# This presentation is for informational purposes only

Customers of Bulwark Protective Brands are solely responsible for conducting their own Hazard/Risk Assessment to identify safety hazards in their work environment.

Customers of Bulwark Protective Brands are solely responsible for selecting appropriate garments and protective gear for their employees and ensuring wearers use the garments and protective gear properly and in conjunction with appropriate gloves and footwear. Because working conditions and other factors may vary, Bulwark Protective Apparel does not make any representation that these garments and protective gear will protect wearers from injury.

# Welcome to our “Town Hall”

**Premise –** We’ve received a lot of questions around FRCP lab coats and coveralls. I did my best to present the questions as they came to us.

## Some definitions

- FR/CP – flame resistant/chemical protective
- Flame resistant – self extinguishes, does not melt, drip or add to the injury
- CP – Chemical Protection, repels small amounts of inadvertent liquid chemical splashes at atmospheric pressure.


Q&A

## Is penetration, permeation or repellency used for liquid chemical protective lab coats?

It depends on what the wearer is being exposed to and the level of protection needed. That's why a hazard assessment is needed. The hazard assessment should dictate the level of protection.

- Penetration is when a liquid passes through pores or imperfections in the material, closures, seams and interfaces with pressure.
- Permeation is when a liquid moves through a material by absorbing on the surface, diffusion through, and desorption on the opposite side, over time.
- Repellency is the ability to resist wetting without pressure.

**Does the type of PPE worn and how it's tested matter if the exposure is a skin irritant, skin sensitizer or a carcinogen?**

Yes – the more severe and potentially damaging the exposure, the more protection is required. For example, if the exposure is potentially life threatening, such as a carcinogen, that can have a long term life threatening affect, non-permeable PPE should be considered. Sensitizers can cause serious long-term allergic reactions that also may justify the selection of non-permeable PPE. Irritant effects typically go away once the exposure is removed. A thorough hazard assessment is required. Also you need to evaluate all PPE – hand, face, breathing, interfaces, etc.

**How do you select a chemical protective garment that can be worn over Flame-Resistant (FR) clothing?**

Any chemical protective garment being worn over FR clothing needs to also be FR. In an application where FR clothing is needed, the outer most layer needs to be FR. If both chemical splash and thermal exposures are present, a garment with both chemical splash  protection and FR properties is the proper choice.

**Which FR standard is the right one to look for when evaluating a lab coat for FR exposures?"**

It depends on the FR/thermal exposure the wearer may potentially be exposed to. If the thermal exposure is a flash fire, garments meeting NFPA 2112 is the FR standard to look for. If there could be an arc flash exposure, a garment meeting ASTM F1506, with an arc rating that meets your exposure needs, would be appropriate.

## Are there cleaning recommendations for FR garments?

FR garments can typically be washed just like regular work clothing using common laundry detergents. Additives like chlorine bleach, peroxides and softeners should not be used. Each garment has laundry instructions and if they are followed, there should be no issues. All Bulwark garments retain their FR properties for the life of the garments if the laundry instructions are followed.

**Can the dual hazard FR/CP garments be laundered and if so is there a limitation on the number of launderings ?**

Yes the FRCP garments can be laundered just like FR garments. Milliken has a limited recommended number of laundering of 50 industrial launderings for it's FR/CP fabric. It will continue to repel some chemicals beyond 50 but it starts to loose some repellency ability with others. It's a gradual reduction in its ability to repel. We have also found that typical lab coats are not laundered very often so 50 launderings can equate to many years of service.

**We wear a coverall where a powdered dust hazardous chemical is used to prevent skin contact. We also have an occasional arc flash exposure. Would an FR coverall work for both these hazards?**

An common woven fabric FR coverall with the appropriate arc rating for your arc exposure would be OK. It however is not designed for protection from a dust particulate. It is air permeable and therefore could allow dust to penetrate. To truly protect the wearer from particulate exposure, a garment designed for particulate exposure would be needed and if arc flash is also a hazard, it should be FR and arc rated. If the arc rating is not high enough, an additional underlayer of an arc rated garment might be sufficient to get to the needed arc rating. Remember in a thermal exposure environment the outer layer must be FR. A garment for particulate protection may not be FR. A secondary FR/Particulate garment may be an option.

## Are there FR garments suitable for clean room applications?

Clean rooms get tricky. Bulwark garments are generally woven or knit fabrics which will produce some degree of lint. And are not designed for clean room applications. There are garments made with Nomex filament yarns* which can be used in clean room environments that also need to be FR.

*https://www.dupont.com/dpt/nomex-knowledge-center/industries/industrial/flame-arc-flash-protective-clothing-cleanroom.html

**Do FR fabrics have an issue with skin exposure to the FR chemicals ?**

FR chemistry has been extensively tested for skin irritation, contact hypersensitivity, and toxicology. All of these tests have shown no irritation or contact sensitivity caused by the flame-retardant chemicals used to make either the fibers or the fabric.

## Why would a reusable lab coat be any better than my disposable one?

The main reason a reusable lab coat like the FRCP coat is preferable is avoiding the human decision point. A disposable is only put on when needed, and that means the wearer has to make a conscious decision to put it on. This gives them the opportunity to either forget or choose not to take the time to put on the coat. Whereas the reusable FRCP coat is worn all day which eliminates the decision point on the part of the wearer.

**Our lab doesn't work with flammable chemicals, so is an FR lab coat really necessary?**

FR may not be necessary. However, if you have open flames like a Bunsen burner or other thermal devices that could ignite a coat sleeve, FR is a good idea. We had a lab manager state that she's had an inexperienced worker reach across the work area exposing there coat sleeve to the flame of a Bunsen burner and ignite their coat.  It was quickly extinguished without injury but could have resulted in something far worse.

**Is there a solution for a chemical splash resistant lab coat for labs without any ignition source?**

Yes – Bulwark makes a non-FR lab coat that has all the chemical repellency, and comfort properties of the FR/CP coat but is not FR. It can be easily recognized by the fact it is white versus royal blue, and is labeled CP not FRCP. Our research has shown that almost every lab uses some liquid chemicals like acids, corrosive, or polar organic solvents that have the potential to cause skin injury. Be sure there are no potential clothing ignition hazards. For protection from non-polar solvents, a secondary non-permeable, FR alternative will be required.

## Does the FR/CP lab coat repel all liquid chemicals?

Unfortunately it does not, but a common lab coat doesn't repel any liquids. Generally the FR/CP coat repels aqueous solutions of chemicals with medium to high surface tension and medium to high polarity that are splashed onto the coat without pressure. Because it is air permeable, to provide breathable comfort, certain non-polar chemicals and liquids under pressure can penetrate through the fabric. The trade off from a non-permeable coat is the wearability and removal of the decision point whether to wear a coat or not.

## Could the FR/CP lab coat fabric be made into a glove?

I suppose it's possible, but in the case of a glove the dexterity would likely be limited since it is a woven fabric not a knit. Plus a glove could be flexed during use and this could allow the openings between the yarns to open wider, which could allow the liquid to penetrate.

**Does the addition of patches or embroidery affect the coats ability to repel?**

Any time you stitch through the fabric it does open a pathway for liquid to potentially penetrate and the stitching thread is not repellant. However, the likelihood of an inadvertent splash landing directly on that area is low, plus the amount of chemical that would penetrate would be very small. It is best to locate any added pieces in an area not likely to be splashed and minimize the size and number of add on’s.

**Is there  a way to know if the repellency is still working?**

Other than testing it yourself with a small drop of chemical there isn't. Keeping track of the number of launderings is a "best practice". The Bulwark FR/CP and CP garments state a maximum of 50 industrial launderings, as mentioned previously. Performing a simple test to see if a drop of one of the chemicals of concern repels, will typically indicate if it still has repellency properties. Make sure that any testing is done in a safe and controlled environment.

# FRCP vs Separate Chemical Protection

**If you need Chemical Splash protection, using Separate Protection, has definite drawbacks:**

- Requires a Decision Point
- Often Unused - Leaving workers unprotected
- Bulky and Uncomfortable
- Possibly not FR

# Thank you

## Questions, Comments?