



Global Shield™ Coating Technology

A Dramatically Different Approach to Resisting Corrosion

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



ENGINEERING YOUR SUCCESS.

The New Standard for Corrosion-Resistant Performance

Global concerns about hazardous materials have given rise to the search for affordable, alternative, corrosion-resistant technologies that exceed the performance of Engineered Hard Chrome (EHC) or Nitride (Ni) while matching or exceeding alternative high performance coatings.

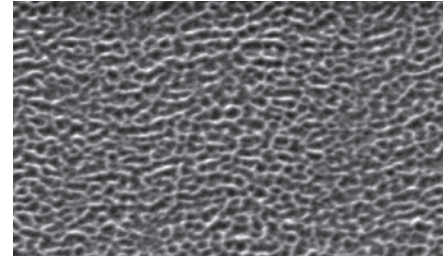
Parker's Global Shield coating is a highly engineered proprietary technology that has the potential to dramatically extend the life of hydraulic cylinders by providing exceptional corrosion resistance in the most challenging mobile and industrial environments. This innovative coating, which can be applied during original cylinder manufacture or during after-market cylinder maintenance, provides protective performance comparable to far more costly coatings and substrates using a process that is both efficient and environmentally responsible.

The Global Shield™ Coating Difference

Designed specifically for use in harsh, challenging environments, this innovative coating provides several performance advantages, when compared with conventional coating technologies, including:

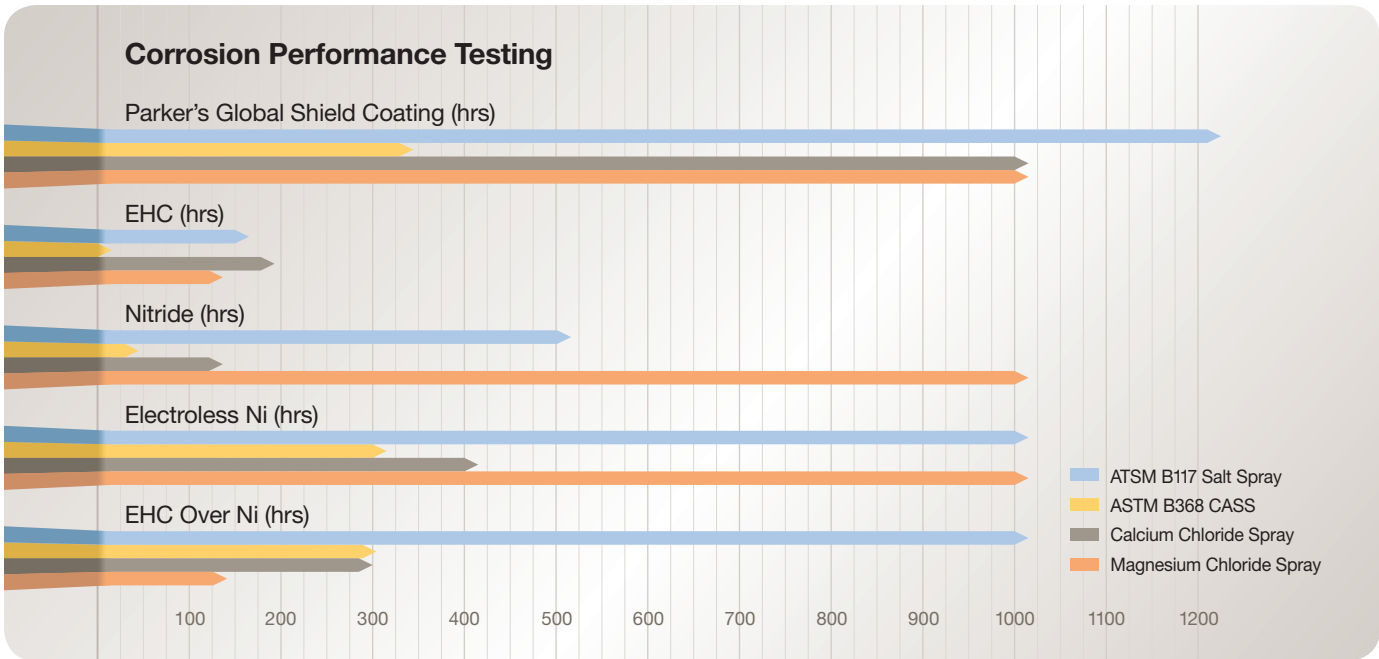
- Improvements in operational productivity, through significant reductions in downtime related to cylinder and seal repairs and replacements
- Extended hydraulic seal life through the coating's lower coefficient of friction
- Improvements in adhesion and ductility, due to a sub-micron, fully dense structure that eliminates surface micro-cracks and delamination
- Customizable finishes to a wide range of thicknesses, as appropriate to specific application requirements and for resurfacing of damaged rods
- Strippability without grinding for ease of removal and coating during remanufacture
- Ability to apply coating to line-of-sight (OD) and non line-of-sight (ID) geometries
- A smaller carbon footprint, due to a more efficient manufacturing process

Emissions from Parker's Global Shield coating technology are well below OSHA Personal Exposure Limits (PEL) and are fully compliant with the European market's Restriction of Hazardous Substances (RoHS) directive, as implemented in July, 2006 and the Registration, Evaluation, Authorisation and Restriction (REACH) initiative, as implemented in June, 2007.



Parker's Global Shield coating features a sub-micron structure (shown here magnified 4000 times) that eliminates surface micro-cracks and delamination.

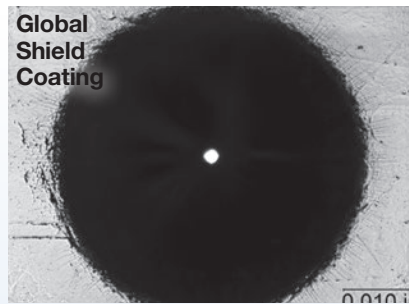
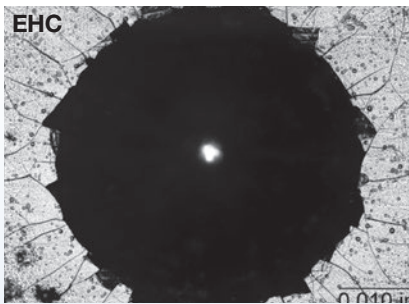




Performance Validated in the Lab and in the Field

This breakthrough, proprietary technology, owned and manufactured by Parker Hannifin Corporation, has been thoroughly tested in the lab and in the field to validate performance in the areas of corrosion and dynamic wear resistance. Cylinders protected with Parker's Global Shield coating have demonstrated resistance to corrosion **up to eight times longer** than conventional coatings. Comprehensive testing data is available from your Parker technical representative.

Indentation/Delamination Testing



When compared with EHC, using the Rockwell "C" Indentation Test protocol, Parker's Global Shield coating exhibited exceptional interfacial adhesion and outstanding impact resistance, with almost no micro-cracking, chipping, or spalling and zero delamination.

Design Parameters

- Coatings can be applied to tube diameters up to 15 inches (381mm) and rod diameters from 0.625 inches (15.87mm) to 15 inches (381mm)
- Thickness ranges from 0.0005 inches (12.7μ) to greater than 0.020 inches (508μ)
- Minimum Hardness – 54, Rockwell C Hardness Scale (HRC)
- Compatible with ferrous and non-ferrous bar, tube, or cast substrates including, but not limited to:
 - 1018, 1026, 1045, 4140 Carbon Steel
 - 304, 316, 17-4 Stainless Steel
 - Ductile Iron
- Recommended uses:
 - Plating new (OEM) cylinders
 - Remanufacturing and plating existing cylinders
 - Resurfacing damaged rods
- Process is reversible to support economical aftermarket remanufacture

Applied Technology: The Proof is in the Performance

- > Mining
- > Construction
- > Material Handling
- > Renewable Energy
- > Power Generation
- > Refuse
- > Oil & Gas
- > Marine/Intermodal
- > Military
- > Heavy-Duty Trucking

Parker's Global Shield coating technology was specifically designed to meet the corrosion, impact, chemical, salt water and acidic resistance requirements of challenging mobile and industrial environments, while ensuring a low carbon footprint. Applications with high-duty cycle and zero tolerance for down-time can achieve extended cylinder and seal life for improved productivity, while meeting goals for sustainable performance, through the use of this highly engineered coating technology.



WARNING - USER RESPONSIBILITY

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker-Hannifin Corporation, its subsidiaries and authorized distributors provide product or system options for further investigation by users having technical expertise.

The user, through its own analysis and testing, is solely responsible for making the final selection of the system and components and assuring that all performance, endurance, maintenance, safety and warning requirements of the application are met. The user must analyze all aspects of the application, follow applicable industry standards, and follow the information concerning the product in the current product catalog and in any other materials provided from Parker or its subsidiaries or authorized distributors.

To the extent that Parker or its subsidiaries or authorized distributors provide component or system options based upon data or specifications provided by the user, the user is responsible for determining that such data and specifications are suitable and sufficient for all applications and reasonably foreseeable uses of the components or systems.

Sustainable design is the cornerstone of Parker's model for developing innovative technologies, which promotes cradle-to-grave efficiencies for the protection of the environment. The environmentally responsible development process for our Global Shield coating ensures:



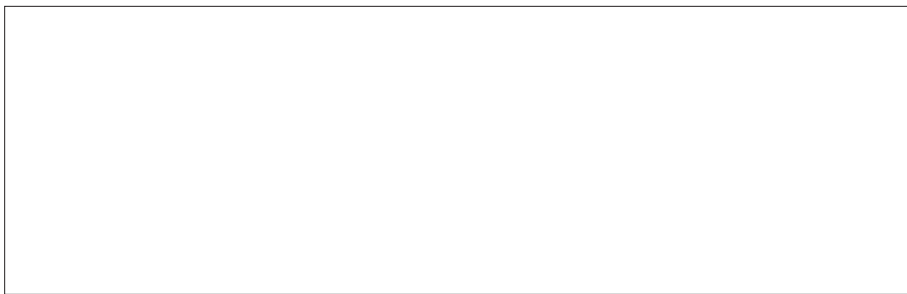
- Zero use of hazardous chromium
- Nominal use of other hazardous materials
- Reduced energy use and an overall reduced carbon footprint in comparison with competitive corrosion-resistant technologies
- 90 percent plating efficiency vs. 20 percent for EHC

The proprietary Global Shield coating technology is the latest innovation from Parker's Mobile Cylinder Division, which has been serving the mobile market since 1920. Supported by the financial strength and global distribution capabilities of Parker Hannifin Corporation, the Mobile Cylinder Division operates two ISO 9001-2008 Certified manufacturing plants and an extensive research and development laboratory, ensuring reliable, consistent material performance. The division's custom-designed hydraulic cylinder solutions include single-stage rod and multi-stage telescopic cylinders featuring:

- Bore sizes up to 18 inches (45.720cm)
- Stroke lengths up to 500 inches (1270.0cm)
- Pressures up to 5000 PSI
- Compatibility with a variety of operating fluids, materials, and coatings
- Integrated valves
- Parker proprietary Intellinder absolute positioning technology
- Incremental position feedback

For additional information about our Global Shield coating or other Mobile Cylinder Division solutions to extend the life of your hydraulic cylinders, please contact your Parker technical representative or call the Parker Mobile Cylinder Division at 330-270-2001.





Your Local Authorized Parker Distributor



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