Hybrid
Marine Insulation System: Ceramic + Traditional Board & Blanket Materials

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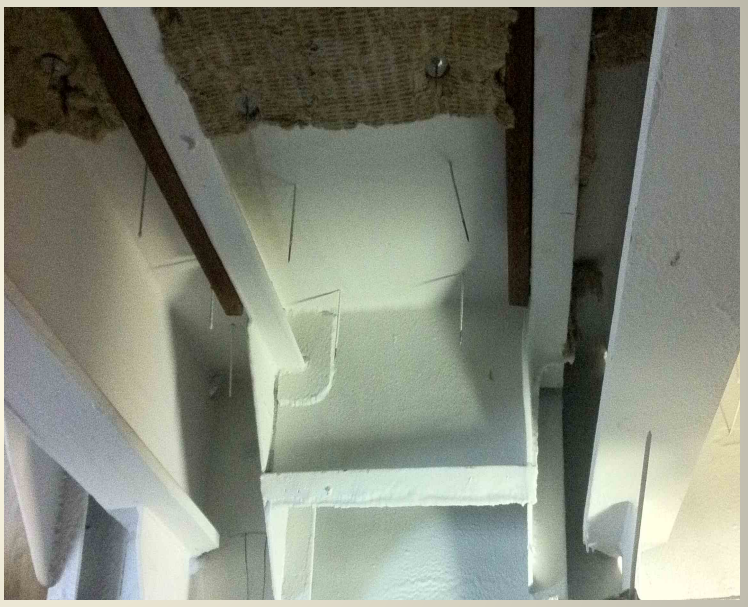
Hybrid System with Board or Blanket:

Combines "Old Style" materials + Ceramic Insulation Coating
= Dry Insulation, Better Performance & Lower Cost



Ceramic insulation Coating (CIC) on plate & stiffeners and traditional materials fastened to flat plate only. This controls condensation, keeps materials dry and improves overall insulation performance.

JT Marine Tug pilot house overhead on Left.
American Seafoods F/V Katie Ann factory overhead on Right.

Hybrid Marine Insulation:

A) **Ceramic Insulation Coating (CIC) controls condensation by raising surface temperatures above Dew Point with 1mm to 2mm thickness (40mils to 80mils).**
B) Controlling condensation keeps absorbent materials drier.
C) Dry materials perform better and prevent corrosion.
D) Stiffeners do not require pins or wrapping. Skipping stiffener wrapps pays for insulation coating on 100% of surfaces.

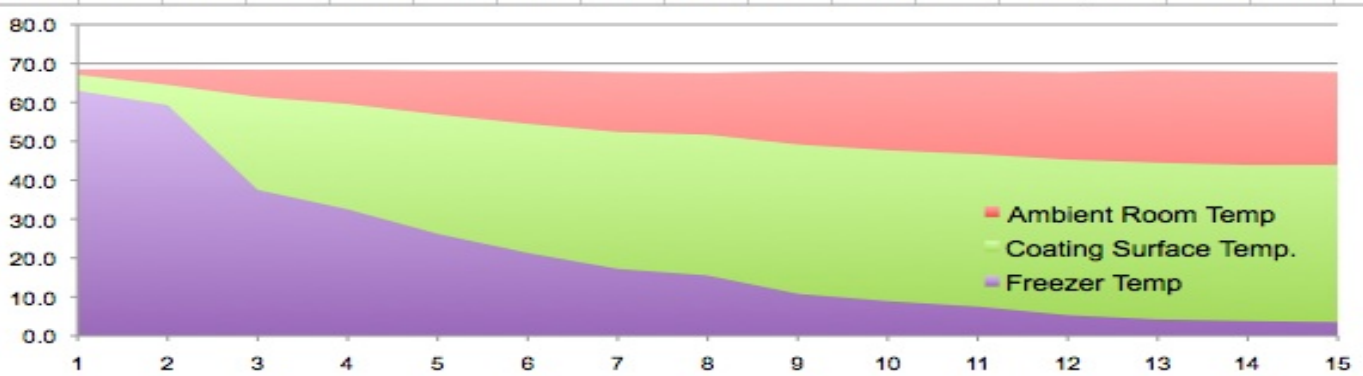
Above application on Western Towboat's Titan Class Living Quarters

How Ceramic Insulation Coating (CIC) Insulates

- **Ceramic Insulation Coating blocks heat transfer with dense layers of hollow ceramic particles & thin air gaps in each coat.**
- **Infrared-based heat transfer is blocked the same way Low E coatings stop radiant heat on glass doors and windows.**
- **Performance is proven on vessels operating world-wide.**
- **The chart below shows performance based on 1mm/40mils of CIC on top of a freezer box whose temperature starts at 68.5F and drops to 3.5F. The CIC's surface temp stabilized at 43.9F, a 40F improvement or temperature resistance against the interior heat.**

Cold Wall Performance Using a Freezer Box with 1mm of ACS Ceramic Insulation Coating

Minute Logged	1	5	10	15	20	25	30	35	40	45	50	60	70	80	90
Ambient Room Temp	68.5	68.5	68.4	68.4	68.2	68.2	67.8	67.6	68.0	67.8	68.0	67.8	68.2	68.0	67.8
Coating Surface Temp.	67.1	64.5	61.4	59.6	56.9	54.5	52.4	51.7	49.2	47.7	46.7	45.3	44.5	43.9	43.9
Freezer Temp	63.0	59.3	37.5	32.5	26.2	21.3	17.2	15.5	10.8	8.9	7.5	5.3	4.2	3.8	3.5
DeltaT: Freezer & Coated Surface	4.1	5.2	23.9	27.1	30.7	33.2	35.2	36.2	38.4	38.8	39.2	40.0	40.3	40.1	40.4



Hybrid System Savings Per SF

Hybrid System savings is based on Ceramic Insulation Coating (CIC) to insulate stiffeners instead of conventional materials. Stiffeners are 30% - 40% of surface areas. CIC on 100% of surfaces also controls condensation and keeps conventional insulation dry and effective. While saving installation time and money, Hybrid System CIC and dry Conventional Materials retain more heat while also preventing corrosion under insulation. The result is better performance at no additional cost.

Insulate with Standard Conventional Materials	**SF Cost**	**Hybrid CIC: Ceramic Coating and Conventional Materials**	**SF Cost**
Cost to insulate flat plate (@70% of total cost)	**$10.50**	**Cost to insulate flat plate only: (@70% of total cost)**	**$10.50**
Stiffener insulation cost with conventional materials (@30% total)	**$4.50**	**Cost for Ceramic Coating Application on Flat Panels & Stiffeners**	**$4.50**
TOTAL INSTALLED COST: Conventional Insulation Only (pins, facing & tape)	**$15.00**	**TOTAL INSTALLED COST: Hybrid CIC 100% Coverage + Conventional Insulation Between Stiffener Only**	**$15.00**

Hybrid Insulation Application Specs based on Port Engineers' and Shipyard' Feedback

	Operating Zone	Under Insulation - 2" Fiberglas Board or Blanket	With Paneling & Air Gap	With Insulated Paneling & Air Gap	Exposed Coating Only	Surface Treatment or Top Coat
Interior Surface with Exterior or Weatherdeck Exposure	Pacific Northwest or Temperate Climates	40 mils/ 1mm	60 mils/ 1.5mm	40 mils/ 1mm	60 mils/ 1.5mm	Latex or Urethane
	Alaska	40-60 mils/ 1-1.5mm	80 mils/ 2mm	60 mils/ 1.5mm	80 mils/ 2mm	Latex or Urethane
	Arctic Antarctica	80 mils/ 2mm	120 mils/ 3mm	80 mils/ 2mm	120 mils/ 3mm	Latex or Urethane
	Persian Gulf	80 mils/ 2mm	80 mils/ 2mm	80 mils/ 2mm	120 mils/ 3mm	Latex or Urethane
Interior Surfaces without Exterior Exposure	Pacific Northwest or Temperate Climates	40 mils	40 mils/ 1mm	40 mils/ 1mm	40 mils/ 1mm	Latex or Urethane
	Alaska	40-60 mils/ 1-1.5 mm	40-60 mils/ 1-1.5mm	40 mils/ 1mm	80 mils/ 2mm	Latex or Urethane
	Arctic Antarctica	60 mils/ 1.5mm	60 mils/ 1.5mm	60 mils/ 1.5mm	80 mils/ 2.5mm	Latex or Urethane
	Persian Gulf	60 mils/ 1.5mm	60 mils/ 1.5mm	60 mils/ 1.5mm	100 mils/ 2.5mm	Latex or Urethane
Exterior Application for Hot Cimate Solar Heat Loading	30-40 mils (1.5mm)					Urethane

Ceramic Insulation Coating Project Specs

RBC on F/V Golden Alaska sidewall

- On new construction, spot prime welds and bare steel surfaces only.
- No pins for CIC only. Pins on flat plate only for Hybrid applications.
- On refits, water-jet loose scale and clean surfaces. Apply surface tolerant epoxy (International 300) and cure for 24-36 hours.
- Apply Ceramic Insulation Coating (CIC) at 40 mils per day for total 80 mil finish Use de-humidification and/or heat in cold conditions.
- Pre-cut blanket or board to reduce cutting and waste at site and install.
- Application in days instead of weeks greatly reduces yard time.