

Chemical Protective Clothing Databases

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Proper selection of Chemical Protective Clothing for use in protection against exposures to Hazardous Materials is a primary concern for essentially all Health and Safety Professionals. Field experience is absolutely one of the most powerful tools for making the selections, but it is not enough. Technical, dependable data reflecting specific testing, using standard methods in a reputable laboratory is also necessary for the Health and Safety Professional to make informed and sound decisions when selecting any Personal Protective Equipment, including Chemical Protective Clothing.

Most reputable manufacturers of Chemical Protective Clothing have electronic databases and selection tools available to assist the Health and Safety Professionals as they work their way through the maze of available Chemical Protective Clothing. Although the authors of these selection guides try very hard to make them very user friendly, there are still nuances and pitfalls.

There are also published guides from sources other than the manufacturers that can be very useful in the proper selection of Chemical Protective Clothing. These are available from a variety of sources, including the American Society of Safety Engineers and the American Industrial Hygiene Association.

The manufacturers' databases are excellent tools and should always be consulted. As noted, field experience is also invaluable in the quest for the right Personal Protective Clothing ensemble. But these two powerful tools are also not enough. The Occupational Safety and Health Administration (OSHA) requires that a thorough Hazard Assessment be performed any time Personal Protective Equipment is prescribed as a measure for protecting workers from occupational hazards. Although some of the manufacturer's databases do include a "stab" at the Hazard Assessment, the entire process cannot be included in the database. It must come from a thorough review and evaluation of the actual worksite, with a listing of the three major categories considered to comprise a good Hazard Assessment. These three categories are typically put into tabular form and include as column 1- SOURCE of the HAZARD; column 2- ASSESSMENT of the HAZARD; and column 3- PROTECTION from the HAZARD. A Non-Mandatory Compliance Guideline for Hazard Assessment can be referenced in the OSHA standard, 29 CFR 1910, Subpart I, Appendix B. The Appendix includes a summary of how to actually perform the Hazard Assessment, an example list of hazards (not intended to be complete or exhaustive). Methods and examples of assessment of the hazards are also included, but again not intended to be exhaustive. The control or protection portion of the Hazard Assessment provides a variety of methods which can generally be grouped into Engineering Controls, Administrative or Work Practice Controls, and Personal Protective Equipment. As stated in the OSHA standards in

numerous places, the use of Personal Protective Equipment should be utilized when the other methods of control have been evaluated and put into place. Personal Protective Equipment, including Chemical Protective Clothing, should always be considered as “the Last Line of Defense”.

It is not the purpose of this course to cover performing a thorough Hazard Assessment. It is strongly recommended that review of this standard and other references be performed before the Health and Safety Professional embarks on the arduous task of properly selecting Personal Protective Equipment, including Chemical Protective Clothing. Formal education plus literally a life-time of experience is necessary to properly perform a Hazard Assessment. A thorough knowledge of the means of protecting the worker is necessary in order to create a safe and healthy work environment. And lastly, a complete understanding of the types and configurations of Personal Protective Equipment, as well as their shortcomings, must be part of the Health and Safety Professional’s arsenal in the war on workplace hazards.

This presentation is designed to provide the participant with some baseline information and also hands-on work experience with some selected databases. There is not ample time to go through all the databases available, however they all generally follow certain logic and decision-tree methods. As mentioned earlier, some of the databases do provide a beginning toward performing a Hazard Assessment, but these cannot and should not be considered as proper and complete assessments of the hazards of any workplace.

Other issues in the selection and use of Chemical Protective Clothing cannot adequately be covered in this presentation as well. Sizing for Chemical Protective Suits is an ongoing issue. Many suits have been deemed as failures incorrectly simply due to the selector not choosing the proper sizes. Unfortunately all suit manufacturers do not use the same suit sizing scheme. A Large in one manufacturer’s offering may not correspond to a Large for another manufacturer. This has led to a reasonable amount of misunderstanding and misleading information in the offerings of Chemical Protective Suits. The thickness of the actual fabrics, whether gloves, suits, boots, etc. is also a very significant issue that must be properly evaluated by the person making the selection. Rather intuitively, typically the thicker the protective material, the better the performance. (Caution, even a very thick material with poor permeation properties is not a good selection.) All Chemical Protective Clothing is not created equally and will not perform equally, even though it may be made of the same material. This is another excellent reason for NOT using one manufacturer’s data for another manufacturer’s product.

There will be some brief explanations of how the databases work at the beginning of the presentation, but the remainder of the session will be focused on hands-on examples and selections of Chemical Protective Clothing. The best practice would be to work with the databases, whichever you choose to use, as often as you have the opportunity in order to familiarize yourself with the specific benefits with that database.

A typical Chemical Protective Clothing database provides information on the products available from the manufacturer. Some of the databases have direct links to the manufacturer’s product catalog, where their product line can be reviewed. This gives the Health and Safety Professional the opportunity to see different configurations and features of the products. Manufacturers attempt to provide as complete a “picture” of their products as possible to aid the Professional in evaluating and selecting the proper fabric and garment for the application (based

upon the Hazard Assessment). Numerous photos with varying views of the products are often included. Style and catalog numbers are typically listed. Many of these appear to be quite complicated, but normally follow some logic that has been assigned by the manufacturer. Remember, there may be numerous iterations of one application, i.e., short gauntlet vs. long gauntlet, hooded coveralls vs. non-hooded, palm coated gloves vs. fully coated, and the options go on. The “meat and potatoes” of the database for the Professional is the technical data. Penetration, Permeation, and Degradation data may be included here. Remember that Permeation should always be primary in your Hazard Assessment. Although all are important, Permeation is the method of failure that cannot be readily seen or even sensed, and it is very difficult to evaluate. The technical database for the Chemical Protective Clothing item must be complete. The data should be specific to the materials tested, not “like” another similar material. The technical database should be owned by the manufacturer, not inferred as much as possible, and preferably generated from third-party, independent laboratories. The more comprehensive databases provide a method to help evaluate compounds not present in the database that are chemically akin to those in the database. This may be accomplished by evaluating by chemical class or family analogy. This method is not ideal, but no database can include every chemical in existence. Be aware that Chemical Mixtures (like many paints or paint strippers, for example) are not typically in the databases. Formulations can vary widely, and Mixtures do not always respond like the combination of their individual constituents. Many formulations have varying amounts of chemicals from different chemical classes with different polarities. There are many common chemicals for which it is very difficult to find the correct protective clothing. Some databases make the selection decision for you, some direct you toward options. Beware, the final decision on what to protect your workers with is YOURS. The selection databases typically include contact information for the manufacturer or possibly distributors, frequently asked questions, and listing of applicable government standards. The standards for testing protective clothing call for room temperature as the testing temperature, not body temperature and not ambient temperatures encountered in high or low climate temperature fluctuations that are commonly encountered. Data from ASTM or EN testing must be used as a guideline with a word of caution that differences in temperature and concentration of chemicals or their particular physical state certainly will affect the chemical resistance properties of the personal protective equipment.

Maneuvering through the Chemical Protective Clothing databases can be as simple as entering your chemical in the database and letting it do its work to answering quite a variety of questions regarding the actual application of the Chemical Protective Clothing. Each manufacturer has selected the method that they feel is most beneficial to their customers and most appealing as they present their products. The product you choose should not only represent the fabric, but also the degree of trust and understanding that you have in the selection database.

The following is a list of web-site addresses for Chemical Protective Clothing databases, it is intended to be complete- any omission is accidental:

- 3M- http://solutions.3m.com/wps/portal/eM/en_US/PPESafetySolutions/PPESafety/Personal_Protective_Equipment
- Ansell- <http://protective.ansell.com/en/Products/Trellchem> - then go to [Trellchem suit selection flowchart](#)
- Blauer - <http://blauer.com/chembio>
- DuPont- www.SafeSPEC.DuPont.com

- ⊙ Honeywell- www.honeywellsafety.com/Americas/Product_Catalog/Protective_Clothing.aspx
- ⊙ Kappler - www.kappler.com/hazmatch/index.asp
- ⊙ Kimberly-Clark- www.kcprofessional.com/us/download%20literature/K0001_08_01.pdf
- ⊙ Lakeland- www.lakeland.com/chemmax_search.aspx
- ⊙ Lion- <http://lionconnects.com>
- ⊙ Showa Best Glove Inc - www.chemrest.com
- ⊙ St. Gobain - www.protectivesystems.saint-gobain.com

This presentation can be found useful for virtually any level of experience from Basic through Executive, however it is suggested for decision-makers which would be considered as Intermediate or Advanced by the criteria presented by the American Society of Safety Engineers. Certified Industrial Hygienists, Certified Safety Professionals, some Professional Engineers, Certified Hazardous Materials Managers, as well as others with specific training and expertise in the selection, use, maintenance, and care of Personal Protective Equipment can serve as excellent resources in the quest for proper selection and use of these devices and items.

The selection of proper Chemical Protective Clothing must include a thorough Hazard Assessment, a methodical review of the needs of the wearers in the field, the acceptance of the wearers as they go about their assigned tasks, a thorough familiarity of the products, an understanding of how the information in the database was arrived at, an understanding of how Chemical Protective Clothing functions and can fail (Degradation, Penetration, and Permeation, and of course, a trust in the manufacturer of the selected Chemical Protective Clothing. Selection is not, and should not be, a simple task. Other things to consider would in the selection process would include availability of the selected items (for example in an emergency situation), the manufacturer's willingness to stand behind the product, the reputation of the manufacturer, the distribution system for the products, and of course the price.