Hand Protection - A Guide to Glove Selection:

Your Wonderful Hands

From your day of birth until the day you die your hands will rarely be still and will move an average 25 million times. In good health hands are capable of a phenomenal range of tasks. What are your hands doing now? Perhaps you are drinking a cup of coffee whilst reading this. Your hands are picking up the cup, turning the page.

Hands play a vital role in everyday communication. We shake hands to say hello, wave goodbye, clap to show appreciation, show concern or love by embracing hands. Even when we cannot communicate with speech, because of differing languages or medical problems, the communication barrier can be overcome with complex sign language.

Your personalised blueprint is mapped out in the lines in the palms and fingers of your hands which are all at once dexterous, sensitive, co-ordinated, powerful and directly responsive to the commands of the brain.

Your Amazing Hands

In no other part of the body is so much packed into so little. Your hand consists of 27 individual bones; over a quarter of those in the entire body, and an intricate infrastructure of muscle tissue, metres of blood vessels and thousands of nerve endings per square inch, mostly in the fingertips. This delicate web of nerves is capable of detecting heat, cold or pain within microseconds and can sense a vibration of less than a hair's width.

Any injury to the wrist or palm could result in permanent damage to the nerves and muscles, leading to loss of sensitivity or at worst, loss of use.

Hands Need Respect

Our ability to live a normal life, to work and earn a living, depends on having healthy hands. So why do we constantly abuse our hands by exposing them to injury and/or disabling skin conditions? Surely we should respect and care for them as we would any other valuable, irreplaceable precision tool.

Remember: Technology boasts many great achievements but it has yet to perfect a machine to rival the hands. You only get one pair of hands – abuse them and you may lose them.

Your Workplace

The activities of an institution such as ours are wide and varied. They range from Veterinary and Human Medicine, through several areas of Engineering and Science to the Social Sciences. Then there are the support services of

Printing, Photography, Cleaning, Maintenance, Gardening, Portering etc. The hands of staff employed in these vastly differing work areas are subject to a correspondingly varied range of hazards.

Unless the hand hazard can be avoided by the use of mechanical control measures (eg automation of a process so that hand contact with the hazard no longer exists) the method of control of a contact or dermal risk is likely to be via Personal Protective Equipment (PPE) in the form of gloves.

Gloves provide the final physical barrier between hazard and skin, but if the glove used is not made of a suitable material that will protect against the specific hazard then it may be worse than no glove at all. A thin disposable Natural Rubber glove that provides excellent protection against biological hazards may provide scant protection against many solvents found in laboratories. Likewise, a general purpose Riggers glove may afford excellent protection against handling hazards, such as abrasion, but will provide scant protection against thermal or chemical hazards.

It is vital that you choose the correct glove for the job in hand.

Hand Hazards Found in the University

Hand hazards found in the University situation can largely be grouped into five types; Mechanical, Thermal, Electrical, Chemical and Biological.

Hazard Type	Area	Example of Hazard
Mechanical	Engineering	Swarf, sharp components, tools, handling, steel wire rope, etc.
	Maintenance	Abrasive bricks, concrete blocks, wood, rope slinging, sharp tools, etc
	Printing	Trimming machines, guillotines, paper, presses, handling loads, etc.
	Catering	Knives, graters, food mixers, handling loads, etc.
	Agriculture	Branches/twigs, wire fencing, sharp tools,

		handling loads, etc.
	Cleaning	Contents of bins-broken glass, sharp objects, baling string, etc.
	Servitorial	Handling sharp objects, string, paper, etc.
	Laboratory	Sharps, needles, broken glass, etc.
	Office	Handling sharp objects, guillotines, scissors, paper, staplers, etc.
Thermal	Engineering	Hot metal tools/workpieces, steam, etc.
	Maintenance	Hot tools, pipework, plant components, steam, roofing felt, cold weather, etc.
	Printing	Hot printing and binding machinery, etc.
	Catering	Frozen food, boiling fat, hot water, hot utensils, steam, etc.
	Agriculture	The elements-cold, wind, hot or cold metal, etc.
	Cleaning	Indoors-hot machinery, hot water, Outdoors-The elements, etc.
	Servitorial	The elements
	Laboratory	Hot liquids, glassware, ovens, etc. freezers, liquid nitrogen, cryogenic material, etc.
	Office	Hot components in photocopiers/printers, etc.

Electrical	Engineering	Electrical machinery or components, etc.
	Maintenance	Electrical tools, Live working, hidden cables, etc.
	Laboratory	Experimental equipment, electrophoresis equipment, batteries, etc.
Chemical	Engineering	Metalworking fluids, oils, solvents, degreasers, adhesives, cement, etc.
	Maintenance	Solvents, oils, paint, epoxy resins, degreasers, cement, tar, etc.
	Printing	Processing chemicals, inks, plate cleaning solvents, adhesives, etc.
	Catering	Dishwasher liquids, oven cleaners, surface cleaning agents, water, etc.
	Agriculture	Pesticides, weedkillers, oils, solvents, etc.
	Cleaning	Bleaches, cleaning agents, detergents, water, etc.
	Servitorial	Cleaning agents, solvents, etc.
	Laboratory	Solvents, reagents, acids, detergents, water, etc.
	Office	Solvents, glues, cleaning agents, water, etc.
Biological	Agriculture	Animal urine, faeces, stings, bites, pricks,

		scratches, etc.
	Cleaning	Human/animal body fluids, laboratory sharps, scratches, etc.
	Laboratory	Human/animal body fluids, pathogens, sharps, etc.

The above list is not exhaustive but gives only examples of the hazard types that may be found in a particular work environment within the University. There are doubtless many more, which you, as the expert in your particular environment, will be able to identify.

Case Studies

Peter has been a welder for 29 years. He lost an eye from a flying spark when working without goggles. It was a terrible blow, but after three months he was able to return to work. His sight will never be the same, but he can keep working - always with goggles.

His daughter Sharon was less fortunate. Qualified for a career in the beauty business, at 27 she was at the height of her career as a top hair stylist. Then she developed dermatitis - the culmination of years with her hands in hot water and shampoo. Now the slightest contact with water and mild detergents leaves her hands red and sore. She has had to leave hairdressing and re-think her career.

Having placed the most common hand hazards likely to be encountered in an institution such as ours into five hazard groups let us now look at the groups again and the properties of generic glove types that protect against each hazard.

Mechanical

Several glove types have been designed to protect the hands from mechanical hazards. One of the more traditional materials, leather, is being phased out in any workplaces and replaced by modern, high performance gloves made of synthetic materials.

- Nitrile (on a fabric liner) provides excellent abrasion and puncture resistance whilst retaining flexibility and comfort.
- Kevlar^{tm} brand fibre (para aramid fibre) a specialist man made yarn from which gloves and sleeves are knitted. These have excellent tear, abrasion and cut resistance.
- Latex (on a fabric liner) natural rubber is an extremely elastic and flexible material with good physical properties. Depending on the formulation of a particular glove, natural rubber can offer abrasion, tear and cut resistance.

- Polyvinyl Chloride (PVC) (on a fabric liner) PVC can offer abrasion and puncture resistance, if thick enough it can afford some cut protection. Generally tear resistance is poor.
- Leather a natural material modified by tanning to give a range of properties. Leather gloves come in a vast range of thickness and styles which vary widely in their protective capabilities from specialised to very basic general purpose gloves.

Note: Gloves should never be used as an alternative to the full and proper use of machine or tool guards.

Thermal

In the University environment thermal hazards may range from the heat of melting metal or glass to the freezing temperatures of liquid nitrogen. In assessing the correct glove choice the type and length of exposure must be taken into account.

- Kevlar[tm] brand fibre This DuPont material was developed for the aerospace industry to offer the heat resistance necessary for re-entering the earth's atmosphere. Kevlar[tm] brand fibre is also used in the manufacturing of gloves where temperature extremes are a problem.
- Leather generally provides good protection against cold, so long as the glove does not get wet. Leather is also used in the composition of heat resistant gloves e.g. welding gloves as it does not melt or burn unlike some synthetic materials.
- Cotton a natural material, cotton provides only moderate resistance to heat and cold. In order to give adequate protection, the material has to be thick which may impede dexterity.
- Aluminised Gloves help reflect heat and can be used in areas where radiant heat is the main hazard and products reach extremely high temperatures. Materials that can be aluminised include Kevlar[tm] brand fibre and leather.

Electrical

Specially designed gloves are required for protection against electrical hazards. This is not a hazard which should be common place in the University environment as control of such hazards would normally be by methods of "lock off" and/or "safe systems of work". However, if assessing gloves for electrical hazards, the voltage and conditions in which the hazard exists must be considered to ensure maximum glove performance.

- Protective gloves designed for electrical purposes are covered by a stringent European Standard (BS EN60903). Within the European Community, gloves must conform to this Standard.
- Natural Rubber Latex an excellent insulating material; therefore provides personal protection against electrical hazards. The gloves are made using a special latex compound ensuring that all gloves

manufactured for the purpose of electrical protection are tested and conform to the above stringent Standard.

Chemical

When assessing risk to hands from exposure to chemicals one should be mindful to look at all chemicals; not at just those with obvious hazards, but also the seemingly harmless, such as detergents and water.

It is essential you have accurate information as to the hazards a particular chemical or preparation (a mixture of chemicals) presents to the user. Material Safety Data Sheets that, by law, are available from your chemical or product supplier are an invaluable source of such information. In order to comply with the Control of Substances Hazardous to Health Regulations, 1994, Material Safety Data Sheets for all hazardous substances, including chemical based products, must be held by the Department.

Gloves for chemical protection tend to be reusable i.e. suitable for more than one operation. Thin, disposable laboratory type, gloves offer little more than splash protection against a small range of specific chemical agents. It is important to bear in mind that although termed reusable such gloves have a finite life. Most chemicals will eventually permeate through a glove and when this happens the hazard is trapped between the glove and the skin. The rate of permeation can vary from minutes to hours, dependant on the chemical hazard and the materials used in the glove manufacture.

Contact with certain chemicals may cause a glove to lose one or more of its physical properties. Gloves may become stiffer and more brittle or softer and weaker. They may lose shape or may swell. This is known as degradation and once again is dependent on the chemical the glove is exposed to and the materials in the glove manufacture.

Due to the very wide range of chemical hazards in the workplace, it is essential to seek specialised advice from a reputable glove manufacturer to establish the most suitable hand protection. What follows is not a definite guide, but a description of the materials used and their properties.

- Latex generally, natural rubber provides excellent resistance to aqueous chemicals such as acids and alkalis. Thicker latex products can also provide a measure of resistance to specific solvents. Different latex compounds will provide varying levels of protection irrespective of thickness. An advantage of latex is that it has a high level of comfort, elasticity and dexterity.
- Nitrile (synthetic rubber) gives good resistance to oil based chemicals and is excellent for protection against petrols, oils and lubricants together will many solvents. However, nitrile rubber is prone to swelling in some solvents thus reducing the physical strength of the product and lessening the protection.
- Polyvinyl Chloride (PVC) will provide chemical resistance to aqueous chemicals, but protection against solvents is limited as many solvents

extract the plasticiser used to make the product flexible. This causes contamination of the solvent being used and the glove may begin to stiffen and crack.

- Neoprene[tm] (or polychloroprene) this has similar comfort and conformity features as natural rubber but with added resistance to petrol, oil and lubricants.
- Polyvinyl alcohol (PVA) protects against most organic solvents but is soluble in water and exposure to water based solvents may reduce performance. PVA is inflexible and requires plasticisation. Currently, because of processing difficulties PVA is only available as a polyethylene laminate or on a supported fabric liner.
- Butyl offers protection against many organic chemicals and strong acids. However, butyl gloves are very difficult to manufacture. An outer layer of Neoprene is often required as butyl has very poor resistance to petrol, oil and lubricants.
- Viton[tm] is a fluorinated polymer similar to Teflon[tm]. The low surface energy of the polymer means that droplets of chemical are not retained on the surface thus reducing chemical permeation. Specialist protection against chlorinated solvents and aromatic hydrocarbons is offered but there is poor resistance to ketones.

Biological

Generally, gloves that are manufactured from materials that afford protection from chemicals will also afford a degree of protection from biological hazards. For those working with biological hazards in the laboratory, medical or veterinary environments sensitivity and dexterity are usually key requirements in glove choice. Thin disposable Latex (Natural Rubber) or Vinyl laboratory gloves are primarily intended to minimise product contamination but, if of good quality, will provide some degree of personal protection. Those that have been performance tested against biological hazards will have the biohazard pictogram on the packaging along with the performance rating. Some gloves that are purely intended for product protection (eg. clean room gloves) or those intended for use against minimal risks will not have been tested against biological hazards. See section on European standards and test information.

It should also be borne in mind that where other hazards are present eg. chemical, abrasion etc. that such gloves may not offer adequate, or any, protection against these hazards.

Case Studies

Wilma, a catering assistant, was called upon to decant corrosive dishwash liquid from a 20 litre container into the machine, a job normally carried out automatically by pump but there was a fault in the machine. She donned a pair of gauntlet gloves that were lying beside the container and almost immediately experienced irritation to the skin of her hands. The gloves had been left, after the previous operation without washing, during this time spell the residue corrosive liquid had permeated the glove and contaminated the interior.

Alastair was a motor mechanic for many years, he loved his job, especially supervising the younger mechanics. When some of them started wearing gloves he'd tease them about not being proper men. He never wore them and though his hands got dry and sore he said it went with the job. He didn't realise that the dirty used oil he came into contact with every day was damaging his skin. Then he found a mark on his hand which started to itch and bleed. When he found it was skin cancer, probably caused by the oils, it was too late. It had already spread to other parts of his body.

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European Standards - Understanding and CE Marking and Pictograms

Personal Protective Equipment falls into three categories;

1. Simple Design – for minimal risks only. The effects of the hazard are of minimal risk and the consequences are reversible. The packaging and where possible the glove are marked CE.
2. Intermediate design – A glove type tested against at least one hazard and approved by a notified body. The broad use of the glove will be indicated by a pictogram on the packaging. The glove will carry a CE mark.
3. Complex Design – for hazards which cause irreversible effects or mortal danger. Gloves must have been tested against the relevant hazard(s), certified by notified body and manufactured under a Quality Assurance System (AQL) which relates to the acceptable number of defective gloves in a batch. The glove and packaging are CE marked.

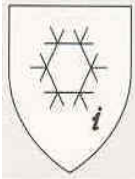
CE marking must be displayed on the glove and packaging. The packaging may also carry a pictogram(s) denoting the type test carried out against the relevant basic European Standard.

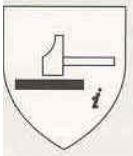
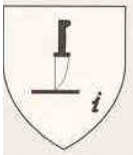
The pictogram(s) and performance levels will be clearly visible on the gloves' packaging. The higher the score the better the performance. Bear in mind however the pictograms depict only the broad hazard category that a glove may afford protection against. They are not a substitute for a proper risk assessment. Example: the pictogram denoting chemical resistance does not state which chemical the glove is designed to protect against. The user could take the wrong message; there is no substitute for checking with the manufacture that a specific glove type is suitable for protection against a specific chemical and exposure.

Pictograms which appear on packaging:

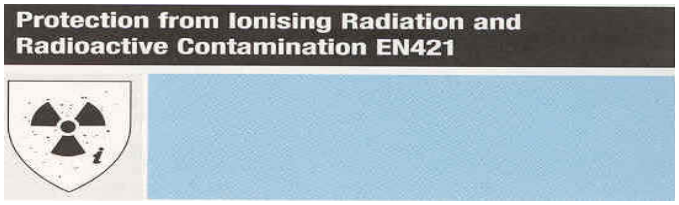
KEY		
Pictogram	Test	Potential Level

Chemicals and Micro-Organisms EN374		
	Micro-organisms : Resistance to penetration by micro-organisms through porous materials, seams, pinholes or other imperfection in the glove material. Referred to as acceptable quality level (AQL).	1-3
	Resistance to Chemical Hazards: The measurement of time for a chemical to permeate through the glove material.	1-6

Protection from Cold EN511		
	a Resistance to convective cold b Resistance to contact cold c Permeability of water	0-4 0-4 0-1 where 0 is a fail

Mechanical Hazards EN388		
	a Resistance to abrasion b Blade cut resistance c Tear resistance d Puncture resistance Where 0 is a fail or not tested.	0-4 0-5 0-4 0-4
	Impact cut resistance	Pass
	Antistatic	Pass

Thermal Hazards EN407		
	a Resistance to flammability b Resistance to contact heat c Resistance to convective heat d Resistance to radiant heat e Resistance to small splashes of molten metal f Resistance to large splashes of molten metal	0-4 0-4 0-3 0-4 0-4 0-4



Important note: A degradation test is not required for EN374 approval therefore the physical effects of the chemical on the glove have not been taken into account. In selecting gloves for chemical protection it is essential that you refer to the manufacturer's information and performance data for the performance of specific gloves against specific chemicals.

Other Factors Affecting Glove Choice

Having recognised the hazard and assessed the risk, using all relevant health and safety data, with the performance demands of the glove, there may be further factors to consider in choosing the correct glove for the job.

- Comfort: The gloves should be, within reason, comfortable or the user may be tempted to remove them and thus the safety barrier between the hazard. Whilst protection must take precedent over comfort, a balance should be aimed at.
- Dexterity: In many spheres of the University this is a priority. It is self-defeating if a glove has to be removed in order to carry out a task as the protection is immediately lost. There are gloves available that both fit closely and offer protection without compromising touch and freedom of movement to carry out delicate tasks.
- Grip: Poor grip may itself cause a safety hazard, particularly if heavy, smooth loads are being carried. If the object is dropped or slips out of the hands a crush type injury may result, or perhaps burns through the spillage of hot liquids or corrosive chemicals.
- Length: The length of the glove is important where there is risk of the hazard threatening the forearm. Comfort may however be compromised, as the longer the glove the less air can ciculate around the hand.<
- Colour: In some areas of industry the colour of glove can be a safety indicator. In the food sector blue protective gloves are often used as this colour stands out should any part of the glove find its way into the food. Eg. Blue – Food Handling. Yellow – Kitchen Cleaning, washing up. Pink – Janitorial cleaning. Protective gloves can also be supplied in fluorescent "High-Viz" colours where visibility is essential such as traffic control, road maintenance or estate working near roads.

Case Studies

Anne works in the kitchen of one of the University's catering outlets. Because of the hot and wet environment she routinely works with her overall sleeves rolled up. She was always careful to wear gloves when changing the syphon tubes on the dishwashing machine, as the dishwash liquid was clearly marked as corrosive. One day, whilst doing this routine job, liquid from the end of a

syphon tube splashed onto her forearm and she sustained corrosive burns. She should have been wearing gauntlet length gloves.

Willie worked as a workshop cleaner. Part of his duty was to wash down machinery twice daily at 8am and 12 noon. As this involved the use of degreasing chemicals he was always careful to use the right gloves for the job.

Willie always safely used the same pair of gloves for both the cleaning sessions, so when the cleaning times were altered to 8am and 4pm, to better suit production, he assumed he should carry out his job in the usual way using the same gloves.

However, the chemicals in the cleaning fluid were now on his gloves for a total of eight hours, from the early morning clean to 4pm. This meant they were permeating the glove material and whereas the gloves had been safe for the previous 12 noon wash, by 4pm the barrier had been breached. That extra four hours resulted in the chemcials getting on to Willie's hands and damaging his skin.

Sandy, a laboratory technician was rinsing glassware which had been steeping in an acid based liquid. He sustained burns to two of his fingers when the liquid penetrated the protective gloves he was wearing. The gloves were for general purpose use and designed for use against minimal risk only. They were not suitable for use against acids where permeation occurred within a very short period of time.

An estate worker received severe bruising to his hand when a coping stone toppled and crushed his fingers whilst he was stacking them.

Glove Selection Guide

Regulations governing the supply of Personal Protective Equipment require that you not only choose gloves that conform to CE standards but that, if called upon to so do, you can demonstrate that you made the safest and most appropriate choice. The following guide provides general information and is a guide to which type of glove to use to provide protection from a wide range of industrial substances. PLEASE NOTE that whilst the information was collated from data from two of the world’s most reputable glove manufacturers, the Occupational Hygiene Unit is not able to control the actual conditions of use, nor make any allowance for the permeability of the glove materials that can influence product performance and durability on actual job applications. It therefore should be used as a GUIDE ONLY.

The Occupational Hygiene Unit has produced this guide in good faith and as a general indication of generic glove type performance in use with different materials. It may be that a particular manufacturer’s specific glove type will have a different classification to that indicated. The chemical resistance of gloves made from the same class of material (eg. Natural Rubber) may vary with gauge and also between manufacturers.

Before handling any hazardous materials always consult with the glove supplier or the Occupational Hygiene Unit as to the suitability of the gloves for use with that material.

Key:

1. G - The glove is well suited for application with that substance.
2. F - The glove is suitable for limited application under careful control (eg. splash exposure)
3. NR - This glove type is definitely not recommended for use with this substance.

- Information not available

Substance	Glove Type						
	Natural Rubber	Nitrile	Neoprene	Polyvinyl Alcohol	Polyvinyl Chloride	Butyl	Viton
Acetaldehyde	F	NR	F	NR	NR	F	*
Acetic Acid	G	G	G	NR	F	G	*
Acetone	F	NR	F	NR	NR	G	NR
Acetonitrile	F	F	G	F	NR	*	*
Acrylic Acid	F	F	F	NR	NR	*	*
Ammonium Hydroxide, conc.	G	G	G	NR	G	G	F
Amyl Acetate	NR	F	NR	F	NR	F	NR
Aniline	F	NR	G	F	F	*	*
Aqua Regia	NR	F	G	NR	G	F	G
Benzaldehyde	F	NR	NR	F	NR	*	NR
Benzene	NR	NR	NR	G	NR	NR	G
Butanol	F	G	G	F	G	G	F
Butyl Acetate	NR	F	NR	G	NR	G	NR
Carbon Disulphide	NR	F	NR	G	NR	*	NR
Carbon Tetrachloride	NR	G	NR	G	NR	NR	G

Chlorobenzene	NR	NR	NR	G	NR	NR	G
Chloroform	NR	NR	NR	G	NR	NR	G
Chloronapthalene	NR	NR	NR	G	NR	*	G
Chromic Acid	NR	F	NR	NR	G	*	G
Citric Acid	G	G	G	F	G	G	G
Cyclohexanol	F	G	G	G	G	*	*
Dibutyl Phthalate	F	G	F	G	NR	*	G
Diethylamine	NR	F	NR	NR	NR	F	NR
Diesel Fuel	NR	F	NR	F	F	NR	G
Ethyl Acetate	F	NR	F	F	NR	F	NR
Ethyl Alcohol	F	G	G	NR	G	F	F
Ethylene Glycol	G	G	G	F	G	G	F

Substance	**Glove Type**						
	Natural Rubber	Nitrile	Neoprene	Polyvinyl Alcohol	Polyvinyl Chloride	Butyl	Viton
Ethyl Ether	NR	G	F	G	NR	NR	NR
Formaldehyde (40% sol)	G	G	G	NR	G	G	G
Formic Acid	G	F	G	NR	G	G	F
Glycerine	G	G	G	F	G	G	G
Hexane	NR	G	G	G	NR	G	G
Hydrazine 65%	G	G	G	NR	G	F	NR
Hydrocloric Acid	G	G	G	NR	G	G	G
HydrofLuoric Acid	G	F	F	NR	F	F	F
Hydrogen Peroxide	G	G	F	NR	G	F	G

Isobutyl Alcohol	F	G	G	NR	F	G	G
Isopropyl Alcohol	F	G	G	NR	G	G	G
Kerosene	NR	G	G	G	F	NR	F
Lactic Acid	G	G	G	F	G	G	G
Methanol	F	F	F	NR	G	F	NR
Methylamine	G	G	G	NR	G	G	NR
Methylene Bromide	NR	NR	NR	G	NR	NR	G
Methylene Chloride	NR	NR	NR	G	NR	NR	G
Metyl Ethyl Ketone, MEK	F	NR	NR	F	NR	G	NR
Methyl Methacrylate	F	F	NR	G	NR	F	NR
Methylated Spirits	G	G	G	NR	F	F	F
Mineral Spirits	NR	G	F	G	F	F	G
Nitric Acid 70%	NR	NR	G	NR	F	F	G
Perchloric Acid 60%	F	G	G	NR	G	G	G
Polychlorinated Byphenyls	NR	NR	NR	NR	F	F	G
Phenol	G	NR	G	F	G	F	G
Phosphoric Acid	F	G	G	NR	G	G	G
Picric Acid	F	G	G	NR	G	F	G
Paint Remover	F	G	F	F	NR	NR	G
Printing Inks	F	G	G	G	F	F	G
Propyl Alcohol	F	G	G	NR	F	G	G
Petrol	NR	G	NR	F	NR	NR	G
Photographic Solutions	G	G	G	NR	F	G	G
Pyridine	F	NR	NR	F	NR	*	*

Rubber Solvent	NR	G	G	G	NR	*	*
Styrene	NR	NR	NR	G	NR	F	F
Sulphuric Acid 95%	NR	NR	F	NR	F	G	F
Sulphuric 47% Battery Acid	F	F	G	NR	G	G	G
Sodium Hypochlorite (Bleach)	G	G	G	NR	G	G	G
Tetrachloroethane	NR	G	NR	G	NR	*	*
Toluene	NR	F	NR	G	NR	NR	G
Turpentine	NR	G	NR	G	NR	*	*
Wash up powder/liquid	G	G	G	*	*	G	G
Xylene	NR	F	NR	G	NR	NR	G

Remember: The above is only a guide. The chemical resistance of gloves may vary with gauge and between manufacturers, you should always check with your supplier/manufacturer that a specific glove will protect against a specific chemical.

Work Related Skin Disorders

Your skin is the body's first line of defence and although it is extremely resilient, with a marvellous capability to repair damage inflicted upon it, is not indestructible. At work we are likely to be mindful of the damage that could be inflicted by solvents, acids and the like but may overlook the harm that more commonplace substances, such as water and detergents, can cause. Hot water dries the skin and tightens it, detergents break down the protective fats and oils. The skin may not appear damaged but it may have been weakened.

The skin can only take a limited amount of abuse and may, after repeated damage, lose the ability to protect itself and react. It may become red and inflamed, itchy, split, or in severe cases blister. This known as irritant contact dermatitis; a term which is used to describe a multitude of skin diseases. The manner in which the body responds will depend on whether the skin has been irritated or whether an allergic reaction is taking place. There is a difference and it is important that it is defined.

Irritant Reactions

Most work related skin disorders are irritant reactions rather than allergies, mostly caused by frequent contact with detergents, degreasers or solvents.

When the skin has been damaged it is important that steps are taken to repair it. This may involve some form of treatment, eg creams, and protection through wearing the correct gloves ensuring the condition is not exacerbated whilst healing takes place. Or, it may be that the substance which caused the irritation has to be avoided whilst healing takes place and then further trauma avoided by the wearing of the correct gloves.

If you suffer from skin irritation, that you think may be work related, you should contact the Occupational Health Unit (508190) at the earliest possible time to seek advice.

Allergic reactions

Allergy caused by contact with a substance (allergic contact dermatitis) differs from irritant contact dermatitis in that the latter has the potential to affect all people, but the former will only affect a small proportion of people exposed to the substance. Unfortunately it is not possible to predict which individuals will develop this problem.

Skin allergies, triggered by contact with a particular substance, will often affect people who have worked in contact with that substance for many years seemingly without adverse effect. This is because repeated exposure is required, over a considerable period of time, before the skin becomes sensitised. This involves the potential allergen penetrating the epidermis and a complicated reaction being set up within the body's immune system. Once sensitisation has occurred, further exposure to the substance, even at low concentrations, at any skin site, will trigger this reaction causing inflammation (dermatitis) at the site of exposure. The time of onset of dermatitis from re-exposure may take from one to five days as it takes time for the allergen to penetrate and the sensitised cells to react. For this reason cause and effect may not be realised by the sufferer.

There is no cure for sensitisation, it is with you for the rest of your life, however a small proportion of people lose their sensitivity with the passage of time. Allergic reactions vary in severity from skin rashes and blisters to breathing difficulties, including asthma. In extreme cases it can induce anaphylactic shock, which can be fatal, as of course can asthma.

The consequence of such contact allergy to the sufferers ability to continue working with the substance, and hence their ability to earn a living, is extreme. Allergens are commonplace in most workplaces manifesting in printing inks, natural latex, paints, detergents, industrial glues, pesticides, cement, coolants and cutting fluids, etc. Obviously people working with potential allergens are at greater risk and great care should be exercised, prevention is of the utmost importance.

Advice is available from the Occupational Health Unit (508190) on avoidance and management of skin problems. Should you suffer from any skin complaint it is essential that you contact the Unit in order that it may be fully investigated to identify if the causation may be work related, a proper diagnosis made, professional advice and help given.

Other Hazards

Latex allergy

Selection of the right glove for the job is emphasised when, in rare cases, some components of the gloves themselves can cause allergic reactions. The chrome in chrome tanned gloves can trigger a reaction in someone already sensitised to the chemical. In rubber latex gloves, sensitisation can be caused by the accelerators used to make the gloves strong or by the natural proteins found in latex. However it must be stressed that only a very small percentage of the working population may be affected, but as with any allergy the consequences can be serious and far reaching.

Latex is found everywhere – wellingtons, bath mats, TV remote controls, garden hoses, carpet underlay, hairbrushes, elasticated underwear and even scratchcards. Latex allergy sufferers have to be careful when visiting the hospital, doctor or dentist.

An increase in latex allergy has been recognised in healthcare and associated workers since the explosion in glove wearing to protect against HIV and Hepatitis. The troubles began when this work sector was flooded with cheap, low grade powdered gloves containing high levels of allergens. Gloves are often sourced from around the world simply according to price, with importers having little or no control over manufacturing standards.

To avoid sensitisation in the first place it is essential that gloves are of adequate quality, manufactured by a reputable company to high standards so that no significant quantities of the allergen are left. To reduce the risk of allergic reactions the gloves should be dermatologically tested and manufactured under stringent conditions to minimise proteins and accelerators but still maximise on protective performance.

Should you think you may have an allergy to latex, advice should be sought from the Occupational Health Unit (508190) who can carry our tests and advise on other alternatives which are available eg. powder free synthetic rubber. Good advice from reputable manufacturers (rather than suppliers) is crucial when protection against allergens, or indeed chemicals is concerned. Reputable firms, such as those acknowledged later, have vast reserves of knowledge with technical hotlines to answer most glove enquiries. They will, back up their advice with recommendations of suitable gloves outwith their own product range if necessary.

Vibration

Vibration which reaches your hands when working with hand-held tools, hand guided machinery or when you are holding materials which are being processed by machinery can cause a range of permanent injuries which are known as hand-arm vibration syndrome (HAVS). These could include damage to; blood circulatory system (vibration white finger (VWF)); sensory nerves; muscles; bones; joints.

VWF: symptoms are usually set off when your hands or body get cold or wet. Early on they are mild. The first sign is often an occasional attack when the fingertips become white. With continued use of vibrating tools the affected area can become larger. During an attack the fingers may also become numb and "pins and needles" experienced. An attack may end with the whiteness changing to a deep red flush, which is often very painful.

Sensory nerve damage: damage to the nerves in the fingers results in the senses of touch and temperature being reduced. Permanent numbness or tingling can be experienced.

Damage to muscles, bones, joints: may cause loss of strength in your hands and pain in the wrists and arms.

Gloves are sometimes recommended as a means of reducing the effects of vibration, with some companies marketing so called anti-vibration gloves/gauntlets. Several scientific papers, and advice from HSE, raise doubts as to their worth in preventing vibration reaching the hands and in some cases suggest that they may increase it. Using the frequency weightings in current standards, commonly available gloves do not normally attenuate effectively the vibration of most tools. It is better to chose gloves that, whilst protecting against any mechanical risk, will keep the hands warm and thus help maintain adequate blood circulation.

Should you think you are showing signs of any of the symptoms mentioned or require further information contact the Occupational Health Unit (508190) or, if you require information on prevention of HAVS and/or information leaflets contact the Occupational Hygiene Unit (508189).

FURTHER INFORMATION:

Information on Specific Glove Selection

The Occupational Hygiene Unit holds:

- The Ansell Edmont USA "Specware" CD-Rom database which has a glove/chemical application guide and the National Library of Medicine database which details health and safety information on over 4500 chemicals.
- The Marigold Industrial "Industry in Safe Hands" glove guide and chemical resistance chart.

- The Best Manufacturing Company chemical resistant gloves guide "Chemrest".
- The Mapa (UK) Ltd chemical resistance and glove guide.

Other Contacts:

- Ansell Edmont Industrial 01527 830603 Web site http://www.westernsafety.com/aechemguideindex.html

- Arco (East Scotland) 01506 841510
- A & J Beveridge Ltd 553 5555
- Best Manufacturing Europe 011 323 458 3333
- Center for Industrial Services (CIS) Personal Protective Equipment (PPE) Compatibility Charts http://www.cis.utk.edu/lppe.html

- Mapa (UK) Ltd 01952 684487
- Marigold Industrial 01992 456761 Web site http://www.marigoldindustrial.com

Glove Sizing Gauge - To achieve maximum comfort and operator efficiency the correct glove size is essential. Marigold Industrial's web site includes an on screen glove gauge, which allows you to measure the correct glove size for your own hand. This on line glove sizer can be accessed here

ShowaGloves:
http://www.showa-europe.com/angl/index.html
ShowaGloves - Chemical Resistance Guide:
http://www.showa-europe.com/angl/les_gants/gants_annexes/chemical_resistance.html

Further Information Available from Occupational Hygiene

Booklets

- Health Risks from Hand-Arm Vibration
- Advice for employers HSE, INDG175
- Advice for employees HSE, INDG126(rev)
- Health Risks Management – A Guide to Working with Solvents HSE, INDG272
- Marigold Industrial Grasp Hand Protection Report

Videos

- Skin Safety In The Workplace Deb Ltd
- Rash Decisions HSE
- Metalworking Fluids – effective coolant care and control of risks to health HSE/Shell (UK)
- Hard To Handle-Hand Arm Vibration-manage the risk HSE

Acknowledgements

The Occupational Hygiene Unit would like to thank Ansell Edmont for their help in providing information used in the compiling of the generic glove guide.

Marigold Industrial are especially thanked for all their help, in particular for giving permission to reproduce the"10 Point Check List To Healthy Hands" and to quote sections from their Grasp Hand Protection Report, upon which much of this document is modelled. Also, for providing copies of the Report.

The Health and Safety Executive are thanked for the use of information.

Note : The University Health and Safety Department does not promote or endorse any of the commercial organisations linked from these pages.

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