

## **CHAPTER 20**

### **SPECIAL PROVISIONS APPLICABLE TO PASSENGER SAILING VESSELS NOT NAVIGATING ON THE RHINE (ZONE R)**

#### **Article 20.01**

##### ***Application of Parts II and III***

In addition to the provisions of Parts II and III, the requirements in this Chapter shall apply to passenger sailing vessels not navigating on the Rhine (Zone R).

#### **Article 20.02**

##### ***Exceptions for certain passenger sailing vessels***

1. For passenger sailing vessels having an  $L_{WL}$  not exceeding 45 m and a maximum permissible number of passengers not exceeding  $L_{WL}$  in whole meters, the following provisions shall not apply:
  - a) Article 3.03(7), provided that anchors are not stored in hawse pipes;
  - b) Article 13.02(2)(d), with regard to length;
  - c) Article 19.08(3)(a);
  - d) Article 19.15(8).
2. By way of derogation from (1), the number of passengers may be raised to 1,5 times the  $L_{WL}$  in whole meters, if sails, rigging and deck fittings so permit.

#### **Article 20.03**

##### ***Stability requirements for vessels under sail***

1. For the calculation of the heeling moment according to Article 19.03(3), the furled sails shall be taken into account when determining the centre of gravity of the vessel.
2. Taking into consideration all loading conditions according to Article 19.03(2), and using a standard arrangement of sails, the heeling moment caused by wind pressure shall not be so high as to exceed a heeling angle of 20°. At the same time
  - a) a constant wind pressure of 0,07 kN/m<sup>2</sup> shall be applied for the calculation;
  - b) the residual safety clearance shall be at least 100 mm, and
  - c) the residual freeboard shall not be negative.
3. The righting lever of static stability shall:
  - a) reach its maximum value  $h_{max}$  at a heeling angle  $\varphi_{max}$  of 25° or over;
  - b) amount to at least 0,20 m at a heeling angle of 30° or over;
  - c) be positive at a heeling angle of up to 60°.
4. The area A under the curve of the righting levers shall not be less than
  - a) 0,055 m · rad up to 30°;
  - b) 0,09 m · rad up to 40° or at the angle  $\varphi_f$  at which an unprotected opening reaches the water surface and which is less than 40°.

Between

- c) 30° and 40°, or
  - d) 30° and the angle  $\varphi_f$  at which an unprotected opening reaches the water surface and which is less than 40°,
- this area shall not be less than  $0,03 \text{ m} \cdot \text{rad}$ .

#### **Article 20.04** ***Shipbuilding and mechanical requirements***

1. By way of derogation from Article 6.01(3), and Article 10.01(3), the equipment must be designed for permanent lists of up to 20°.
2. By way of derogation from Article 19.06(5)(a) and Article 19.06(9)(b), the inspection body may, in the case of passenger sailing vessels not more than 25 m long, authorise a clear width of less than 0,80 m for connecting corridors and companionways. However, the clear width shall be at least 0,60 m.
3. By way of derogation from Article 19.06(10)(a), the inspection body may, in specific cases, authorise the use of removable guard rails in areas where this is necessary for controlling the sails.
4. Within the meaning of Article 19.07, sails rank as a main propulsion system.
5. By way of derogation from Article 19.15(6)(c), the height of the lower edge of the door opening may be reduced to 0,20 m above the floor of the passenger area. Once opened, the door shall close and lock automatically.
6. If there is a possibility of the propeller idling while the vessel is under sail, any endangered parts of the propulsion system shall be protected against potential damage.

#### **Article 20.05** ***Rigging in general***

1. The parts of the rigging shall be arranged in such a way as to prevent unacceptable chafing.
2. If a material other than wood is used or if special types of rigging are used, such a design shall guarantee equivalent levels of safety with the dimensions and strength values laid down in this Chapter.

As proof of sufficient strength:

- a) a strength calculation shall be carried out; or
- b) a certificate has been obtained from a recognised classification society; or
- c) dimensioning shall be based on the procedures set out in a recognised regulatory framework (e.g. Middendorf, Kusk-Jensen).

The proof shall be presented to the inspection body.

### **Article 20.06** ***Masts and spars in general***

1. All spars shall be made of high-quality material.
2. Wood for masts shall:
  - a) be free of knot concentrations;
  - b) be free of sapwood within the required dimensions;
  - c) as far as possible be straight-grained;
  - d) contain as little as possible twisted growth.
3. If the chosen timber is either pitch pine or Oregon pine of quality level 'clear and better', the diameters in the tables reproduced in Articles 20.07 to 20.12 can be reduced by 5 %.
4. If the timbers used for masts, topmasts, yardarms, booms and bowsprits are not round in cross-section, such timbers must be of equivalent strength.
5. Mast pedestals, mast trunks and fastenings on deck, on floor-plates and on stem or stern shall be constructed in such a way that they can either absorb the forces they are subjected to or transfer them to other connected parts of the structure.
6. Depending on the stability of the vessel and the external forces it is subjected to and also the distribution of the available sail area, the inspection body may, on the basis of the dimensions laid down in Articles 20.07 to 20.12, allow reductions in the cross-sections of the spars and, where appropriate, of the rigging. Proof shall be submitted in accordance with Article 20.05(2).
7. If the vessel's period of oscillation/period of roll, in seconds, is less than three quarters of its breadth, in metres, the dimensions set out in Articles 20.07 to 20.12 shall be increased. Proof shall be submitted in accordance with Article 20.05(2).
8. In the tables reproduced in Articles 20.07 to 20.12 and 20.14, possible intermediate values shall be interpolated.

### **Article 20.07** ***Special provisions for masts***

1. Wooden masts shall meet the following minimum requirements:

Length <sup>1</sup> [m]	Diameter on deck [cm]	Diameter on the cross-tree [cm]	Diameter on the mast cap [cm]
10	20	17	15
11	22	17	15
12	24	19	17
13	26	21	18
14	28	23	19
15	30	25	21
16	32	26	22
17	34	28	23
18	36	29	24
19	39	31	25

<sup>1</sup> Distance from the cross-tree to the deck.

Length <sup>1</sup> [m]	Diameter on deck [cm]	Diameter on the cross-tree [cm]	Diameter on the mast cap [cm]
20	41	33	26
21	43	34	28
22	44	35	29
23	46	37	30
24	49	39	32
25	51	41	33

If a mast has two yards, the diameters shall be increased by at least 10 %.

If a mast has more than two yards, the diameters shall be increased by at least 15 %.

In the case of masts fitted through the deck, the diameter at the mast foot shall be at least 75 % of the diameter of the mast at deck level.

- Mast fittings, mast bands, cross-trees and mast caps shall be sufficiently strongly dimensioned and attached.

### **Article 20.08** ***Special provisions for topmasts***

- Wooden topmasts shall meet the following minimum requirements:

Length <sup>1</sup> [m]	Diameter at the foot [cm]	Half-length diameter [cm]	Diameter at fitting <sup>2</sup> [cm]
4	8	7	6
5	10	9	7
6	13	11	8
7	14	13	10
8	16	15	11
9	18	16	13
10	20	18	15
11	23	20	16
12	25	22	17
13	26	24	18
14	28	25	20
15	31	27	21

If square sails are attached to a topmast, the dimensions set out in the table shall be increased by 10 %.

<sup>1</sup> Total length of the topmast, without the masthead.

<sup>2</sup> Diameter of the topmast at the level of the masthead fitting.

2. The overlap between the topmast and the mast shall be at least 10 times the required foot diameter of the topmast.

**Article 20.09**  
***Special provisions for bowsprits***

1. Wooden bowsprits shall meet the following minimum requirements:

Length <sup>1</sup> [m]	Diameter at stem [cm]	Half-length diameter [cm]
4	14,5	12,5
5	18	16
6	22	19
7	25	23
8	29	25
9	32	29
10	36	32
11	39	35
12	43	39

2. The inboard section of the bowsprit shall have a length of at least four times the diameter of the bowsprit at the stem.
3. The diameter of the bowsprit at its head shall be at least 60 % of the diameter of the bowsprit at the stem.

**Article 20.10**  
***Special provisions for jib-booms***

1. Wooden jib-booms shall meet the following minimum requirements:

Length <sup>2</sup> [m]	2	3	4	5	6	7	8	9	10
Diameter at the stem [cm]	7	10	14	17	21	24	28	31	35

2. The diameter of the jib-boom at its head shall be at least 60 % of the diameter at the stem.

<sup>1</sup> Total length of the bowsprit.

<sup>2</sup> Total length of the jib-boom.

### Article 20.11

#### *Special provisions for main booms*

1. Wooden main booms shall meet the following minimum requirements:

Length <sup>1</sup> [m]	5	6	7	8	9	10	11	12	13	14	15	16
Diameter [cm]	14	15	16	17	18	20	21	23	24	25	26	27

2. The diameter at the swivel pin shall be at least 72 % of the diameter specified in the table.
3. The diameter at the clew shall be at least 85 % of the diameter specified in the table.
4. Measured from the mast, the greatest diameter shall be at two thirds of the length.
5. Where:
- there is an angle of less than 65° between the main boom and the after leech and the main sheet is attached to the end of the boom, or
  - the attachment point of the sheet is not abreast of the clew,

The inspection body may, according to Article 20.05(2), require a greater diameter.

6. For sail areas of less than 50 m<sup>2</sup>, the inspection body may authorise reductions in the dimensions set out in the table.

### Article 20.12

#### *Special provisions for gaffs*

1. Wooden gaffs shall meet the following minimum requirements:

Length <sup>2</sup> [m]	4	5	6	7	8	9	10
Diameter [cm]	10	12	14	16	17	18	20

2. The unsupported length of the gaff shall be not more than 75 %.
3. The breaking strength of the crowfoot shall be at least equal to 1,2 times the breaking strength of the peak halyard.
4. The top angle of the crowfoot shall be a maximum of 60°.
5. If, by way of derogation from (4), the top angle of the crowfoot is greater than 60°, the tensile strength shall be adjusted to accommodate the forces that will then occur.
6. For sail areas of less than 50 m<sup>2</sup>, the inspection body may authorise reductions in the dimensions set out in the table.

<sup>1</sup> Total length of the main boom.

<sup>2</sup> Total length of the gaff.

**Article 20.13*****General provisions for standing and running rigging***

1. Standing and running rigging shall comply with the strength requirements set out in Articles 20.14 and 20.15.
2. Wire cable connections may take the form of:
  - a) splicings,
  - b) compression sleeves, or
  - c) sealing sleeves.
 Splicings shall be marled and ends shall be whipped.
3. Eye splices shall be provided with thimbles.
4. Ropes shall be routed in such a way as not to obstruct entrances and companionways.

**Article 20.14*****Special provisions for standing rigging***

1. Forestays and shrouds shall meet the following minimum requirements:

Mast length <sup>1</sup> [m]	11	12	13	14	15	16	17	18
Tensile strength of the forestay [kN]	160	172	185	200	220	244	269	294
Tensile strength of the shrouds [kN]	355	415	450	485	525	540	630	720
Number of shroud cables and ropes per side	3	3	3	3	3	3	4	4

2. Backstays, topmasts, flying jib-stays, jib-booms and bowsprit shrouds shall meet the following minimum requirements:

Mast length <sup>2</sup> [m]	<13	13-18	>18
Tensile strength of the backstay [kN]	89	119	159
Tensile strength of the topmast [kN]	89	119	159
Length of topmast [m]	<6	6-8	>8
Tensile strength of the flying jib-stay [kN]	58	89	119
Length of jib-boom [m]	<5	5-7	>7
Tensile strength of the bow sprit shrouds [kN]	58	89	119

<sup>1</sup> Distance from the top or cross-tree to the deck.

<sup>2</sup> Distance from the top or cross-tree to the deck.

3. The preferred rope design shall be based on Rope Construction Method 6 × 7 FE in the strength class 1550 N/mm<sup>2</sup>. Alternatively, at the same strength class, Construction Method 6 × 36 SE or 6 × 19 FE may be used. Because of the higher elasticity of Construction Method 6 × 19, the tensile strengths given in the table shall be increased by 10 %. Use of a different rope design shall be permitted provided it has comparable properties.
4. If rigid rigging is used, the tensile strengths shown in the table shall be increased by 30 %.
5. For rigging, only approved forks, round eyes and bolts may be used.
6. Bolts, forks, round eyes and turnbuckles shall be capable of being properly secured.
7. The tensile strength of the bobstay shall be at least 1,2 times the tensile strength of the respective jib-stay and flying jib-stay.
8. For vessels with less than 30 m<sup>3</sup> water displacement, the inspection body may permit the reductions in tensile strengths shown in the table set out below:

Water displacement divided by the number of masts [m <sup>3</sup> ]	Reduction [%]
>20 to 30	20
10 to 20	35
< 10	60

### Article 20.15

#### ***Special provisions for running rigging***

1. For running rigging, fibre ropes or steel wire ropes shall be used. The minimum tensile strength and the diameter for running rigging shall, in relation to the sail area, meet the following minimum requirements:

Type of running rigging	Rope material	Sail area [m <sup>2</sup> ]	Minimum tensile strength [kN]	Diameter of rope [mm]
Staysail halyards	Steel wire	up to 35	20	6
		> 35	38	8
	Fibre (polypropylene - PP)	Rope diameter of at least 14 mm and one rope sheave for every 25 m <sup>2</sup> or part thereof		
Gaff sail halyards Top sail halyards	Steel wire	up to 50	20	6
		> 50 to 80	30	8
		> 80 to 120	60	10
		>120 to 160	80	12
	Fibre (PP)	Rope diameter of at least 18 mm and one rope sheave for every 30 m <sup>2</sup> or part thereof		

Type of running rigging	Rope material	Sail area [m <sup>2</sup> ]	Minimum tensile strength [kN]	Diameter of rope [mm]
Staysail sheets	Fibre (PP)	up to 40	14	
		> 40	18	
	For sail areas of more than 30 m <sup>2</sup> , the sheet shall take the form of a tackle or shall be capable of being operated by a winch			
Gaff-/Top-sail sheets	Steel wire	< 100	60	10
		100 to 150	85	12
		> 150	116	14
		For top sail sheets, elastic connection elements (fore runners) are necessary.		
	Fibre (PP)	Rope diameter of at least 18 mm and at least three rope sheaves. Where the sail area is greater than 60 m <sup>2</sup> , one rope sheave per 20 m <sup>2</sup>		

- Running rigging forming part of the staying shall have a tensile strength which corresponds to that of the respective stay or shrouds.
- If materials other than those stated in (1) are used, the strength values given in the table in (1) shall be complied with.

Fibre ropes of polyethylene shall not be used.

### Article 20.16 *Fittings and parts of the rigging*

- If steel wire ropes or fibre ropes are used, the diameters of the rope sheaves (measured from centre of rope to centre of rope) shall meet the following minimum requirements:

Steel wire [mm]	6	7	8	9	10	11	12
Fibre [mm]	16	18	20	22	24	26	28
Rope sheave [mm]	100	110	120	130	145	155	165

- By way of derogation from (1), the diameter of the rope sheaves may be equal to six times the diameter of the steel wire, provided that the steel wire does not constantly run over sheaves.
- The tensile strength of the fittings (e.g. forks, round eyes, turnbuckles, eye-plates, bolts, rings and shackles) shall be compatible with the tensile strength of the standing or running rigging that is attached to them.
- The fastenings of stay and shroud futtocks shall be designed to take up the forces they are subjected to.
- Only one shackle, along with the relevant stay or shroud, may be attached to each eye.
- Blocks of halyards and topping lifts shall be securely fastened to the mast, and the revolving crowfeet used for this purpose shall be in good condition.
- Attachments of eye-bolts, cleats, belaying pins and fife-rails shall be designed to cope with the forces they are subjected to.

**Article 20.17**  
***Sails***

1. It shall be ensured that sails can be taken in simply, swiftly and safely.
2. The sail area shall be appropriate for the type of vessel and the water displacement.

**Article 20.18**  
***Equipment***

1. Vessels that are fitted with a jib-boom or a bowsprit shall have a jib-net and an adequate number of appropriate holding and tensioning devices.
2. The equipment according to (1) may be dispensed with if the jib-boom or bowsprit is equipped with a hand becket and a foot rope adequately dimensioned to allow for the attachment of a safety harness to be carried on board.
3. For work on the rigging, a boatswain's chair shall be provided.

**Article 20.19**  
***Testing***

1. The rigging shall be tested by the inspection body every 2,5 years. As a minimum, the test shall cover the following:
  - a) the sails, including leeches, clews and reef eyes;
  - b) the state of the masts and spars;
  - c) the state of the standing and running rigging together with cable wire connections;
  - d) facilities for taking in the sail swiftly and safely;
  - e) the secure fastening of blocks of halyards and topping lifts;
  - f) the fastening of mast trunks and other fastening points for standing and running rigging that are attached to the vessel;
  - g) the winches for operating the sails;
  - h) other facilities fitted for the purposes of sailing, such as lee-boards and the fittings for operating them;
  - i) the measures taken to prevent the chafing of the spars, the running and standing rigging and the sails;
  - j) the equipment according to Article 20.18.
2. That part of the wooden mast passing through the deck and located below the deck shall be re-examined at intervals to be determined by the inspection body, but at the very least on the occasion of each periodical inspection. The mast shall be extracted for this purpose.
3. A certificate of the last inspection carried out in accordance with (1) and issued, dated and signed by the inspection body, shall be carried on board.