

ANTI-ICING SYSTEM FOR OFFLOADING TURRET BUOY

CUSTOMER SUCCESS STORY



First tanker using the TU-1200 in Eastern Canada

SRL silicone rubber heating blankets provide energy-efficient solution for oil transport

Application

Transporting materials across large waterways provide many challenges such as access to ports, inclement weather, as well as equipment for loading and offloading of the material. Tides create further challenges for docking and off-loading. (An example is The Bay of Fundy changing water depth by as much as 16 meters.) Eliminating the need to bring a tanker into port, by finding an alternative method for material movement, can reduce costs by as much as 75%.

Large turret buoys are used in shallow and deep-water environments for loading and unloading fluids between tankers and storage facilities on the shore. An existing buoy off the coast of Saint John, New Brunswick on the Bay of Fundy is exposed to temperatures as low as -32°C (-25°F). Ice forming on the outside of the buoy limited use and created safety concerns. Monobuoy was awarded a contract to install their TU-1200 buoy, a 12-meter CALM (catenary anchor-leg mooring) as a replacement. This buoy is capable of servicing tankers up to 400,000 DWT (dead-weight tons) and pump up to 75,000 BPH (barrels per hour) of liquids such as crude oil, refined oils, or other fluids. The customer required the buoy have heaters to prevent ice from forming on the exterior surfaces, and required a 30-year life expectancy.



Older ice-covered buoy

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Solution

BriskHeat® was asked to supply surface heating for the buoy with a surface area of 350 square meters. Engineers recommended the total heat requirement to be just over 350 kW based on the temperature extreme and wind speed. Insulating the interior surface of the heaters mounted to the cold exterior walls could result in condensation, so no insulation would be installed. Additional heat loss was considered as part of the solution offered. This “lost heat” helped to warm the inside of the buoy creating a more comfortable environment for personnel during use.



Buoy design for installation of heating blankets on exterior walls

BriskHeat's SRL Silicone Rubber Heating Blankets were selected as they are designed to be used on metal surfaces and have a watt density of 2.5 watts per square inch (0.39 w/cm²). They have 20 mil fiberglass material on each side of the heating element as reinforcement to the silicone sheets. SRL blankets are moisture and chemical resistant to protect from condensation or in the event of leaks. These features provide the extra durability required to meet the end-users service life needs. The SRL-ADJ version includes a built-in temperature controller with thermostat to adjust the heaters if necessary.

Monobuoy engineers created a thermal model to simulate heat transfer through the steel walls, ensuring a minimum temperature of 5°C and a maximum of 65°C for worker safety. This provided the exact size, number, and locations for each heater. Based on the heat requirements and the watt density of the SRL heating blankets, a total of 200 square meters of surface heat was needed for the application and six different shapes/sizes developed for installation.

According to Monobuoy's Technical Director, “The client is extremely happy. The buoy remains ice-free much better than the old buoy (which had cable trace-heating) and uses much less power.”



Dive room showing custom SRL-ADJ heating blanket with built-in control

Ease of installation and replacement was another requirement of the solution. Each heater included peel and stick pressure sensitive adhesive which is available on most BriskHeat® silicone heaters. Cord locations had to be considered for supplying power to each heater. For easy access to wiring, junction boxes were used to create heating zones with multiple heaters controlled with a single sensor.

The buoy was constructed, and heaters were installed in the fall of 2018. The first tanker was successfully offloaded on October 29, 2018. After almost three years in service, the Monobuoy TU-1200 CALM Buoy, equipped with BriskHeat® SRL silicone rubber heating blankets for ice prevention, has met all customer performance criteria without the need to replace a single heater.