

**Translation: Only the Danish version is authentic**

*Technical regulation no. 2/Order no. 9651 of 28 June 2007  
issued by the Danish Maritime Authority*

**Technical regulation on the stability, buoyancy, etc.  
of houseboats and floating structures<sup>1</sup>**

In pursuance of section 1, section 3, section 17(5), section 22, section 28 and section 32 of the Act on Safety at Sea, cf. Consolidated Act no. 627 of 26 July 2002, as amended by Act no. 1465 of 22 December 2004, and by authority of the Minister of Economic and Business Affairs, the following provisions are laid down:

**Application**

**Section 1.** This technical regulation shall apply to the stability, buoyancy, watertight subdivision, etc. of houseboats (floating dwellings) and floating structures covered by the Construction Act<sup>2</sup>. This technical regulation supplements the Construction Act and the administrative provisions issued pursuant to the Construction Act.

**Definitions**

**Section 2.** For the purposes of this technical regulation, the following definitions shall apply:

- 1) "Hull": The pontoon or the barge under a houseboat or floating structure or the hull of a previous ship that is fitted out for at floating structure used for habitation, business purposes or the like.
- 2) "Recognised standards": Danish design and construction standards, codes of practice<sup>3</sup> and equivalent international standards as well as the rules of recognised classification societies on the design and construction of ships and vessels.
- 3) "Houseboats and floating structures": Units on the water permanently in port and used for habitation, business purposes or similar purposes not of a merely transitory nature.
- 4) "Authorised person or company": A person or company authorised by the Danish Maritime Authority to carry out the verifications mentioned in section 13. An authorised person is authorised to require repairs made and to issue a certificate on the inspection following a satisfactory inspection.
- 5) "Professionally competent person": A person with documented expert knowledge about stability and floating structures.

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<sup>1</sup> This technical regulation has been notified in draft form in accordance with European Parliament and Council Directive 98/34/EC (the information procedure directive), as amended most recently by Directive 98/48/EC.

<sup>2</sup> Section 2(3) of the Construction Act: "The remarks to the Act state that floating structures permanently in port and used for habitation, business purposes or institutional purposes are covered by the Construction Act. It is also stated in section 11(b) of the Construction Act that they shall comply with the building regulations or the municipal authority's requirements, respectively.

<sup>3</sup> Such as codes of practice for steel, concrete, etc.

## Equivalents

**Section 3.** Where this technical regulation requires that a particular accessory, material, device or apparatus, or type thereof, be fitted or present on board a houseboat or floating structure, or that certain measures be taken, the Danish Maritime Authority shall permit another accessory, material, device or apparatus, or type thereof, or a different measure to be taken on the floating dwelling if, by the testing thereof or via another method, it feels that it has been substantiated that such an accessory, material, device or apparatus, or type thereof, or measure is as effective as that required in accordance with the regulations.

*Subsection 2.* The Danish Maritime Authority shall accept tests that have been carried out by approved testing bodies, including testing bodies in other EU member States, in EFTA states that are contracting parties to the EEA Agreement and in Turkey, which provide appropriate and satisfactory guarantees of the technical, professional and independent nature of the tests.

## Technical requirements

### The hull

**Section 4.** The strength and design of the hull shall be sufficient to withstand all foreseeable conditions during its planned use. The dimensions of the hull shall be such that it is able to bear and absorb the static and dynamic effects of force of the houses and superstructures placed in or on the hull as well as from any engine or tank installations as well as other equipment. The necessary reinforcements shall be built-in where point loads occur.

*Subsection 2.* The hull shall be designed and constructed in accordance with the relevant provisions in the rules issued by a recognised organisation<sup>4</sup> with regard to the hull design, strength and material dimensions.

*Subsection 3.* Where the hull is made of a material or using a method for which no design rules are provided by the recognised organisations or the Danish Maritime Authority, other recognised standards or codes of practice may be used.

*Subsection 4.* All spaces, tanks and sub-divisions shall be accessible for inspection.

*Subsection 5.* The hull shall be fitted with suitable cleats, fixtures or bollards in order to be securely moored. There shall also be at least one fixture or bollard at each end which can be used for towing. If the towing fixtures are easily accessible, these may also be approved as mooring fixtures. The area to which the cleats, fixtures and bollards are fastened shall be adequately reinforced.

*Subsection 6.* The design and construction shall be carried out in accordance with recognised standards<sup>5</sup> and with what is required by the material and construction method used in order to achieve a reliable and safe construction.

*Subsection 7.* Welding of the hull shall be carried out in accordance with recognised standards and codes of practice for carrying out welding work, for example in accordance with the rules of a recognised organisation.

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<sup>4</sup> Reference is made to technical regulation no. 5 of 9 August 2002 on the recognition and authorisation of organisations carrying out inspections and surveys of ships.

<sup>5</sup> Where recognised organisations have produced guidelines for the construction, these may be used.

## Materials

**Section 5.** The hull shall be made of steel, aluminium, reinforced concrete or other suitable material which is resistant to salt water, with the application of effective protection, where applicable.

*Subsection 2.* All materials used for the hull, deck, external cladding and the base for the floor covering that is exposed to water or moisture shall be made of a material that is not adversely affected by moisture, or else it shall be protected in a suitable manner.

## Tanks

**Section 6.** Where tanks need to be present on board for the storage of water, oil, sewage, etc., in newly constructed hulls the tanks shall be loose or built into a double bottom or double shell and be easy to inspect, both internally and externally.

*Subsection 2.* The tanks shall be dimensioned to withstand the maximum pressure they may be exposed to during use. Vent pipes shall discharge into the open air at least 380 mm above the deck of the hull.

## Bilge systems

**Section 7.** In each separate delimited space below deck in the houseboat or floating structure, a water level alarm shall be installed with acoustic and visual warning, which, in the event of an unintentional inflow of water, is audible throughout the floating structure. Where several spaces are connected, it is sufficient for water level alarms to be installed in one of the spaces at the lowest points, taking into account any trim and heel.

*Subsection 2.* There shall be a bilge pump with a minimum capacity that ensures that water can be pumped through the main bilge pipe at a rate of at least 2 m/s. However, the capacity of the bilge pump shall not be less than 15 m<sup>3</sup>/h. The internal diameter 'd' of the main bilge pump is determined using the following formula:

$$d = 25 + 1.68\sqrt{L(B + D)}_{(mm)}$$

Where: L, B and D are the hull's length, breadth and depth or moulded depth in metres.

The bilge pump(s) shall be arranged so that it is possible to discharge from all spaces below deck, apart from spaces used only for storing water or oil, or it shall be possible to move the pump from one suction well to another.

*Subsection 3.* Where it can be established that the safety of the barge is not thereby impaired, the bilge pumping arrangement and water level alarms may be dispensed with in certain spaces. This assumes that, in the event of a leak, it is possible to maintain an actual GM value of 0.60 m.

## Sub-division, buoyancy and stability

**Section 8.** The houseboat or the floating structure shall be stable under all conceivable conditions, both taking account of its unladen weight, supplies and cargo as well as persons and other moving cargo during normal use and whilst being towed. It shall be possible for this to be documented for the houseboat or floating structure.

*Subsection 2.* Hulls constructed as closed, watertight pontoons, for the sole purpose of maintaining the buoyancy of the houseboat or floating structure, shall be subdivided by means of, among other things, longitudinal and transverse watertight divisions (bulkheads), which shall ensure that the fully laden houseboat or floating structure remains afloat with positive stability even if the largest space becomes filled with water. Alternatively, there shall be a sufficient number of pontoons for the houseboat or floating structure to remain afloat with positive stability and a minimum GM value of 0.60 m even if the largest pontoon becomes filled with water.

*Subsection 3.* Stability<sup>6</sup>, expressed as metacentric height, GM, in intact condition, shall as a minimum be equal to or greater than a metacentric height (GM) of 0.60 m.

$$GM = \left( \frac{I_{VL}}{V} \right) - BG$$

$I_{VL}$  = the athwartships moment of inertia of the waterline plane around the centreline ( $m^4$ ).

$V$  = the volume of total displacement of the houseboat or floating structure to the relevant waterline ( $m^3$ ).

$G$  = the common centre of gravity for the fully laden houseboat or floating structure, measured in metres above the lower edge of the keel (lowest point on the lower edge of the barge) in the middle of the barge.

$BG$  = the vertical distance between the centre of buoyancy (B) and the fully laden houseboat or floating structure's combined centre of gravity (G).

$M$  = the metacentre is the point of intersection between the buoyancy line before and after a very slight list.

*Subsection 4.* When construction of a houseboat or floating structure is complete (that is to say, when it has a superstructure, etc.), an inclining test shall be carried out to establish the centre of gravity (G). As an alternative to an inclining test, detailed weight and centre of gravity calculations may be carried out by a professionally competent person.

*Subsection 5.* If modifications are made to the hull or superstructure which significantly affect the unladen weight and the location of the centre of gravity, the stability shall be re-evaluated by a professionally competent person. Significant in this connection means a change to the unladen weight of  $\pm 5\%$  or above or an increase in BG of 3% or above.

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<sup>6</sup> Reference is made to the most recent guidance on the approval of stability issued by the Danish Maritime Authority.

*Subsection 6.* It may be permitted to dispense with the determination of G for a particular hull under a houseboat or floating structure if data from an inclining test is available or a precise calculation has been made for a sister vessel. A follow-up check on the unladen weight shall be carried out by observing the draught or freeboard. In the case of deviations of up to 5% of the unladen weight (displacement), the use of stability data from a sister ship is acceptable.

*Subsection 7.* The stability of the finished, complete houseboat or floating structure shall, in the case of asymmetrical loading (side stress), wind action and a crowding of the maximum number of persons that can be expected to be on board onto one side on the topmost available level, be sufficient for the hull not to list more than 4° and the list shall reduce the freeboard on one side by a maximum of two-thirds of the original freeboard. A wind pressure of not less than 500 N/m<sup>2</sup> on the floating dwelling's façade above the mooring level shall be applied and the vertical moment arm shall be measured from the centre of the projected underwater hull in profile, or alternatively the wind pressure shall be determined by means of a more detailed calculation pursuant to the Danish standard code DS 410 "Code of practice for loads for the design of structures".

*Subsection 8.* Equivalent methods for determining stability may be used, provided this is acceptable to the authorised person.

*Subsection 9.* Ship-like hulls which comply with the relevant provisions for ships shall be regarded as having adequate stability and buoyancy, etc.

### **Freeboard and freeboard-related conditions**

**Section 9.** The freeboard, measured from the surface of the water to the top edge of the hull on the finished houseboat or floating structure, shall never be less than 500 mm when the floating dwelling is not listing.

*Subsection 2.* It shall be possible to maintain the watertightness and integrity of the hull, including the watertightness of openings into the sea, during towing. New hulls shall not have sea valves and other openings below the waterline unless there is a closable valve on the shell that can be shut from the deck. Discharge openings in the hull above the light waterline and less than 350 mm above the deepest waterline, and systems with open discharge outlets inboards shall have a non-return valve preventing the penetration of water. Pipe systems connected to lead-throughs in the hull shall be fitted so as to prevent water entering the vessel even if the valves are open. Valves on hull lead-throughs shall be fit for use on houseboats or floating structures and made of steel, bronze or another tough material and be fitted in such a way that they are easily accessible.

*Subsection 3.* If the hull has sidescuttles, the lower edge of these shall be positioned at least 500 mm above the surface of the water at the maximum draught. It shall not be possible to open sidescuttles and windows whose lower edge is less than 800 mm above the waterline at the maximum draught. Sidescuttles, windows and apertures as well as the glass therein shall be of solid construction and made of suitable materials. Glass in sidescuttles as well as windows and apertures situated within the freeboard shall be hardened or laminated glass, which shall be mechanically secured between two metal frames or between a flange and a metal frame.

## Special safety rules for houseboats or floating structures

**Section 10.** At least one approved lifebuoy provided with a 30 m line, ready for immediate use, shall be placed on the seaward side of the houseboat or floating structure.

*Subsection 2.* The houseboat or floating structure shall be provided with a permanently fitted ladder to enable a person who has fallen into the water to climb safely onto the hull. Where the houseboat or floating structure is located at a wharf or bridge provided with equivalent ladders, the ladder on the houseboat or floating structure may be dispensed with.

*Subsection 3.* In order to prevent people from falling into the water, a guard rail or railing with a handrail, knee rail and foot rail shall be provided on deck and in other places where people pass, or equivalent protection shall be provided by other means. The handrail shall be located at a minimum height of 1 metre, the knee rail at a height of approximately 0.5 metres and foot rail shall be at least 0.1 metre high. In the case of open types of guard rail the distance between the bars shall not be greater than 150 mm. The bars in guard rails shall be placed vertically so that children cannot climb up. For existing railing this may be ensured by fitting plates or tarpaulin on the inside of the bars. Decks, steps or other places where people pass shall be designed so that the area is anti-skid or shall be covered with an anti-skid material.

## Removal of floating structures

**Section 11.** When a houseboat or floating structure is moved within a port or similarly sheltered area, only the number of persons necessary for the removal may be present on board. Approved lifejackets<sup>7</sup> shall be available for those present on board.

*Subsection 2.* If the houseboat or floating structure is moved from one port to another, it shall be done during a period with prospects of favourable weather conditions, and there shall be no persons on board whilst it is being towed outside port areas unless the regulations on the construction, design, equipment and operation of ships are complied with.

## Approval and surveys

**Section 12.** Before a hull for a houseboat or floating structure is put into service, its design shall be approved pursuant to this technical regulation and be inspected by a person or undertaking that is authorised to do so by the Danish Maritime Authority. The authorised party shall, following a satisfactory examination and inspection, issue a certificate confirming that the hull complies with this technical regulation. Before the finished houseboat or floating structure is put into service as new, an authorised person shall verify the stability of the total structure using a recognised method and issue appropriate documentation. The documentation shall be retained by the owner.

*Subsection 2.* The outside of houseboats and floating structures' bottom shall be inspected on land by an authorised person at least every 5 years and a certificate shall be issued concerning the inspection. The owner shall retain the certificate from the most recent inspection. The owner shall send a copy of the certificate to the Danish Maritime Authority in electronic or paper form.

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<sup>7</sup> Lifejackets approved according to recognised codes of practice are lifejackets that are CE-marked or wheel-marked.

*Subsection 3.* In the case of houseboats and floating structures with a bottom made of especially resistant materials or which have undergone special preservation and external corrosion protection using long-life paint systems combined with active anodes, the intervals between bottom inspections may be extended to 10 years.

### **Penalties and entry into force**

**Section 13.** Contraventions of sections 4-13 shall be punishable by fine or imprisonment for a period not exceeding 1 year.

*Subsection 2.* The penalty may be increased to imprisonment for a period not exceeding 2 years if

- 1) the contravention has caused damage to life or health or risk of such damage;
- 2) an injunction or order has previously been issued in connection with the same or equivalent situations; or
- 3) the contravention has produced or has been intended to produce financial benefits to the contravener or others.

*Subsection 3.* It shall be considered especially aggravating circumstances if the contravention has caused damage to the life or health of persons below the age of 18 or risk of such damage, cf. subsection 2, item 1.

*Subsection 4.* If the benefit obtained through the contravention is not confiscated, the size of such financial benefit obtained shall be taken into account when determining the fine, including additional fines.

*Subsection 5.* Companies etc. (legal personalities) may be liable to punishment according to the provisions of chapter 5 of the Penal Code.

**Section 14.** This technical regulation shall enter into force on 1 August 2007.

**Section 15.** This technical regulation shall not apply to Greenland.

*Subsection 2.* Floating structures not covered by technical regulation no. 1 of 27 January 2004 on the stability, buoyancy, etc. of floating dwellings that had been taken in use before the entry into force of this technical regulation shall comply with the provisions of this technical regulation no later than one year after the entry into force of this technical regulation, including be approved by an authorised person or undertaking.

*Subsection 3.* Technical regulation no. 1 of 27 January 2004 on the stability, buoyancy, etc. of floating dwellings shall be repealed.

## **Remarks to the technical regulation on the stability, buoyancy etc. of houseboats and floating structures**

### **Introduction**

Municipalities, port authorities as well as users and owners of houseboats and floating structures have been uncertain as regards the regulation that applies to the design, arrangement and operational conditions, if any, of these units.

In this light, the Danish Enterprise and Construction Authority, the Danish Working Environment Authority and the Danish Maritime Authority have found it necessary to clarify the division of authority in relation to houseboats and floating structures used for habitation, business purposes or the like.

### **The Construction Act**

An amendment of section 11(b) of the Construction Act in 2004 has clarified that the Act covers houseboats and floating structures used for habitation, business purposes or similar purposes. Furthermore, the remarks to the Act state that floating structures permanently in port and used for habitation, business purposes or institutional purposes are covered by the Construction Act, including the provisions on the handling of construction cases.

In addition, the Danish Enterprise and Construction Authority has issued guidelines in May 2004 on the handling of cases related to the construction of floating dwellings. The guidelines state that they also apply to the handling of cases related to houseboats being built, rebuilt or used for other purposes than habitation, such as business activities, restaurants, cafes, theatres, music venues, etc.

As the construction authority, the municipality shall decide in each individual case what requirements apply to each individual construction considering the intended use and nature of the floating structure. It is also the municipality that shall decide to what extent it shall be possible to grant an exemption from the provisions of the regulations.

### **Health and Safety at Work Act**

Together with the Danish Working Environment Authority, a delimitation has been made as regards the responsibility of authority for the field of health and safety at work for floating structures used for business purposes.

In the future, the Danish Working Environment Authority will inspect floating structures used for business purposes that do not hold a sailing permit from the Danish Maritime Authority and that are permanently located at a wharf or the like.

## **The Act on Safety at Sea and other maritime legislation**

The Danish Maritime Authority administers the Act on Safety at Sea. The purpose of the Act is, among other things, to ensure that ships are constructed, equipped and operated so that the safety of life at sea is fully secured and so that they are suitable for the intended purpose at any time.

The Act is a framework law; except for one general omnibus clause, it is decided by means of technical regulations issued by the Danish Maritime Authority how ships shall be constructed, arranged and equipped.

Subsequently, the Danish Maritime Authority only regulates the stability and buoyancy, etc. of floating structures as stipulated in this technical regulation.

The owner is responsible for any other conditions in this technical regulation as well as for the conditions covered by other authorities.

It will still be possible to register houseboats and floating structures in the Danish Ship Registry, where they will be given the designation floating dwelling, etc.

*Danish Maritime Authority, 28 June 2007*

Steen Nielsen / Anne Lene Ries