft and service.

#### **16.4 Demonstrations**

16.4.1 The limits of safe use of any of the stabilization control system devices shall be based on demonstrations and a verification process in accordance with annex 9.

16.4.2 Demonstration in accordance with annex 9 shall determine any adverse effects upon safe operation of the craft in the event of an uncontrollable total deflection of any one control device. Any limitation on the operation of the craft as may be necessary to ensure that the redundancy or safeguards in the systems provide equivalent safety shall be included in the craft operating manual.