

Employee Safety

## Spray Painting and Coating Applications

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The North American Paint and Coatings Market totals nearly \$16.8 billion<sup>1</sup>. Paint and other coatings have two primary functions—decoration and protection—both of which provide considerable economic benefit. Decorating and protecting new and existing structures, such as homes, apartments and other buildings, accounts for a substantial amount of paint used each year. Another significant volume of paint and coatings is used as product finishes to decorate and/or protect industrial products. Spray application of paints and other coatings is one of the most common methods of application.

<sup>1</sup>IHS Connect® Paint and Coatings Industry Overview (2015); IBIS World.

**OSHA Standards** The United States Occupational Safety and Health Administration (OSHA) regulates worker exposure to the many chemical substances used in spray painting. Personal protective equipment (PPE) is commonly used in conjunction with other exposure controls to protect workers from any hazardous chemicals present. When PPE is used, the OSHA standards require a hazard assessment of tasks, followed by justification for selecting appropriate protective equipment. The OSHA requirements for PPE, including the requirement for documented hazard assessments, can be found in the regulations at 29 CFR 1910, Subpart I, Sections 132-138 for general industry and 29 CFR 1915, Subpart I, Sections 151-160 for maritime industry. The construction regulations have requirements for the provision of PPE based on the hazards present, but do not require documented hazard assessments regarding the selection of the equipment.

**Principal Hazards and Fire Risks** The principal hazards associated with the spray application of paints and other coatings are related to the components in the paint or coating, as well as the application process itself. Typically, a paint or coating is a mixture of solvents, pigments and other additives that may have negative health effects on workers who are over exposed to them by inhalation or dermal contact. Some paints and coatings contain isocyanates, which are powerful sensitizers and irritants that can cause serious health effects due to both dermal and respiratory exposures. Additionally, because the solvents commonly used are flammable or combustible, the handling of these products presents a fire risk that is enhanced during spray applications due to the generation of significant amounts of aerosols and vapors.

**Protection from Exposure and Fire Risks** In spray applications of paints or coatings, workers are typically protected from the exposure and fire risks by a combination of engineering and administrative controls used in combination with PPE. A spray booth is the most common type of engineering control used for spray applications, both to protect workers and reduce fire risk. There are a variety of spray application techniques, such as air pressure fed; low pressure/low volume; high pressure/low volume; airless and others that have different levels of exposure potential. Similarly, the spray application process involves a range of activities, including mixing, application, inspection, touch-up and clean-up that also have differing exposure potential. If not properly protected, workers can be exposed to dry particulates, aerosols and liquid splash, depending on the task. In a well-designed and operated spray booth, the spray operators should only encounter small, airborne liquid or solid aerosols of paint. Paint spray aerosols typically range from 0.5 µm to greater than 10 µm, depending on the spray application equipment used. At these sizes, the penetration behaviors of liquid and solid aerosols are similar. PPE DuPont™ Tyvek® garments are frequently used in spray paint operations because the fabric provides an ideal balance of protection, durability and comfort. Coveralls made with Tyvek® fabric may be suitable for use for protecting workers in paint applications because the structure of Tyvek® offers a high degree of protection against airborne particles. Additionally, Tyvek® is highly resistant to abrasion and maintains high barrier protection, even under harsh conditions. Because many paint applications occur outdoors during summer months or in enclosed indoor spaces with heavy machinery, a frequently cited challenge facing these workers is heat stress. In potential heat stress situations, Tyvek®

400 D (Dual) coveralls offer the protection and durability of Tyvek® fabric on the front along with the comfort and breathability of DuPont™ ProShield® 10 fabric on the back. The Tyvek® 400 D (Dual) design is particularly useful to help minimize heat stress risks. **This garment may be suitable for use when spray paint exposure is *primarily in front*.**

Typical Spray Painting Hazards/Description/Examples	ProShield® 10	Tyvek® 400 D	Tyvek® 400	ProShield® 60	Tyvek® 800 J	Tychem® 2000/4000/5000/6000
Particulates	◆	◆	◆			
Overspray with exposure primarily in front		◆				
Overspray			◆	◆	◆	◆
Overspray with light liquid contact			◆	◆	◆	◆
Overspray with heavy liquid contact						◆*
Heavy liquid splash (mixing, clean-up, etc.)						◆**
Durability	●	●●	●●	●	●●	●●●
Comfort	●●●●	●●●●	●●●	●●	●●	●

◆ Acceptable for use ● Fair ●● Good ●●● Better ●●●● Best

\* Liquid barrier performance varies based on the amount of liquid on the garment, the length of time the liquid is on the garment, applied pressures and certain physical properties of the liquid. In applications where a higher liquid barrier is needed, consider DuPont™ Tychem® protective garments.

\*\* Fabric selection should be based on the evaluation of available permeation data for the paint constituents or cleaning solvents being used. Refer to DuPont™ SafeSPEC™ (SafeSPEC.DuPont.com).

#### Typical Spray Painting Hazards/Descriptions/Examples

Even higher liquid barrier is achieved with garments made from DuPont™ Tychem® barrier fabrics with taped seams. However, in exchange for a higher level of barrier protection, there is a significantly higher risk of heat stress. Tychem® garments are appropriate for situations in which the wearer has the potential for prolonged exposure to un-reacted activator or solvents, such as in the maintenance of large-scale paint distribution equipment, spill cleanup or large volume mixing activities. Please refer to SafeSPEC™ for Tychem® Protective Fabrics for isocyanate barrier information appropriate when handling large volumes of un-reacted activator, as well as barrier information for solvents commonly found in resin-based paints.

**WARNINGS:** DuPont protective apparel should be worn with appropriate respiratory protection and other PPE necessary to protect against those hazards identified in the hazard assessment. Tyvek®, Tyvek® 400 D, Tyvek® 800 J, ProShield® 10, ProShield® 60 and Tychem® are not flame resistant and should not be used around heat, flame, sparks or potentially flammable or explosive environments. Tyvek® coveralls can be considered for use with the appropriate respirators and other suitable PPE to minimize contact with paint aerosols. Tyvek® garments are not appropriate if they are getting wet (paint is dripping or running, or wet to the touch) or if spotting is observed on skin or garments worn under the coveralls. Tychem® aprons and smocks are available for situations where prolonged liquid exposure may be limited to the front of the torso and/or arms of the wearer. These aprons and smocks can be worn with Tyvek® to provide localized protection while limiting the level of thermal discomfort. Tyvek® 800 J contains natural rubber latex which may cause allergic reactions in some sensitized individuals. Anyone who begins to exhibit an allergic response during the use of DuPont products should immediately cease using these products. The incident should also be reported to DuPont at 1-800-441-3637 so that an investigation can be initiated.

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information should first verify that the garment selected is suitable for the intended use. In many cases, seams and closures have shorter breakthrough times and higher permeation rates than the fabric. If fabric becomes torn, abraded or punctured, end user should discontinue use of garment to avoid compromising the barrier protection. **SINCE CONDITIONS OF USE ARE OUTSIDE OUR CONTROL, WE MAKE NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION, NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE AND ASSUME NO LIABILITY IN CONNECTION WITH ANY USE OF THIS INFORMATION.** This information is not intended as a license to operate under or a recommendation to infringe any patent, trademark or technical information of DuPont or others covering any material or its use.

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