



Personal Protective Equipment

## 6 Steps for Selecting PPE for the Oil & Gas Industry

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Workers in the oil & gas and petrochemical industries perform many high-risk tasks that involve exposure to multiple hazards. In some cases, these high-risk tasks are also performed under extreme weather conditions and in remote locations.

A broad range of personal protective equipment (PPE) solutions are needed to address the multiple hazards workers face, including garments for flash fire hazards; protection against fine particle hazards and low-level liquid splashes; protection against concentrated chemicals under pressure; and gloves for cut and multi-hazard protection.

With so many different manufacturers offering PPE solutions, identifying and sourcing the most appropriate PPE can be very time-consuming for busy health, safety and environment (HSE) managers.

The following steps should help to simplify the process of selecting PPE for oil & gas applications.

### 1. Hazard identification

Selection of PPE is the responsibility of employers under OSHA 1910.132.

Employer assessment of workplace hazards drives the selection of appropriate PPE and a key first step is to conduct a Site Hazard Identification and Risk Assessment. This may involve consultation with a number of colleagues to make sure that all potential hazards have been identified. Common sources of risk include potential flash fires, mechanical hazards – such as exposure to slick, oily surfaces, sharp edges, punctures and heat contact – and exposure to a wide range of hazardous chemicals, dusts and solvents.

In order to minimize risk, most safety professionals apply the “Hierarchy of Controls”. This essentially means that, if possible, you should eliminate the hazard completely: if this is not possible, you should substitute a safer option. Risks may be reduced by applying engineering and administrative controls to minimize potential contact. Once the risk reduction process is completed, PPE options can be selected to protect against any residual risk.

### 2. Matching PPE to the hazard

There are a number of essential properties to look for in PPE, depending on the hazard(s) you have identified. This section gives some top-level guidance: but you should always consult with the PPE

manufacturer to check that you have chosen the appropriate level of protection for your needs. Also remember that all the different PPE elements – gowns, coveralls, gloves and masks – must afford the appropriate level of protection.

### *Flame resistance*

Make sure you understand the ***basic differences between “inherent” and “treated” flame-resistant (FR) technologies.***

- “Inherent” means that FR properties are a natural part of the fibers used in the fabric. The flame resistance is intrinsic, permanent and cannot be washed away or worn out.
- “Treated” fabrics use chemical additives to make them flame resistant. The FR properties of chemically treated FR (FRT) fabrics – which are usually cotton or cotton/nylon blends – may be diminished or removed altogether depending on how they are laundered and/or which chemicals they are exposed to in the work environment.

### *Chemical exposure*

Look for garments that exhibit the following properties:

- ***A strong permeation barrier*** built into the material to protect against a wide range of chemicals
- The ability to repel low concentrations of inorganic liquids and aerosols
- The ability to prevent solid particles from penetrating

To deliver optimum protection, ensure that the garment is tested against the specific chemical risks you have identified to deliver optimum protection. Ask your garment manufacturer to provide permeation data against your specific chemicals.

### *Cut hazards*

In the oil & gas industry, it is likely that cut hazards will be encountered in combination with exposure to chemicals and/or extreme temperatures. Thanks to recent advances in materials technology, PPE manufacturers are able to offer ***protective gloves engineered with Kevlar®*** to help provide the required combination of protection, without compromising the wearer’s ability to perform tasks such as using tools and operating equipment.

### *Arc hazard*

Electric arc flash is one of the most serious and least understood electrical hazards encountered in the workplace. An electric arc is a continuous electric discharge of high current which flows through an air gap between conductors. This generates a very bright ultra-violet light as well as intensive heat. An arc flash is typically caused by a short circuit, which are often the result of a human error (e.g. caused by a worker touching a test probe to the wrong surface or from a slipped tool).

Recent advances in PPE protection include the ***DuPont™ Nomex® global portfolio***<sup>2</sup>. Included in the DuPont™ Nomex® global portfolio, Nomex® Essential Arc offers reliable, inherently flame-resistant arc flash protection that meets NFPA 70E Category 2 requirements in a single layer, with enhanced

garment durability for fewer replacements.

### 3. Regulatory compliance

In addition to making sure PPE matches your particular protection requirements, it is necessary to evaluate it against regional and/or global standards. In the US, the provision of protective clothing is covered by OSHA 1910.1321. The main points of the legislation are:

- Through a hazard assessment, the employer shall determine the appropriate PPE that will protect employees from the hazard(s) identified.
- Employees must be consulted over the PPE and provided with instructions/training on its use and compatibility with other PPE.
- PPE must be provided and maintained by the employer free of charge to employees and kept in good, reliable condition. The employer is also responsible for ensuring employee-owned PPE is adequate and maintained properly.
- All PPE must be appropriate for the work performed and risks involved, without itself posing any increased risk due to the work environment, conditions, or the design of the PPE.

If you are responsible for selecting PPE centrally for use in an oil & gas company with global operations, you need to check the relevant legislation.

### 4. Design and comfort of PPE

PPE is only truly effective if it is used properly. Design and comfort both play a big role in employee acceptance. Consider the following:

- In terms of comfort, how soft and/or lightweight is the material?
- Are the garments sized well, so they will fit?
- How quickly does the material wick away or absorb moisture from breathing or sweating?
- How do workers properly don and doff garments to remain safe?
- Is the garment reusable? If so, how should the garment be properly cleaned and disinfected?

### 5. A word about COVID-19

We cannot complete an article about PPE without mentioning **COVID-19**. The virus that causes COVID-19 has emerged as a global threat to the health of workers – placing additional responsibility on HSE professionals, particularly in essential industries like oil & gas.

As new guidance continues to evolve, it extremely important – and very challenging – to quickly adapt to the changing needs of workers during the COVID-19 pandemic. However, the same basic principles apply as for other forms of PPE.

- Evaluate the risk of exposure to the virus as well as hazards present in your work environment in order to protect workers effectively.
- Match the PPE solution to the hazard. For example, if there is a flash fire hazard, all PPE should be flame-resistant (including a face covering).
- Check PPE effectiveness in filtering out particulates, viruses or bacteria: ask the manufacturer for the data you need.
- Is the PPE solution reusable? If so, how can it be decontaminated appropriately and how often? How durable is it to multiple launderings? Might a single use disposable option be more appropriate and cost-effective?
- Is the solution comfortable to wear?

## 6. Save time, stay safe

In conclusion, the PPE selection process can be long and complex, but there are ways that HSE managers can save time.

- Consult with an expert to help identify the specific combination of PPE that can address the multiple hazards a worker may face on the job.
- Look for PPE manufacturers that have in-depth knowledge, expertise and resources to help guide you in your research.
- Ask companies for resources and information that can help simplify the process of matching PPE to the hazards your workers face.
- Choose a PPE partner that can work side-by-side with you to help you match PPE to your hazards and provide additional support, such as training.
- Explore the *Oil & Gas PPE Guidebook from DuPont Personal Protection* to help you select PPE based on your tasks and hazards.

1. Occupational Safety and Health Administration: Directive *1910.132* of November 18, 2016 on the minimum health and safety requirements for the use by workers of personal protective equipment at the workplace; 81 FR

82999 <https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.132>

2. *The Nomex® global portfolio of fabric solutions is an extension of the DuPont Personal Protection Portfolio, which consists of DuPont™ Kevlar® aramid fiber for cut and mechanical protection, DuPont™ Tychem® garments liquid chemical and gas hazards, and DuPont™ Tyvek® garments particulate and light splash hazards. Tychem® and Tyvek® garments for Oil & Gas and Mining applications are also available through DuPont's distributor network across the NA market.*

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