

Historical Development of VCI Fitted Covers

Historical: Vasanth published a limited literature review on the use of vapor corrosion inhibitors (VCI) in naval vessels at NACE's 1996 Corrosion Conference [1]. He cited an NRL review of VCI during World War II conducted by Baker and Zisman. It found that equipment losses were appalling in the early war years, primarily due to poor packaging for overseas shipping. It stated that paper, cardboard, cloth, and other packaging materials can be impregnated with nitrite-based corrosion inhibitors and used for either shipment or storage of equipment. It should be noted that the US Department of Defense (DoD) includes VCIs in a military standard for packaging materials [2].

Impetus to develop VCI covers: Around the turn of the century, the U.S. Navy was interested in securing covers that provided better asset protection than traditional canvas and vinyl covers. In 2000, a Phase II SBIR [3] for "Flexible Corrosion Preventative Coverings", (essentially the first generation of advanced protective covers with VCI technology), was awarded to Creare, Inc. [4]. In 2008, the USAF published a report on a year-long study which compared the asset protection utilizing simple shelters, vinyl covers, and the first generation of advanced protective covers with VCI technology. This report provided validation that the first generation of advanced protective covers with VCI resulted in an order of magnitude (10X) better asset protection than that provided by either vinyl covers or simple shelters [5].

U.S. Navy Approval: To put some context into the U.S. Navy's use of advanced protective covers, in 2003 NAVSEA approved the first generation of advanced protective covers with VCI technology. Following this approval, NAVSEA began to outfit the fleet with an array of VCI protective covers for a large variety of equipment ranging from weapons systems to deck equipment. In 2012, a next generation advanced protective cover with VCI technology emerged that also provided a lighter, more form-fitting cover. This next generation cover, made from Transshield's ArmorDillo® with VCI technology, gained NAVSEA approval in 2013. These now have NSN's and can be found in the Navy's supply chain.

The U.S. Navy was among the first to realize the benefits of advanced protective covers with VCI technology. Since then, the development of high-tech fabrics containing blends of enhanced VCIs has resulted in an array of advanced protective covers designed for specific applications, from transportation use and long-term storage to heavy-duty applications such as the harsh environment at sea. The use of these "next generation"

advanced protective covers with VCI technology is not limited to the Navy. Demand has steadily increased across the other military branches. A more comprehensive review of advanced protective covers with VCI technology was presented at FMMS in 2016 [6].

Independent Verification: Authors from four countries have collaborated on a paper entitled Corrosion Inhibitors for Prolonged Protection of Military Equipment and Vehicles [7] in which they cite the rapid expansion of corrosion inhibitor use and show examples of cannons, weapons, and other military hardware wrapped in VCI impregnated polypropylene and fabrics.

In 2006, Defence Research and Development Canada conducted a study [8] into corrosion of its combat service support vehicles. The study reviewed corrosion related practices of the U.S. Army and U.S. Marine Corps, the Australian Defence Science and Technology Organisation (DSTO), and Royal Military College of Canada. The finding pertinent to this report was that new storage technologies should be considered and VCI protective covers were cited as an example.

Conclusion: VCIs have been extensively used by the DoD since World War II. Almost 20 years ago, the U.S. Navy funded the development of advanced protective covers with VCI technology since the protection of canvas and vinyl covers was unsatisfactory. Since 2003, form-fitted advanced protective covers with VCI technology have repeatedly proven themselves to be the cost-effective choice in operational use.

References

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