

COMPOSITE MATERIALS AND ARTICLES



JSC «Shipbuilding & Shiprepair Technology Center» (JSC SSTC) develops technologies and manufactures composite materials and articles for shipbuilding, ship repair and other industries.

Activities of JSC SSTC in field of composite materials:

- Development of production procedures and assistance in construction and repair of composite vessels;
- Development of composite shipbuilding sites at shipyards;
- Development of fiberglass coating technology for propulsion and stern shafts;
- Development of adhesive-based technology for installation of outfitting components;
- Development of technological procedures for appliance of multi-purpose coatings;
- Development and setting-up of complex vibro-acoustic protection facilities;
- Calculation of airborne noise and hull vibration rates in vessel's compartments at design stage and measurement of the same at all vessel trials stages;
- Study of physical-mechanical, acoustic and vibration-damping properties of materials in test center CSC Sudoplast, certified by Federal Technical Regulation and Metrology Agency and Russian Maritime Register of Shipping.

Manufacturing of antenna buoy cases

Composite buoy cases are capable to meet the following requirements:

- Radio transparency;
- Positive buoyancy up to 600 m depth;
- Operability under external hydrostatic pressure up to 6 MPa.

Isotensoid shape of case head provides optimum combination of processibility and load carrying capacity. Replacement of fiberglass (2.0 g/cm³) with organic plastic (1,35 g/cm³) maintains mechanical parameters and provides additional advantages:

- Reduction of hull weight by 20–30%;
- 1.5-2 times increase of lifting capacity;
- Increases radio-transparency as per requirements (dielectric capacity is 3.4 for organic plastic and 4,6 for organic plastic).

Full life time of the article is 12 years.



Manufacturing of electric insulation decouplings

JSC SSTC manufactures axial insulation decouplings, which operate at temperature exceeding 4.5 K and perform galvanic separation at 30 kV.

Production method: winding of saturated glass-roving as per spiral-tangential trajectory.

Edge lines are made from 316L steel.

Dimensions of edge line tubes:

- Internal diameter: 17.3 mm;
- External diameter: 21.3 mm.

Minimum length of tube of metal non-insulated metal edge line: 100 mm.

Maximum length of insulator: 800 mm.

Working environment: helium at 300-4.5K temperature

The insulator can withstand 56 kV, DC under 300 K.

Environment:

- Outside: air;
- Inside: fluid helium under 1.2 atm pressure.



Anti-friction composite materials “SFERA” for heavy-duty friction assemblies and sealings of ship valves

Anti-friction composite materials SFERA on basis of polyester-ketones were developed as an alternative to Grafelon 20M material used in ship ball valves sealing.

Application of SFERA materials helps to exclude hazardous import components comprising phenilone C2 (binding material for Grafelon-20M). Also, SFERA materials do not cause dimensional changes of the valve unlike Grafelon-20M with high hydroscopic rate. Mechanical properties of SFERA materials are similar to Grafelon-20M, while its tribotechnical characteristics are better.

These materials can be used both in sea and fresh water under 5-25 MPa unit pressure and up to 3 m/s gliding speed.

Parameter	Grafelon 20M	Material modifications	
		SFERA T	SFERA TD
Physical and mechanical properties			
Breaking compression stress, MPa	250.0	272.6	239.0
Impact viscosity, kJ/m²	21.0	30.0	17.5
Breaking stress at static bending, MPa	160.0	190.5	150.9
Water consumption for 24 hrs at 20°C, %	0.30	0.05	0.05
Density, kg/m³	1320–1360	1322–1335	1402–1410
Tribotechnical properties at reciprocation in sea water			
Friction factor	0.198	0.177	0.171
Wear rate, µm/min	1.55	0.233	0.183
Wear intensity, I _b *10 ⁻⁷	3.24	0.49	0.38

Anti-friction composite materials SFERA-40 for friction bearings of shaft lines and propulsion shafts

Anti-friction composite materials SFERA-40 on basis of fluorine plastic-40 were developed as an alternative to graphite fluorine plastic ANITA-40 used for manufacturing of friction bearing inserts.

ANITA-40 is based on fluorine plastic-40 with addition of colloid-graphite compound. Tribotechnical properties of SFERA-40 materials are similar to ANITA-40, while its physical and mechanical characteristics are better. Advanced properties of SFERA-40 help to extend application area of friction bearings made from fluorine plastic.

These materials can be used both in sea and fresh water under 20 MPa unit pressure and up to 5 m/s gliding speed.

Parameter	ANITA-40	Material modifications	
		SFERA-40 T	SFERA-40 TD
Physical and mechanical properties			
Breaking compression stress, MPa	70.0	95.6	95.0
Impact viscosity, kJ/m²	17.0	21.0	23.0
Breaking stress at static bending, MPa	53.0	80.0	80.0
Maximum tensile stress, MPa	32.0	51.0	46.0
Brinell hardness, MPa	105	130	140
Density, kg/m³	1880	1550	1650
Tribotechnical properties under rotation			
Friction factor at friction bearing startup	0.17	0.13	0.16

**JSC SSTC is ready for mutually beneficial
cooperation with all interested domestic and
foreign parties**



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