International standards, introduced in 2002 to improve shipping safety, required water ingress detection and alarm systems in the cargo holds of all newly-built single-skin bulk carriers (Regulation 12 of SOLAS Chap XII, IACS UR S24 and IMO standards). At the time, the standards specified that ships built before 2003 had to be in compliance by the time they were ten years old or, if they were already more than ten years old, by their third annual inspection.

The challenge

To help the marine industry meet the standard, a major marine engineering and retrofitting firm in Greece with 25 years of experience in supplying automation systems, designed a system that is fully compliant with Regulation 12. This required a reliable, easy-to-install, low-cost instrument to detect water in the many different materials that a ship may carry as cargo. Lloyd’s Register and American Bureau of Shipping (ABS) approvals are required for insurance purposes. Floats are not suitable because they cannot handle material build-up and require regular maintenance and frequent replacement.

The solution

The marine engineering company found a reliable, low cost solution with the SITRANS LC300 interface measurement instrument from Siemens. This two-wire capacitance instrument uses a unique inverse-frequency approach to capacitance technology that offers superior
resolution and repeatability. Its patented Active-Shield technology protects the measurement from the effects of material build-up, vapor, dust, or condensation. It is accurate in materials with low or high dielectric properties.

In a typical application, a SITRANS LC300 sensor probe is attached to a cable in a metal stilling pipe located in the cargo hold. In most cases, a 2.0 m (6.6 ft) probe made of PFA-coated stainless steel is suspended on a 20 m (65 ft) cable, but probes and cables are available in customized lengths for specific applications. The probe can be programmed for two alarms at specific heights. Typical settings are for detection at 0.5 m (1.6 ft) and 2.0 m (6.6 ft). The 4-20 mA output is connected to a water ingress monitoring panel on the navigation bridge. The panel includes an LCD and buttons for calibration and diagnostics. It monitors the status of each cargo hold, indicating normal operation, material at alarm heights, and sensor or cable failure.

**The benefits**

Over the years, the company has installed more than 100 SITRANS LC300 instruments on bulk carriers. The devices have proven reliable and accurate in detecting water ingress.

The instrument is easy to install, and its push-button calibration and integrated local display make it easy to set up. SITRANS LC300 detects level at two preset points, so it requires only one unit for each cargo hold. This is a saving because other technologies require two instruments. It also saves installation time, construction of pipes, and electrical wiring, making it a low cost solution.

The SITRANS LC300 needs less time for procurement and installation, and no maintenance, resulting in a significant decrease of the total cost. The system enables the marine industry to meet the regulations, and enhances shipping safety.