

## SECTION 1

## GENERAL REQUIREMENTS

### 1 General

#### 1.1 Application

**1.1.1** The characteristics of composite materials to be used in the construction of yachts within scope of Bureau Veritas classification are to comply with the present Chapter.

#### 1.2 General

**1.2.1** The composite's characteristics are directly depending on:

- type of resin
- type of fibre
- type of reinforcement fabric
- type of hull's manufacturing process.

All these particulars are taken into account in this Chapter:

- to characterize composite materials from a mechanical point of view
- to define the Bureau Veritas survey and inspection requested for granting the construction marks  $\boxtimes$  or  $\bullet$  and for classing the yacht.

**1.2.2** The following steps are to be examined within the scope of the classification of a composite yacht, from a structural point of view:

- Raw materials: homologation or equivalent process to grant the construction marks as defined in Ch 12, Sec 2, [6]
- Theoretical characterization of laminates as defined in Ch 12, Sec 3 (individual layer) and Ch 12, Sec 4 (laminated)
- Mechanical sample tests representative of the hull's structure to compare with theoretical analysis as defined in Ch 12, Sec 5, [4]
- Structure drawings examination, as defined in Ch 1, Sec 3
- Preliminary survey of the yard and survey at work as defined in Ch 12, Sec 5, [2] and Ch 12, Sec 5, [3].

**1.2.3** The composite materials considered in this present chapter are basically those made from:

- Thermoset resin's systems
- Glass, carbon or para-aramid based reinforcement fabrics
- Manufacturing processes as lay-ups (spray and hand) or vacuums (infusion) or pre-pregs.

Composite materials made of other resin's systems, fibres or manufacturing processes may be accepted provided their specifications are submitted to the Society for approval.

### 2 Documents to be submitted

#### 2.1 General

**2.1.1** As a rule, the drawings and documents to be submitted for examination are listed in Ch 1, Sec 3, Tab 1.

#### 2.2 Laminate

**2.2.1** Following information are to be given on drawings:

- arrangement of laminate for the various structural elements: thickness, definition of the successive layers of reinforcement, mass per square meter in layers of reinforcement, proportion in mass of reinforcement of each layer, directions of roving layers and unidirectional reinforcements, decreasing in thicknesses between layers
- direction of laminate in relation with ship structure
- structure of oil tanks or other liquid tanks which are integrated to the hull
- details of connection between various structural elements and details of attachments to the hull of reinforcing supplementary elements
- pillars.

#### 2.3 Individual layer

**2.3.1** However, the technical specifications of suppliers with indication of types, trademarks and references of the resins and gel-coats, reinforcements, and core materials are to be supplied.

These specifications have to give the following information:

- for resins: system (polyester, vinylester or epoxy), density, Young modulus, shear modulus, Poisson coefficient, breaking strength and elongation at break
- for reinforcements (unidirectional reinforcements, woven rovings, chopped strand mats): quality (fibre's type, density with breaking strength of the elementary fibre, Young modulus and Poisson coefficient, in fibre direction and normal to fibre direction), mass per square meter, thickness and eventually weft-warp distribution
- for core materials: type and quality, density, tensile, compression and shear strength and elasticity moduli.