

Syntactic Buoyancy Materials

For Undersea Applications



Photo by Shelley Dawicki, Woods Hole Oceanographic Institution

Trelleborg Offshore manufactures several different classes of syntactic foam for undersea buoyancy applications. Blocks of the foam are typically cast in 0.5 and 1.0 cubic foot sizes and are used to prepare large buoyancy modules that can be readily shaped to conform to hull contours and outfitted for installation in the forward and aft free-flood areas of submarines.

Oceanographers also depend on syntactic foams to suspend instrumentation in deep ocean studies. For these applications, the syntactic foam is used in either block form or custom moulded shapes for installation in manned and unmanned submersibles such as the famed Alvin and Jason vehicles that were used to discover and explore the Titanic.

Characteristics of Trelleborg Offshore Microballoon-based Syntactic Materials

Trelleborg Offshore produces four types of syntactic foams to meet the broad range of customer requirements for many oceanographic subsea and defense applications.

EL Grade epoxy syntactic foams have been the materials of choice for manufacturing manned and unmanned submersibles for years with their range of densities and ability to withstand exposure to diesel fuels and hydraulic fluids.

TG Grade syntactic foams are lightweight and economical for building manned and remote operating vehicles. The foams have also been used to manufacture mine neutralization systems because of their zero magnetic and sea-water comparable acoustic signatures and to fabricate eyebrows for nuclear submarines because of their buoyancy, acoustic profile and ability to significantly improve sonar functions.

DS Grade syntactic foams combine lightweight glass microballoons with multifunctional epoxy resin to produce ultra-high strength-to-weight materials for high-performance, deep sea applications including unmanned and manned submersibles.

VF Grade epoxy syntactic foams combine microballoons and macrospheres for ultra-light weight applications such as filling control surfaces on nuclear submarines. The Grade A shock-qualified castable syntactic foams are sold as kits for on-site field use.

Product	Nominal Density kg/m ³ (pcf)	Service Pressure MPa (psi)	Service Depth MSW (FSW)
EL-30	480 (30)	20.68 (3,000)	2,050 (6,750)
EL-34	544 (34)	62.05 (9,000)	6,096 (20,000)
EL-36	576 (36)	75.84 (11,000)	7,315 (24,000)
TG-2000	384 (24)	20.68 (3,000)	2,000 (6,560)
TG-3000	416 (26)	30.64 (4,444)	3,000 (9,850)
TG-4000	449 (29)	36.45 (5,287)	4,000 (13,124)
TG-7000	545 (34)	70.10 (10,165)	7,000 (22,966)
VF-22	352 (22)	1.83 (266)	180 (600)
VF-25S	416 (26)	6.89 (1,000)	680 (2,252)
VF-38	608 (38)	9.18 (1,332)	914 (3,000)
DS-28	449 (28)	35.15 (5,098)	3,500 (11,482)
DS-30	480 (30)	50.19 (7,280)	5,000 (16,400)
DS-33	528 (33)	61.23 (8,880)	6,096 (20,000)
DS-35	560 (35)	81.97 (11,888)	8,138 (26,700)
DS-39	608 (38)	116.33 (16,872)	11,580 (38,000)



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