Warren/Simsite® Composites For Pumping Applications Aboard U.S. Navy Ships

Warren Pumps, Inc.
A member of the Colfax Group

Key Reasons To Choose Warren/Simsite® Impellers and Rings

What is Simsite?

Simsite is a fiber-reinforced structural composite material, offered in both a phenolic laminate and epoxy laminate. The structural design of unique, continuous fibers are interwoven in a bi-directional or tri-directional weave, which give the components both high structural strength and flexibility.

NAVSEA Drawing 803-7226047

On April 18, 1996, by virtue of NAVSEA letter Ser 03Y3/110, Simsite composite material was approved for use on Naval centrifugal pumps. This letter granted approval to provide Simsite composite products in material Grades 302 and 375, for selected applications in accordance with NAVSEA drawing 803-7226047. The approved surface ship pump components for which Simsite composites are authorized include impellers, case rings, lantern rings, shaft sleeves, throat bushings and fluid lubricated bearings. These components are approved by the NAVSEA drawing to be used in the following services:

- General Service Circulating Pumps
- Auxiliary Machinery Cooling Water Pumps
- Distilling Plant Feed Pumps
- Distilling Plant Brine Pumps
- Potable Water Vacuum Priming Pumps
- Auxiliary Circulating Pumps
- Diesel Engine Cooling Water Pumps
- Refrigeration Condenser Regulating Pumps
- Reserve Feed Pumps
- Bilge Pumps
- Seawater Service Pumps
- Main Circulating Pumps
- Fire Pumps
- Portable Fire Pumps
- Distillate Pumps
- Potable Water Pumps
- A/C Chilled Water Pumps

Installations

Warren/Simsite composite components are currently in operation throughout the fleet. The Classes include:

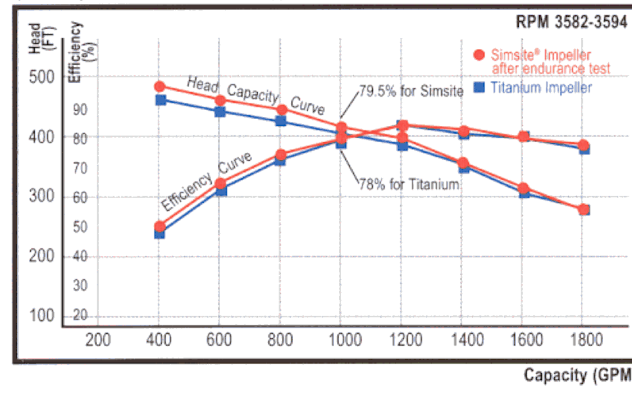
- AGF-3
- CG-47
- CV-63
- CVN-65
- CVN-68
- DD-963
- DDG-51
- FFG-7
- LHA-1
- LPD-4
- LSD-36
- MCM-1
- PC-1
- TAO-187

Simsite Composite Key Features

- **Trouble-Free Performance:** Impellers are lightweight and offer mechanical strength and corrosion resistance. Since Simsite is an inert material, pump corrosion caused by bimetal electrolysis is significantly reduced.
- **Lower Operating and Maintenance Costs:** Simsite impellers and rings are excellent for new or retrofit applications. Wear of pump parts is reduced because of Simsite's balance, lightweight and self-lubricating properties.
- **Customized for Maximum Performance:** Since Simsite parts are fully machined, there are no casting imperfections, as in cast metal parts. There is no time or expense related to making patterns or molds. Casting also makes it difficult to keep exact vane spacing in impellers, which affects efficiency, balance and acoustics.
- **Outstanding Characteristics:** Impellers are 100 percent machined on both exterior and interior surfaces which ensure symmetry in the location and shape of the vanes. The result is both increased efficiency of the pump and reduction of flow resistance.

Performance Curves

(For Navy Std. 1000 GPM Fire Pump)



Proven Performance

During the extensive Simsite materials qualification testing program, the Simsite impeller, case rings and shaft sleeve proved superior in performance to their metal counterparts. After a 500-hour Endurance Test, the pump's performance exceeded those of new metal parts. Even after a second 500 hours the pump continued to exceed the performance of new metal components. After these two 500-hour Endurance Tests, the same Simsite components successfully passed shock testing to MIL-S-901D.

Warren/Simsite® Composites Are Ideal For Retrofit And Replacement Applications

Resistant to corrosion and erosion
- Maintains structural integrity and performance

Weight savings
- Six times lighter than monel, inconel, bronze or alloy-20
- Three time lighter than titanium
- Reduced shaft deflection
- Longer pump life
- Impellers are lightweight

Prevents galling
- Impellers are lightweight
- Lower co-efficient of friction prevents galling and seizing
- Tighter clearances reduce leakage

Structural Composite
- Outstanding resistance to corrosion and erosion
- Electrolysis significantly reduced, thereby extending the life of casings and other components

Precision machined
- Radial forces reduced
- Capable of improving existing hydraulics
- Bearing life is increased
- Load is reduced
- Mechanical seal life is increased

Warren Simsite Composites Meet or Exceed the Requirements of NAVSEA Drawing 803-7226047

Simsite Navy Grade 302 Material Properties

Property	Units	ASTM Method	X Direction	Y Direction
Tensile Strength	KSI	D3039	14.8	15.5
Tensile Modulus	MSI	D3039	1.7	1.8
Tensile Elongation	%	D3039	2.0	2.1
Flexural Strength	KSI	D790	25.2	21.5
Flexural Modulus	MSI	D790	1.4	1.3
Compressive Strength	KSIS	D3410	37.6	37.3
Impact Resistance	FT-LB/IN	D256	2.6	2.4
Specific Gravity	-	D792	1.4	1.4
Water Absorption	% 24 Hrs. @ 73°F	D570	1.1	1.1
Hardness	Barcol	D2583	43	40
Heat Distortion Temperature	°F @ 264psi	D648	235	220
Coefficient of Thermal Expansion	IN/IN/°C X 10^{-5}	E831	1.4	1.9

Simsite Navy Grade 375 Material Properties

Property	Units	ASTM Method	X Direction	Y Direction
Tensile Strength	KSI	D3039	58.5	49.4
Tensile Modulus	MSI	D3039	3.2	3.1
Tensile Elongation	%	D3039	2.0	2.0
Flexural Strength	KSI	D790	67.7	56.1
Flexural Modulus	MSI	D790	3.1	2.7
Compressive Strength	KSIS	D3410	68.3	60.2
Impact Resistance	FT-LB/IN	D256	9.1	12.2
Specific Gravity	-	D792	1.8	1.8
Water Absorption	% 24 Hrs. @ 73°F	D570	.07	.07
Hardness	Barcol	D2583	65	66
Heat Distortion Temperature	°F @ 264psi	D648	500	505
Coefficient of Thermal Expansion	IN/IN/°C X 10^{-5}	E831	1.3	1.2

Warren Pumps, Inc.
"Warren pumps Solutions"

The Warren brand name has been a quality standard on ships of the U.S. Navy for nearly a century. Warren pioneered the application of pump technology to difficult shipboard applications and continues to develop new manufacturing innovations and set new standards for quality assurance.

Warren Pumps, Inc. is the exclusive distributor for Simsite products for the U.S. Navy. When you buy Simsite, you will be working with Warren Pumps, one of the most respected names in the Fleet.

For information on how to order Warren brand replacement parts Contact our Field Sales Representative in your area:

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