The Hand *our most useful tool*

This tool is exposed to numerous hazards

The hand is one of the most complex tools and one accident in three involves it. The hand has such unique attributes and is an essential part of the human body; it must be adequately protected when exposed to hazards which can seriously damage it.

To protect your hand, you will need to assess:

- **Hazard** - Potential to do harm
- **Risk** - Likelihood that your hands may be harmed
- **Consequence** – Severity or degree of injury sustained

Mechanical Hazards

Statistics prove mechanical hazards are the most common causes of hand injuries in industry. They account for 60% of all reported accidents to hands.
Mechanical risks in the workplace are often a combination of several different hazards

Consequences:

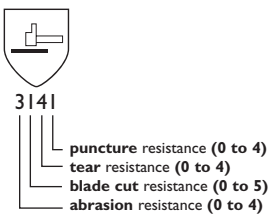
- cuts to the skin, tendons, blood vessels, and nerves,
- punctures and pricks,
- skin abrasion,
- skin irritation (rubbing),
- fractures, sprains.

Examples of applications:

- handling sharp objects such as glass or metal parts,
- handling sharp and slippery plastic parts
- handling cardboard boxes wooden pallets etc,
- assembling small sharp engineering parts

EN 388
Protection against mechanical risks

Protection against general mechanical risks is symbolised by a pictogram and accompanied by four digits (each digit gives the level of performance obtained according to the corresponding test).



Major Hazards for the Hand

Chemical hazards

Where there is a possibility of personnel being exposed to harmful or toxic materials Risk Assessment MUST be done. It is essential Risk Assessments are conducted by suitably trained competent staff. Glove manufacturers can assist and advise personnel doing these risk assessments on the most appropriate hand protection when all mechanical hazards and chemical rates have been assessed.

Consequences:

- chemical burns,
- skin irritations,
- allergic dermatitis,
- major organ damage,
- carcinogenic effects.

Examples of applications:

- cleaning jobs (detergents, disinfectants, solvents, diluted caustics),
- mixing or transferring concentrated chemicals from containers,
- diluting concentrated chemicals,
- handling chemical-coated parts,
- hazmat- Hazardous Material

Liquid proof (EN 374-2)

Liquid proof (EN 374-2)

AND

minimum 2 in performance level (>30 min.) to 3 listed chemicals at least (EN 374-1 Annex A).

Although they do not have any denomination, we can say that:

- If a glove is liquid proof according to EN 364-1, but with no other pretention or checking of the chemical resistance, or not passing the level specified for the second case, it will bear the pictogram « liquid proof » or « basic chemical protection».
- If a glove is liquid proof and has a level of performance in the permeation test according to EN 374-3 of 2 at least (> 30 minutes) for at least 3 of the chemicals listed in annex A, then the « Erlenmeyer flask » pictogram can be used. It shall be accompanied with the standard number and the code letters of the chemicals for which the level 2 at least has been obtained (thus there can be up to 12 letters).

Code	Chemical	Class
A	Methanol	Primary alcohol
B	Acetone	Ketone
C	Acetonitrile	Nitrile compound
D	Dichloromethane	Chlorinated paraffin
E	Carbon Disulphide	Sulphur organic compound
F	Toluene	Aromatic Hydrocarbon
G	Diethylamine	Amine
H	Tetrahydrofurane	Ether compound
I	Ethyl Acetate	Ester
J	N-Heptane	Saturated hydrocarbon
K	Sodium Hydroxide 40%	Inorganic base
L	Sulphuric Acid 96%	Mineral acid

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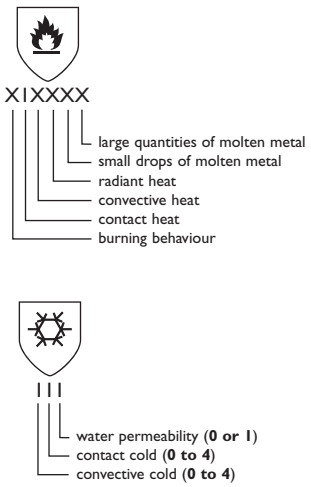
Thermal hazards

Thermal risks due to high temperatures or fire are causing mainly immediate accidents. The awareness is high in this field and PPE are spontaneously requested and worn by operators.
Hazards induced by low temperatures are often combined with a wet environment therefore it is essential to wear insulated liquid proof gloves.



Consequences:

- thermal burns,
- dermatitis,
- skin cancer,
- frostbite and chilblains,
- skin peeling in contact with frozen surfaces,
- reduced blood circulation,
- increased risk of muscular-skeletal disorders.

Examples of applications:

- fire-fighting,
- handling hot parts,
- extracting rubber type or thermoplastics from moulds,
- welding, foundry works, thermoforming,
- removing food from ovens or rotisseries,
- driving vehicles outside,
- outdoors jobs in cold weather,
- handling of liquid gas,
- job in cold rooms.

PPE directive as applicable for Protective Gloves

Every glove is certified in "category II" except:

Cat. I

Simple design protecting against minor risks

- Superficial mechanical aggressions (gardening, dirty jobs, sports…)
- Low toxicity cleaning agents (dishwashing, cleaning jobs) for professional use
- Heat below 50°C, non-dangerous shocks, non extreme cold, for professional use

Cat. III

Complex design against mortal risks or risks that can irreversibly harm the health

- gloves against electrical risks
- hot environments at 100°C or higher
- cold environments at –50°C or colder
- limited protection against chemical attack or ionizing radiations

Standards and Performance

These harmonised standards are not compulsory, but give presumption of conformity to the essential requirements of the 89 / 686 / CE directive. They are therefore widely used in CE certification.

EN 420
Essential requirements for protective gloves

- Ergonomic/Comfort: construction, sizing, dexterity
- Innocuousness: material used is not toxic
- Glove Marking: each glove shall be marked
- Packaging/Leaflet: The information leaflet is compulsory, and shall accompany the PPE on the market. The end-user is entitled to find such information with the gloves he buys.

Shapes

- Anatomical - anatomical shape is specific to each hand.
- Ambidextrous - this shape enables the glove to be worn on either the right or left hand, these are mainly thin disposable gloves.

Dimensions

- Size (EN 420) - size range of the gloves is generally between 5 and 11 and corresponds to the circumference of the palm.
- Length (EN 420) - glove lengths generally vary between 22 and 60 cm. It must be selected according to the hazards incurred.
- Thickness - crucial for the dexterity and performance of the glove. It is generally between 0.1 and 1.5 mm.

Embossing

Depending on the type of contact, the glove embossing may vary. In some cases, in particular with product protection, gloves may be smooth. In other cases different types of embossing may be needed to improve grip.

Interior finishes

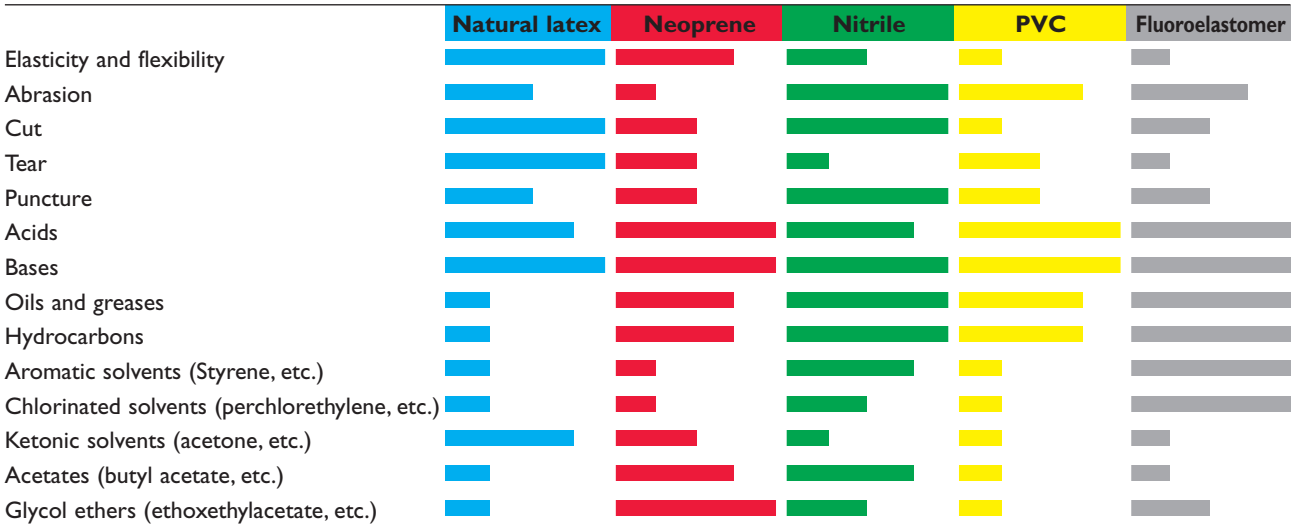
- **Powdered** - helps when putting on and taking off the gloves without increasing the thickness.
- **Chlorinated** - powder-free treatment which helps when putting on and taking off the gloves without increasing the thickness. Reduces the risk of allergy from natural latex gloves.
- **Flocked** - cotton based textile fibres on the inside of the gloves. Fleeced feel. Good absorption of perspiration for extended use.
- **Supported** - knitted interior made from cotton or synthetic materials to increase comfort. Particularly suitable for long-term work.

Wrist finishes

- Plain edge - The standard.
- Rolled cuff – increased resistance to tearing when putting gloves on.
- Scalloped cut - long-lasting life.
- Safety cuff – protects the wrist, ease of removal, ventilation of the hand.
- Knitted wrist - protects the wrist and stays firmly on the hand.
- Overseam finish – increased resistance to tearing.

Materials

Mechanical and chemical properties



Advantages and limitations of materials

	Natural latex	Neoprene	Nitrile	PVC	Fluoroelastomer
Advantages	Excellent flexibility and resistance to numerous acids and ketones.	Multi-purpose chemical resistance: acids, aliphatic solvents. Performs well when exposed to sunlight and ozone.	Very good resistance to abrasion and perforation. Very good resistance to hydrocarbon derivatives.	Good resistance to acids and bases.	Excellent resistance to aliphatic, aromatic and chlorinated solvents.
Limitations	Avoid contact with oils, greases and hydrocarbon derivatives. Proteins from natural latex may cause allergies.	Avoid contact with chlorinated and aromatic solvents.	Avoid contact with solvents containing keytones, oxidising acids and organic compounds containing nitrogen.	Weak mechanical resistance. Avoid contact with solvents containing keytones and aromatic solvents.	Avoid contact with keytones and acetates.

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