Main changes in BV Rules for Composite Ships (NR546)

Main changes in Bureau Veritas Rules for the Classification of Ships built in Composite Materials (October 2021 edition), regarding the previous edition (November 2018) are described as follows:

Rules History

October 2021 edition Contents	Previous edition: November 2018 Contents
Hull in composite Materials and Plywood, Material Approval, Design Principles, Construction and Survey [NR 546 DT R03 E October 2021]	Hull in composite Materials and Plywood, Material Approval, Design Principles, Construction and Survey [NR 546 DT R02 E November 2018]

Hull Structure

Application of the Rules to inland navigation (NR217)

- Application of the Rules for inland navigation vessel built in composite materials – Sec 1, [1.1.2].

Stress analysis in gluing connection

- Stress analysis in gluing connection has been detailed and safety factors updated – Sec 2, [1.3.5].

New description for finite element calculation

- Global strength scantling analysis – Sec 2, [3.1.3] and Sec 2, [6]
- Panel analysis under global loads and scantling criteria – Sec 6, [6.1.3]
- Structural beam model –Sec 7, [1.2.3].

Calculation of shear strain and stress in transverse reference section

- In addition to bending strain and stress, shear strain and stress formulae are available – Sec 2, [4.2].

Simplified method for the calculation of the transverse section shear stress

- Proposition of an additional simplified method for the calculation of a transverse section shear stress when the inertia of the section is not determined – Sec 2, [4.3.4].

Raw materials

- Update of red cedar characteristics considered as reinforcement fabrics and not core materials and breaking shear stresses modified – Sec 4, [3.3.8] and Sec 4, Tab 5
- Definition of new category of PET foam cores – Sec 4, [4.2.1] and Sec 4, Tab 3.

Individual layers

- Update of default values of content in volume and content in mass for chopped strand mat – Sec 5, Tab 1.

Laminate behaviour under bending moments, shear forces and in-plane forces

- Update of definition of bending moment M_{xy} for plates – Sec 6, [3.1.2]
- Update of K_{xy} definition – Sec 6, [3.2.1].

Stiffener

- Description of the different possibility and methodologies for stiffener model analysis – Sec 7, [1.2]
- Update of description of stiffener model – Sec 7, Fig 1
- Update of critical buckling stress under axial force of stiffeners with the definitions of buckling for flanges – Sec 7, [3.2.2]
- Update of reduction coefficient factor c_f for calculation of bending moment for stiffener under sea or internal pressure – Sec 7, [4.2.1]
- Update of shear rigidity – Sec 7, [10..1.2], b)
- Update of definition of eccentricity for stiffeners – Sec 7, [10.1.5].

Custom section stiffeners

- Definition of custom section stiffeners and characteristics calculation (neutral axes, rigidity, eccentricity) – Sec 7, [10.2]
- Analysis of custom stiffeners under local loads (forces and moments) – Sec 7, [9.3].

Plywood characteristics definition

- Update of plywood characteristics definition to be consistent with laminates characteristics definitions – Sec 8, Symbols and Sec 8, Tab 1
- Update of maximum break shear values – Sec 8, Tab 1.

Composite shaft line

- Update the definition of axial misalignment strain – Sec 10, [4.1.3]
- Update the strain in laminate shaft line – Sec 10, [4.2.1]
- Update of critical shear buckling stress – Sec 10, [5.1.1], b)
- Update of bending and torsional vibration calculation – Sec 10, [6.1.2.].

Mechanical tests on laminate test panels

- Update of particular test for structural gluing joint - Sec 11, [4.2.3], b).