

Modified Sight Glass Meets Tough Navy Specs

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A branch of the U.S. Navy, the Military Sealift Command, recently awarded a contract for the purchase of sampling material and testing equipment to carry out oil analysis aboard its fleet of noncombatant ships. One component of this equipment is to be a rather special sight glass and L.J. Star was one of several companies invited to respond. The specs required the sight glass be capable of maintaining 2600 psi operating pressure and include a snap ring that would contain a desiccant to detect process contamination. That was the easy part for the L.J. Star applications specialists since a standard MetaGlas® threaded sight glass would meet the pressure spec with room to spare. The essential element of a MetaGlas sight glass is the viewing disc which consists of a stainless steel ring surrounding a viewing element of pure borosilicate glass. In the manufacturing process the molten glass is placed within the steel ring at high temperature and the assembly cooled. The differing coefficient of thermal expansion between the two results in a prestressed glass element fused within the steel ring. The finished disc is capable of tolerating extremes of operating temperatures and pressure. All that was necessary to meet the key spec, then, was to modify a standard MetaGlas sight glass to include a snap ring chamber to accommodate the desiccant and that was readily accomplished.

The hard part was that the spec also required a sample component to be tested to catastrophic failure. Though theoretically possible, L.J. Star testing equipment could not attain such pressure and, in fact, nobody had ever tested a MetaGlas sight glass to actual catastrophic failure, that is, the point at which the fused glass-metal junction separated and/or the glass failed resulting in a massive pressure leak.

The closest anyone had ever come was a lab test in which a standard MetaGlas sight glass was subjected to pressure many times its rated capability. Though no actual failure or pressure loss resulted, the testing was discontinued when the glass element developed hairline surface cracks that significantly limited visibility. So, lacking a facility capable of such a test, L.J. Star agreed instead to provide five product samples to the Navy's prime contractor for independent testing. Word came back a few weeks later approving the MetaGlas sight glass as responsive to the specification. The testing engineer reported, "We have tested your sight glass. We attempted to take the unit to its burst pressure and found that our testing unit failed prior to your sight glass." In fact the tested samples were undamaged.

After bid evaluation, L.J. Star was awarded a subcontract for 280 of the units for delivery during the first year of the program.