



# Fluoropolymer Coated Stainless Steel Duct



**PureGuard LLC**  
A Critical Process Systems Group Company



## Reliable Fume Exhaust

### ■ Facility Design

Many of today's new industrial manufacturing facilities are larger, more expensive and more tightly regulated when it comes to construction materials and process engineering. Federal and municipal regulations as well as insurance guidelines figure heavily in the design of facility systems.

One area where regulations come into play is for manufacturing processes that produce highly corrosive, toxic and potentially combustible fumes as by-products. An exhaust system is required to safely remove these harmful fumes, not only for operator safety but to assure facility integrity and uninterrupted operation.

### ■ The PureGuard Advantage

When it comes to containing aggressive fumes and fluids, facility engineers are discovering the many benefits of PureGuard II. With its new fluoropolymer coating formula, PureGuard II possesses many desirable attributes: durable, reliable, cost-effective, and safe, not only for the facility but for the environment. This FM Approved system of duct, fittings, and control devices combines the strength and versatility of stainless steel with the superior corrosion

surfaces. FM Approval is important since it certifies that PureGuard II components exhibit properties that limit flame spread and smoke generation in the unlikely but ever present possibility of a fire in the fume exhaust system.

### ■ FM Approved

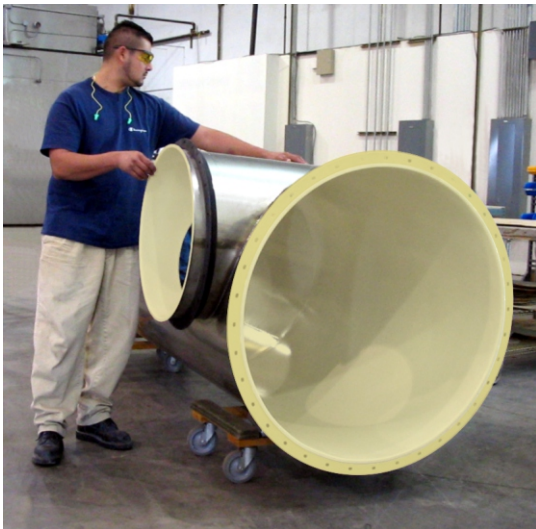
Affiliated with FM (Factory Mutual) Global, one of the world's largest insurance underwriters, FM Approvals provides testing and certification of building materials for the specific aim of reducing commercial and industrial property losses from fire. For PureGuard II, the key to FM Approval is the proven structural integrity of steel as a substrate which will not burn or collapse in the event of a fire nor generate large quantities of smoke.

PureGuard II meets the requirements of FM 4922 and is approved for use as a fume exhaust product without internal fire suppression systems. While incorporating a variety of flat panel tests, Factory Mutual goes beyond reliance on ASTM E-84 results to test actual duct in real fire situations. PureGuard II does not burn, generate smoke, or melt with a flame spread of 0 and smoke development of 20. PureGuard II is also approved for the maximum possible limits of approval in the range of 4" to 60" diameter duct and places no restrictions on vertical height risers within each fire area. PureGuard provides reduced burn rate characteristics and smoke generation performance over the original PureGuard product, thereby protecting valuable tooling and adjacent production areas.

FM 4910 builds upon the results of FM 4922 testing using small scale flat panel tests to ensure suitability for clean room installations. The protocol evaluates fire propagation behavior, potential for smoke contamination, and potential for contamination by corrosive products of combustion. PureGuard II did not ignite in these tests and as a result has no value for Smoke Damage Index (SDI) or Flame Propagation Index (FPT).

The benefits of PureGuard II over other coated duct are more compelling than ever.





## ■ Pure Guard Fluoropolymer Coating

PureGuard LLC's proprietary fluoropolymer coating is more than your typical powder coating. Applied using an electrostatic spray and bake process, the thermoplastic resin is integrally bonded to the substrate. This allows the coating to be applied to virtually any fitting, regardless of size or configuration.

In addition to excellent chemical resistance, the coating exhibits many beneficial attributes such as high impact strength, good abrasion resistance and superior performance over a broad temperature range. The coating does not absorb water or chemicals and permeation does not affect the coating bond. It will not chip, peel, blister or delaminate resulting in essentially no degradation of the substrate.

## ■ Desirable Coating Attributes

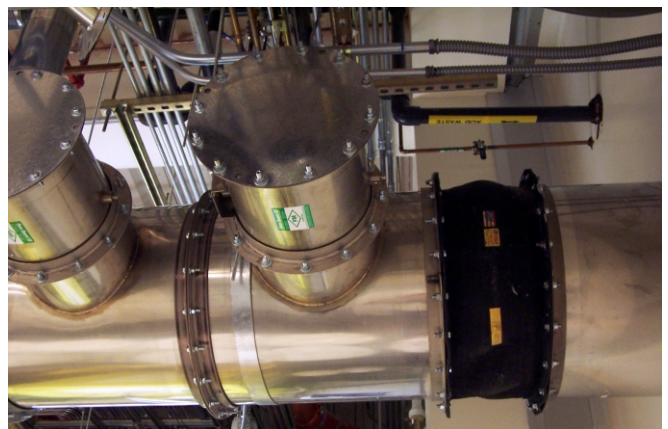
Besides PureGuard II's high level of chemical resistance, this fluoropolymer formula possesses the following desirable attributes:

- Mechanically tough with excellent cut through and abrasion resistance
- Low cold flow
- High tensile strength and good elongation properties
- Excellent impact resistance at room temperature and down into the cryogenic
- Dimensionally stable
- Continuous use to 300°F in most applications
- Excellent release properties
- Very smooth surface

## ■ PureGuard II Benefits

PureGuard II is a fully engineered, modular fume exhaust system, available in a wide range of standard duct and fittings from 2" up to 120" diameter. Key PureGuard II benefits are:

- Easy installation with mechanical fasteners and PTFE gaskets save time, labor, and money!
- Without the need for sprinklers, fire protection costs are significantly reduced as well as lower annual fire and business interruption insurance costs.
- The PureGuard coating will not absorb water or chemicals, eliminating hazardous waste disposal or chemical leaching issues. The stainless steel can be reused or sold for scrap value.
- Components are available in virtually any size and configuration including rectangular and oval.
- Easily field modified, duct smaller than 30" diameter and 20 gauge material can be cut to length on site; branch lines added with saddle tap fittings; and ports for drain lines, tool hook-up and system measurement can be easily installed in the field.
- Rated for continuous use up to 300°F. The combination of fluoropolymer coated stainless steel and PTFE joint sealant technology constitutes a liquid tight system virtually unaffected by a wide range of industrial chemicals.
- Classified as a true "Class 1" product in compliance with NFPA 820 established by the Uniform Building Code which is accepted by federal, state and local authorities.
- Manufactured in accordance with current SMACNA standards and Factory Mutual quality protocols including dimension, appearance, coating uniformity, coating thickness, and process documentation. Each coated fitting undergoes a total surface conductivity test or "spark" test to assure the integrity of the coating.



## ■ QC Flange Option

PureGuard II also provides for even faster and easier installation with the QC Flange option. Available from 2" up to 14" diameter duct, companion angle rings with multiple fasteners are replaced with a single fastener, band style clamp. This joining system provides safe, reliable joints with no sacrifice in flexibility or integrity. The QC clamp system is also incorporated in the FM approval of PureGuard II and is ideal for tool hook-up and drain line use.

## ■ Control Devices

PureGuard LLC also offers a wide range of control devices for exhaust fume applications. All PureGuard II dampers utilize quality steel construction and have been specifically designed as coated devices to provide maximum corrosion resistance. Dampers are available in different configurations to meet your system needs.

## ■ Specialty Adapters

PureGuard LLC also offers a wide selection of specialty adapters to allow transition from PureGuard II to a wide range of threaded or other flanged piping systems.

## ■ Cost Effective

Manufactured ready to install, PureGuard II requires minimal installation labor thus providing real savings from the moment it is bolted into place. For duct systems smaller than 14" diameter, the single fastener band style QC clamp option provides quick connections and further reduces installation costs. PureGuard II is FM Approved for smoke and fume evacuation systems without the need for internal sprinklers thus saving the costs of sprinkler supply mains, drain lines to waste treatment processing, and the need for continuous system maintenance. PureGuard II components are modular by design; a retired system can be disassembled, easily decontaminated and stored for reuse. Annual fire and business interruption insurance costs are greatly reduced for FM Approved duct and fittings. Long term, the economic effects of chemical leaching and subsequent hazardous waste issues associated with other systems are eliminated. These are only a few of the many cost saving benefits of PureGuard II.



## ■ Background

The evolution of coated duct began in the semiconductor industry of the early 1990's. As chemical concentrations and temperatures increased in the manufacturing process, the need for more robust corrosive fume exhaust duct became necessary. A process was developed to integrally bond a fluoropolymer resin ( chemical resistance ) to the surface of stainless steel ( strength and fire resistance ). PureGuard II builds on this coating process to provide a superior product.

## ■ Research and Testing

As part of PureGuard LLC's continuous improvement initiative, a comprehensive program of research and testing of available fluoropolymers for corrosive fume exhaust service was conducted to determine the performance properties of compatible coatings. Working closely with resin manufacturers, a base product was selected and then the formula modified to enhance key properties. Tests confirmed that this proprietary enhanced fluoropolymer resin system equals or exceeds the properties found in standard ETFE or ECTFE for mechanical adhesion, permeation resistance and chemical resistance.

# Test Results

TEST	TEST DESCRIPTION	TEST RESULTS
<b>Chemical Immersion</b>	Extended immersion in strong acids.	Samples exhibited no evidence of chemical attack or loss of adhesion, no blisters developed, some of the other coatings tested did blister.
<b>EIS (Electrochemical Impedance Spectroscopy)</b>	Following extended immersion in strong acids, impedance measurements taken to determine permeation resistance.	Results indicate excellent protection with end of test percentages of 97% or greater permeation resistance.
<b>E-84 (Stiner Tunnel)</b>	ASTM E 84 tests for Fire Spread and Smoke Developed, frequently used by code officials and regulatory agencies in the acceptance of interior finish materials.	PureGuard II falls in the Class 1 category with a Flame Spread Index of "0" and a Smoke Developed Index of "20".
<b>Atlas Cell</b>	Standard ASTM test involving test pieces subject to boiling water for defined periods of time then check the coating for delamination or blisters.	The new PureGuard coating ran far longer than any other coating ever tested.
<b>Boil and Peel</b>	Standard test, prolonged boil of flat coated substrate samples with scored coating, samples then deformed in a defined way to see if coating will peel.	The adhesion of the PureGuard coating is the best ever seen.
<b>Field Flange</b>	Round duct samples are cut and reflanged to observe coating adhesion to the new flange.	No peel or delamination observed, adhesion to substrate remains consistent.
<b>Field Patch / Repair</b>	Coated samples are repair patched.	Patches found to be superior to patches of other coatings.
<b>FM 4922</b>	Standard Factory Mutual test, measures flame propagation in duct systems.	Test passed: temperatures well below 1,000°F at 23 feet.

## ■ Specify PureGuard II

The PureGuard coating can only be described as the most effective shield against chemical attack available today. Many of the chemicals and solvents that are easily contained by this coating can cause rapid deterioration of other plastics and all but the most exotic metal alloys. Visually this new fluoropolymer coating is a yellow green shade. Chemical compatibility data for this coating is available for over 300 chemicals from PureGuard LLC.

Please inquire today as to your particular use.

## ■ Why PureGuard LLC?

With industry recognized Approvals and Listings from Factory Mutual, Underwriters Laboratories, and the U.S. Government, PureGuard LLC is well positioned to be your sole source provider for coated stainless steel fume exhaust duct needs.



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