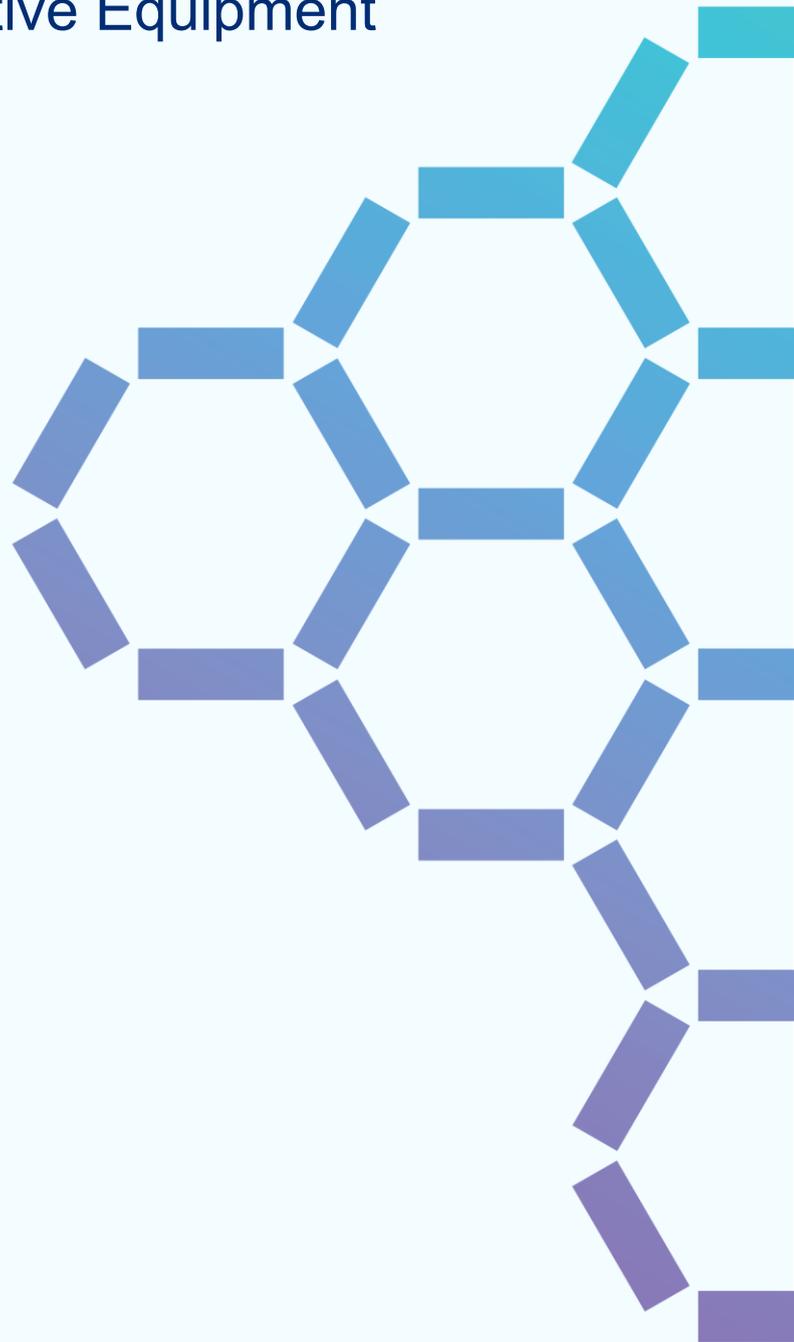


Hydrofluoric Acid Guidance - Section B

Personal Protective Equipment



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Chemical Industries Association

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Introduction

The Hydrofluoric Acid Sector Network of the Chemical Industries Association (CIA) has developed this Guidance. It is intended to highlight the recommended level of Personal Protective Equipment (PPE) for a variety of operations and maintenance work where there is potential for exposure to HF. The Guidance is based upon many years of practical experience amongst members of the HF Sector Network; it reflects the current best practice (at the time of publication) and is recommended for use in conjunction with information from the supplier(s) of HF and manufacturers of PPE for use at sites using HF.

The Guidance has been defined by linking recommended PPE levels to risk categories for activities; examples of work and the appropriate PPE are given, and the appendices include photographic examples of the various PPE levels.

The Guidance is not to be used as a substitute for any applicable specific legislative requirement. Whilst all reasonable efforts have been made to ensure the accuracy of the contents and legislative requirements at the time of publication, readers must refer to these themselves to ensure their compliance with current legal duties.

Acronyms

AHF	Anhydrous Hydrogen Fluoride
API	American Petroleum Institute
BA	Breathing Apparatus, equipment that allows a person to breathe in environments where the air is unsafe or unsuitable
EC	European Community
EN	Norme Européenne
HF	Hydrogen Fluoride
ID	Identification
ISO	International Standards Organisation
OSHA	Occupational Safety and Health Administration, a U.S. government agency
PPE	Personal Protective Equipment
prEN	Provisional Norme Européenne
PVC	Polyvinyl Chloride

B1 General Overview

(i) All HF handling facilities should have written policies and procedures covering the use of PPE by all employees, contractors and visitors. An appropriate training policy must be in force at the facility. All employees and contractors involved with HF facilities should have appropriate training, to include hazard awareness, risk assessment, the correct way to fit, wear and decontaminate PPE, as well as First Aid and emergency procedures as a minimum. These policies should be strictly enforced and implemented.

Note: For normal operations PPE should NOT be relied upon as the primary or only defence mechanism. The hierarchy of control should be such that plant and equipment design should eliminate or minimise the risk of exposure of personnel involved in HF handling duties or activities, so that the wearing of PPE becomes a necessary precautionary measure as opposed to the only exposure prevention one. For abnormal situations, e.g. during emergencies, a level of complete protection should always be specified, details of which can also be found later in this Guidance.

(ii) HF is a very toxic and corrosive chemical which, when exposure occurs, can lead to severe health risks and can, if the correct treatment is not quickly and efficiently applied, prove to be fatal.

Note: Despite the inherent hazardous properties of HF, the UK and European industry has a good safety record and has shown that HF can be safely transported, handled, and used in process plant. This is dependent upon correctly identifying the risks, adhering to the correct procedures, and using the appropriate level of PPE. Injuries within the industry are often due to a failure in the risk assessment process, and the lack of or incorrect use of the appropriate PPE.

(iii) Many materials have been tried and tested following recognised procedures for resistance to HF, e.g. Neoprene. Many materials have also been shown to be acceptable through years of experience, e.g. PVC. When selecting PPE, the material of choice must be shown to be resistant to HF. It is recommended that handlers of HF select only reputable PPE suppliers who can give documentary evidence of resistivity to HF or rely on their supplier of HF to advise on suitable equipment. In all cases, materials used in the production of PPE for use on HF handling units must be tested for permeation and resistance to HF and aqueous HF.

Note: all materials have some permeability to HF, particularly liquid HF. Direct contact should be avoided. PPE known to have been exposed to liquid HF should be decontaminated as soon as possible (see further below in B 2.3 'Care of PPE & Testing').

In addition to materials shown from test data to be resistant to HF permeation, for information the relevant European Norm associated with types of PPE are as follows:

- a) Type 1 EN 943-1 Gas-tight suit (e.g. Emergency Response fully encapsulated suit).
- b) Type 2 EN 943-1 Non-gas tight suit (e.g. Respirix air-fed Tank Suit).
- c) Type 3 EN 14605 Liquid-tight suit (e.g. Respirix 2-piece neoprene suit; Alpha Solway PVC suit; Dupont Tychem F suit).
- d) Type 4 EN 14605 Spray-tight suit.

(iv) Individual site management teams must still complete HF handling risk assessments. This Guidance on PPE is intended to complement, not replace, individual task risk assessments.

B1.1 Legislative Standards

The Personal Protective Equipment at Work Regulations

The **Personal Protective Equipment at Work Regulations 1992** came into UK legislation 1st January 1993. They relate, in the main, to PPE which is not subject to other Regulations, including COSHH and the Noise at Work Regulations. Consequently, technical aspects of chemical protective clothing, respirators and ear defenders are not covered by most of the requirements of the Personal Protective Equipment at Work Regulations.

The Regulations were amended in April 2022 by the **Protective Equipment at Work (Amendment) Regulations 2022**. The duties under the original 1992 Regulations remain unchanged but are extended to workers other than those with a direct contract of employment. Full details can be found on the HSE website here: <https://www.hse.gov.uk/ppe/ppe-Regulations-2022.htm#amended>

The main requirements of the Regulations can be summarised as follows:

1. **Provision of PPE (Regulation 4)**. Suitable PPE must be provided wherever it is not reasonably practicable to control a risk to health and safety by other measures.
2. **Compatibility of PPE (Regulation 5)**. Where more than one item of PPE is being worn, they must be compatible with each other.
3. **Assessment of PPE (Regulation 6)**. Whenever it is decided that the use of PPE is necessary, an assessment must be made

covering the degree of risk, the suitability of the PPE selected, any additional risks due to the environment in which the work is to be done, and any health implications of wearing the equipment, e.g. heat stress. The assessment must be recorded unless it is easily repeatable and must be reviewed wherever there is reason to suspect it is no longer valid or where there has been a significant change to the work.

4. **Maintenance and replacement of PPE (Regulation 7).** Any PPE provided to employees should be maintained in an efficient state, in efficient working order and in good repair. An effective system of maintenance of PPE is essential to make sure the equipment continues to provide the degree of protection intended. Maintenance includes, where appropriate, cleaning, disinfection, examination, replacement, repair and testing. Where appropriate, records of tests and examinations should also be kept. Persons carrying out repairs and testing of PPE should be trained and approved to do so by the PPE manufacturer.
5. **Accommodation for PPE (Regulation 8).** Suitable accommodation for PPE storage when not in use should be provided. The storage should be adequate to protect the PPE from contamination, loss or damage. For specific information on correct storage refer to the supplier recommendations.
6. **Information, instruction and training (Regulation 9).** Employees and contractors should be given suitable information, instruction and training to enable them to make effective use of PPE provided and protect them against workplace and health hazards, such as heat stress. The training should be systematic and include theoretical and practical elements. Records of training details should be kept.
7. **Use of PPE (Regulation 10).** PPE should be used as intended and the employer should ensure that the proper use is maintained.
8. **Reporting of loss or defect (Regulation 11).** Arrangements to allow the reporting of loss or defects of PPE should be provided. Employees must take reasonable care of PPE provided and report any loss or defect as soon as possible.

Product Compliance for PPE

Regulation (EU) 2016/425 of the European Parliament and of the Council of 9 March 2016 on personal protective equipment and repealing Council Directive 89/686/EEC, requires that within the European Union ALL PPE carry the 'CE' marking as a sign that the product complies with the essential requirements of these Regulations. The UK Government continues to maintain obligations on PPE manufacturers and users, see later.

PPE must be tested using the standard test protocol against the relevant hazard(s) and manufactured under an approved quality assurance system, e.g. **ISO 9001:2015 Quality Management Systems - Requirements**.

An EC-type examination certificate is then issued by the manufacturer's selected Notified Body, certifying that the PPE satisfies the relevant provisions of the PPE Directive. The manufacturer then issues a Declaration of Conformity (DoC) for the PPE and affixes a CE conformity mark followed by the unique Notified Body identification number. Though the UK left the EU, the obligations on PPE manufacturers remain, though now the DoC may be the EU DoC if **CE** marked, or a UK DoC if **UKCA** marked.

UK Government Guidance explains how for equipment being supplied in or into Great Britain, (excepting Northern Ireland), that the Government is extending recognition of certain goods that meet EU requirements (including the CE marking), indefinitely, beyond 2024 for many products. **The Product Safety and Metrology etc. (Amendment) Regulations 2024** give effect to this and came into force on 1 October 2024. There are obligations on manufacturers of PPE. A manufacturer is a person who manufactures PPE, or has PPE designed or manufactured, and markets that PPE under their name or trademark. Before placing PPE on the GB market (Northern Ireland only accepts CE marked goods), the manufacturer must:

- a) Design and manufacture it in accordance with the applicable essential health and safety requirements. These are set out in ANNEX II to the of the Personal Protective Equipment Regulation (EU) 2016/425.
- b) Classify the PPE according to risk, (Category I, II or III)
- c) Decide which conformity assessment marking (UKCA or CE) they intend the PPE to have when placed on the GB market
- d) Draw up technical documentation
- e) Have a relevant conformity assessment procedure carried out.

Categories of PPE. PPE falls into one of three categories, I, II, III:

- **Category I. Simple Design** – this equipment is designed for minimal risks only and where the effects of any hazard are of minimal risk and the consequences of any exposure are reversible.
- **Category II. Intermediate Design** – PPE which has been tested against at least one hazard and is approved by a notified body.

- **Category III. Complex Design – this equipment is designed to protect exclusively against hazards which cause irreversible damage to health or mortal danger.** Category III PPE must be assessed by a Notified Body based in the European Union. Upon a successful assessment of the PPE, the Notified Body will issue the manufacturer a:
 - a. Module B EU type-examination certificate. This will state the harmonised standard(s) addressing the specific risk(s) that the PPE was designed to protect against. As set out in Annex V of Regulation (EU) 2016/425.
 - b. Module D EU type-examination certificate. This will state the quality assurance of the production process set out in Annex VIII of Regulation (EU) 2016/425.

For use with HF only 'Category III' 'Complex Design' PPE is appropriate. Where PPE does not display the relevant EU certification and CE marking, it cannot be utilised at a UK or European facility handling HF.

Note: There is no recognised standard for reporting degradation of test materials. The chemical permeation test (e.g. see *ISO 6529:2013, Protective clothing. Protection against chemicals. Determination of resistance of protective clothing materials to permeation by liquids and gases*) requires the condition of a test fabric to be noted including any degradation. However, permeation can occur without any obvious sign of degradation, and it would be unsafe to assume that, because degradation was not obvious, there was no damage due to exposure. The only method acceptable is to test the PPE for permeation of the specific chemical(s).

Note: whilst references may be provided within this text, legislation changes and standards are under routine review and development, therefore the reader is reminded to carry out their own appropriate due diligence on the current legal requirements and practices covering their application.

B2 PPE Policy

Each operating site should have a clear, written policy describing the use and requirements of individuals with regards to PPE. The policy, which should be reviewed periodically, should comply with all local, national and international legislation where appropriate and, as a minimum, should include the following areas.

B2.1 Risk Assessment

Each site handling HF should have a procedure that demands a risk assessment be completed prior to initiating each new task or job. The risk assessment may be in the form of an established Local Area Instruction or similar formal written procedure for routine work. For non-routine or one-off tasks then it is advised that a risk assessment is completed, including a representative of the working party involved in the task.

Risk assessment should be considered for all areas and aspects of HF handling including plant, decontamination and maintenance areas, loading/unloading facilities, transit, sampling, laboratories, pilot plant, on and off-site medical facilities, including emergency responders. From a PPE perspective the risk assessment needs to determine if the potential for exposure/contact falls into a 'low,' 'medium' or 'high' risk category. (See definitions below)

During risk assessment consideration should also be given to any potential health implications for the wearer of PPE e.g. depending upon PPE level it may be appropriate to define a maximum work time. Heating and cooling systems for personnel required to wear PPE in extreme conditions are available and should be considered where necessary. Also, certain tasks, e.g. scaffolding in areas of high risk, may require a heavy-duty glove which is not only chemically resistant but will also resist mechanical damage.

The risk assessment may include the following details:

- Clear identification of the task to be done and the individuals involved
- Clear identification of the decontamination procedures required
- Clear identification of the possibility of exposure to all hazards
- Clear identification of the appropriate PPE required for each step of the task. (low, medium or high-risk PPE – see definitions below)
- A review of the competence and understanding of the individuals involved
- An evaluation of the risks associated with each step of the task
- Identification of suitable measures to eliminate or mitigate as many of the hazards as possible
- Clear identification of the expected duration of the task and any health or hygiene implications
- Clear identification of any back up emergency plan, if necessary.

B2.2 Levels of PPE

The following information provides the basic principles regarding levels of Personal Protective Equipment (PPE) to be worn for types of activity associated with producing or using HF. Although some sites have extra levels of PPE within their procedures above those identified, or for certain activities adopt a higher standard than others (i.e. some sites wear under-gloves beneath the primary HF glove protection) the following suggests **the minimum standard of equipment that should be worn** for the relevant the risk category.

B2.2.1 Risk Categories & PPE Standards

PPE can be broken down to four basic ascending levels of risk and protection:

1. **'HF Low Risk'** – definition: Where the potential for contact/exposure is low and the quantities and type of any potential contact are such that ingress cannot be gained through clothing or via, neck, wrist, waist or leg openings.
2. **'HF Medium Risk'** – definition: Where contact / exposure to HF is unlikely but in extreme circumstance may be possible.
3. **'HF High Risk'** – definition: Where quantities of HF or HF contaminated material sufficient to cause injury if inhaled or in contact with exposed skin are credible and could cause exposure through clothing or via neck, wrist, waist or leg openings.
4. **'BA Emergency Response'** – definition: Where access to a HF liquid / vapour environment or an area that could potentially see HF liquid / vapour sufficient to cause serious harm is required.

'Low Risk' PPE Standard

'Low risk' reflects the minimum standard of PPE for plant access and non-invasive interaction with plant equipment. It is intended to be worn for operating and maintenance activities that do not involve direct contact with HF or significantly contaminated equipment.

Some user sites have adopted a higher standard for some of the above activities using 'Medium Risk' standard to access plant and carry out non-invasive operating duties.

Minimum '**Low Risk**' PPE consists of:

- Helmet
- Eye protection – goggles / glasses
- Safety boots – leather or rubber
- Full Body Cover – Overalls, jacket and trousers or equivalent body, arm, and leg protection
- Gloves – generally task-specific.

'Medium Risk' PPE Standard

Note: Not all sites use an intermediate standard suit, preferring to move between either 'Low' or 'High Risk' PPE, according to the circumstances of the site.

For those sites that use 'Medium Risk' PPE the standard is applied to those non-invasive activities requiring interaction with HF systems and there is potential for contact with HF.

The following list is not exhaustive, but HF 'Medium Risk' Suit standard is required for tasks such as:

- Starting pump drives or opening / closing valves or similar (for some sites)
- Plant access (for some sites)
- Handling of equipment where minimal residual contaminants are present (see B2.2.2 Relaxation of 'High Risk' suit standard).

Minimum 'Medium Risk' PPE consists of:

- PVC, neoprene or butyl suit or 2-piece suit. The colour *may* be Green, but this can vary according to the manufacturer.
- Filtered air-fed hood, or helmet / visor face protection
- HF Chemical wellies or leather safety boots with chemical over-boots
- HF-resistant gloves.

'High Risk' PPE Standard

'High Risk' PPE must be worn for all process activities that involve invasive actions i.e.: process sampling and connection and disconnection of ISO tanks. It should also be worn for those jobs where exposure to contaminants is unavoidable such as unpacking plant columns. 'High Risk' standard should also be worn for laboratory handling activities such as decanting and opening of sample bombs.

Maintenance Activities

'High Risk' PPE must be worn for all invasive maintenance activities. The standard is based upon the premise that decontamination of HF systems, whether for maintenance or ISO tank connection / disconnection, cannot be judged satisfactory until confirmed clean by initial break-in and observation. It also presumes that decontamination methods may have been unsuccessful, and HF is still present within the system. The PPE for initial break-in must therefore be adequate to prevent liquor and vapour ingress through head / neck, glove, and boot openings.

'High Risk' PPE standard should therefore be worn for all invasive work on HF systems until decontamination is proven adequate. It should also be worn for tasks that, although not invasive, could result in an uncontrolled loss of containment (e.g. pulling up live joints).

The following list is not exhaustive, but HF 'High Risk' Suit standard is required for tasks such as:

- Unpacking of plant columns
- ISO tank connection / disconnection
- Sampling of HF systems

- All initial pipe work or equipment break-ins such as unbolting a flange joint or pump casing, sawing / grinding into a pipeline or unscrewing a pipe coupling
- Changing bolts on flanges still 'live'
- Connecting purge lines
- Pulling up joints on 'live' systems
- Rodding clear blocked sample or drain lines
- Handling / decanting HF samples in lab
- Strip down of equipment (such as valves / pump inners for decontamination)
- Re-commissioning of equipment after maintenance
- Decontamination of equipment removed from plant (e.g. water jetting).

Minimum '**High Risk**' PPE consists of:

- One-piece HF resistant suit with glove cuff seal and double envelope leggings
- Integral suit mask air supply or mask air-fed hood or alternatively filtered air-fed hood (task dependent)
- HF-resistant gloves
- HF chemical wellies.

BA Emergency Response PPE

Used only for emergency incident response where personnel need to enter the contaminated area to investigate the source of a leak, undertake manual isolation of a system, or effect repair. Personnel will not don an 'Emergency Response Suit' and enter a hazardous environment to carry out the above tasks until the 'Incident Officer', 'Technical Adviser' or similar responsible person has assessed the situation and authorised the activity.

Minimum '**Emergency Response**' PPE consists of:

- One-piece fully encapsulated HF resistant suit with glove cuff seal and built in sealed HF resistant wellingtons.
- HF resistant gloves
- BA set.

B2.2.2 Relaxation of 'High Risk' PPE Standard

Contamination must be assumed, and 'High Risk' PPE worn, until:

- Visual inspection confirms the system to be free of gaseous, liquid or solid HF contaminant sufficient to cause injury if inhaled or in contact with exposed skin. (**Note: not necessarily large amounts e.g. an egg cup full of HF will gas profusely, react violently with water, and cause serious burns and systemic reaction**). Decontamination should be verified through fully opened ends of equipment, not just cracked / broken joints.
- Equipment that may retain pockets of contaminants (pump casing, lengths of pipework containing bends / lutes etc) have been air / nitrogen purged, or water flushed and checked to be pH neutral.
- Residual contaminants post initial break-in are identified as being in a state that allows safe handling wearing 'Medium Risk' PPE (e.g. there may be slight lingering odour, wet surfaces or damp solids present that the individual could come into contact with whilst handling equipment, but not to an extent that could gain ingress through PPE neck / wrist / waist / leg openings).
- Residual contaminants post break-in are identified as being in a state that allows 'Low Risk' PPE to be worn (e.g. deposits such as dried film/scale that present minimal contamination hazard).
- HF samples are adequately capped / contained and can be transported without danger of spillage.

Note: Plant or equipment should not be handled with bare hands or sent offsite until full decontamination has taken place. Full decontamination is usually achieved only after thorough steam / water washing, jetting or chemical cleaning (as appropriate) and will often involve a strip down of component parts. An exception on some sites concerns control valves that are removed, blanked and sent for overhaul after an initial decontamination only. This is to prevent the corrosive effect of any washing / steaming method employed. In such cases, the offsite workshop must be fully conversant with HF and the level of PPE required for breaking into and handling HF-contaminated equipment.

B2.2.3 Sampling Operations

Sampling operations should be considered as a line break despite the fact there is an element of control in that the flow and direction of the chemical is regulated via enclosed 'bomb' type receptacle or valve and pipework design.

'High Risk' PPE is therefore required for sampling of HF systems or for cleaning / emptying returned sample bottles.

B2.2.4 Recommissioning HF Systems After Maintenance

PPE for re-commissioning HF systems after maintenance should be a minimum of HF 'High Risk' Suit. This will allow for isolation in the event of leakage or in the case of catastrophic failure and allow safe retreat from the area.

B2.3 Care of PPE & Testing

It is the responsibility of the user to inspect the condition of equipment prior to and after use. Any faults should be rectified or new equipment obtained. All materials used to manufacture PPE may become permeable to HF, in particular liquid HF, over time and if damaged. Despite good decontamination procedures, degradation can still occur over time. A formal testing schedule should therefore be in place to ensure such wear or other physical damage is identified.

- **Suits** - Visually check for tears, holes, and thinning. Ensure the jointing tape has not peeled away and that the zip and cover close adequately. An inspection lamp designed for the purpose is recommended. Marker pens should not be used on suits as they can weaken the structure of the protective layers. (If names / numbers for ID purposes are required then mark the collar as this will be protected by the hood).
- **Hoods** – Similar inspection as above; also hose and attachments should be inspected together with face shield condition and seal.
- **Gloves** – Material condition should be checked for excessive wear, splits, holes etc, and preferably confirmed as intact by inflating with air in a water bath and checking for leakage. If attached to the suit, then an inspection lamp can also be used to help identify any holes or other defects.
- **Boots / Wellingtons (Wellies)** – Inspect material for excessive wear / damage etc, particularly the soles and seams. If possible, leak-test the boots using air in a water bath.
- **Decontamination of PPE** - All PPE must be decontaminated after use. Individuals should wash down protective equipment prior to removal, ensuring all areas are washed (lift arms to get full exposure to cleaning). Be aware that zips / fastenings beneath suit flaps can also become contaminated. The use of a second person to hose down and check that the rear is free from contaminants is advisable.

Acid indicating sprays are commercially available that can be used following PPE decontamination, particularly when contact with HF is known to have taken place, to confirm no acidic residue remains on the suit and it is safe to remove and handle.

Given the duty of an 'Emergency Response' suit they should always be inspected and tested after use. For some types this will require the suit to be inflated. To prevent damage or inadvertent use for exercises, it is recommended these suits be sealed in a bag until required.

B2.4 Training

In all cases PPE should only be worn by those trained in its selection, use, application and decontamination. The training requirements for operators, maintenance, contractors, management and visitors should be clearly identified and must be followed. Time-based refresher training should also be provided. In all cases training and re-training should be recorded and these records maintained for a suitable period. All individuals working on or visiting facilities handling HF should be trained in the use and limitations of the PPE available within the facility. Training in the use of PPE should also cover the health and hygiene issues associated with wearing the equipment.

For further detailed information refer to 'CIA HF Network Guidance – Section A – Training'.

B2.5 Auditing

To ensure that relevant procedures and standards are maintained, regular auditing of PPE systems is imperative. Periodic auditing will confirm that systems are working correctly and can identify where any requirements are not being followed.

Auditing should be considered at a number of differing levels, for example frequent audits from within the work group, and less frequent external auditing by non-facility personnel. All audits and actions generated should be fully documented with individual actions and responsibilities clearly identified, followed up and formally closed out.

B3 Materials Testing

The following materials have been shown, either through rigorous testing or through operational experience, to offer protection against HF when used correctly:

- Teflon
- Viton
- PVC
- Neoprene
- Butyl rubber

To select the most appropriate material for the duty required the operator should contact the various companies supplying PPE and request the most current data on breakthrough times for the various products, the test procedure followed, and the recommended maximum usage period. It is important to specify the concentration and physical form of HF that the PPE is required to protect against. The breakthrough time for aqueous HF can appear to be significantly more than against anhydrous HF and due to the difficulty of testing with anhydrous HF the manufacturer's specification details may not include anhydrous HF.

Appendix 1 Nomenclature of Different PPE Classes

- This Guidance document refers to the level of PPE to be worn according to the risk associated with the task being undertaken using the nomenclature Low, Medium, and High Risk, with the addition of Emergency Response suit. See 'B2.2.1 Risk Categories & PPE Standards'.
- In the USA, the US government agency, Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) standard, **29 CFR 1910.120 App B - General Description and Discussion of the Levels of Protection and Protective Gear**. OSHA Levels A to D being:
 - Level A- To be selected when the greatest level of skin, respiratory, and eye protection is required.
 - Level B- The highest level of respiratory protection is necessary, but a lesser level of skin protection is needed.
 - Level C- The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air purifying respirators are met.
 - Level D- A work uniform affording minimal protection, used for nuisance contamination only.
- Within the oil refinery industry, the HF Alkylation plants also refer to the American Petroleum Industry **API RP 751 Safe Operation of Hydrofluoric Acid Alkylation Units**. This also defines four levels of PPE according to risk.

Note: API levels are in a 'reversed' order compared with those from OSHA.

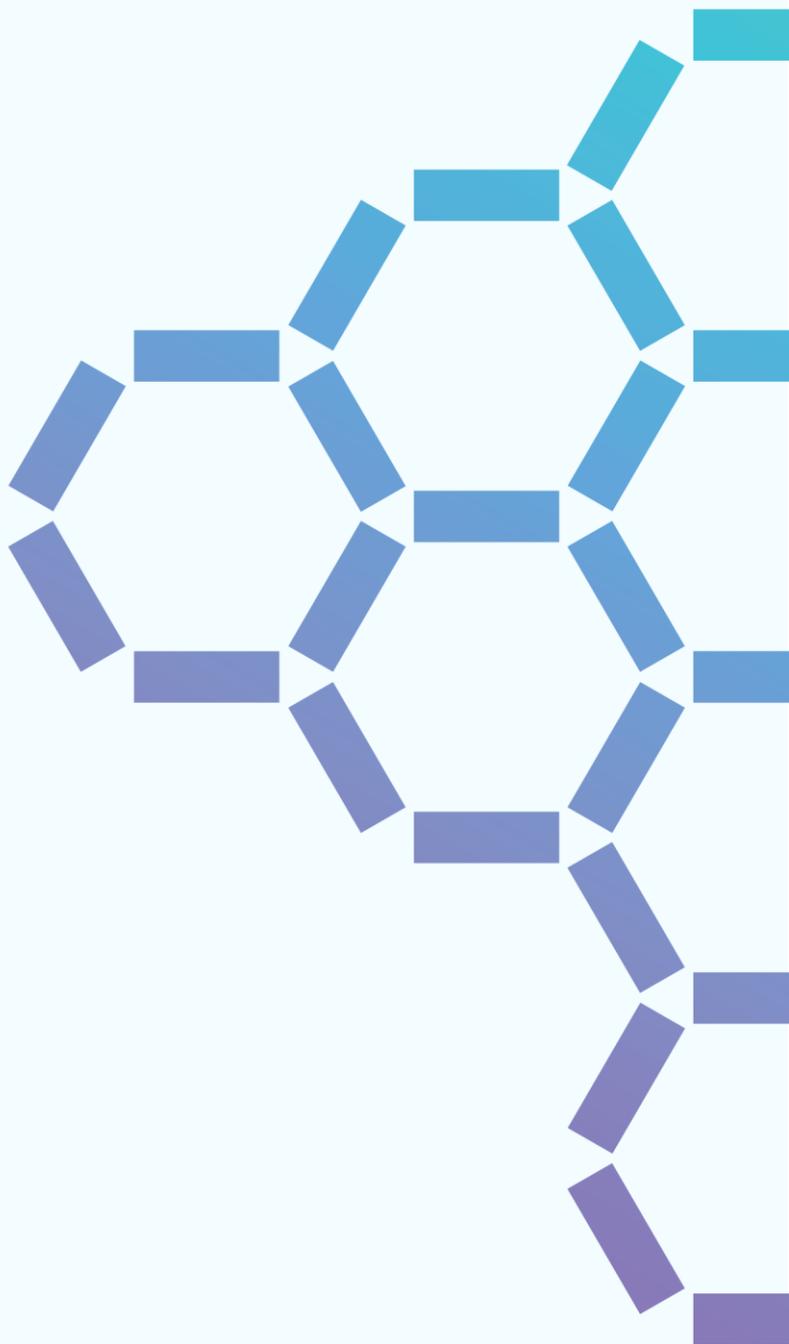
To avoid confusion and provide clarity, within these risk categories and levels of PPE, and with reference to the guidance in this CIA HF Sector Network Guidance document the equivalent definitions are:

API751	OSHA	CIA
A	D	Low Risk
B	C	Medium Risk
C	B	High Risk
D	A	BA Emergency Response

Appendix 2 Photographic Examples of PPE Categories

Risk Category	Examples
<p style="text-align: center;">Low</p> <p>Overalls, safety boots, safety glasses and hood / cowl</p>	 
<p style="text-align: center;">Medium</p> <p>Two-piece suit with cowl, goggles and visor</p>	

Risk Category	Examples
<p style="text-align: center;">Medium-High Two-piece suit with filtered air RPE</p>	
<p style="text-align: center;">High One-piece suit with filtered air hood or integral air-line supply</p>	
<p style="text-align: center;">Emergency Response Gas-tight suit</p>	



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