Personal Protective Equipment (PPE) for Handling Liquid Nitrogen and other Cryogenic Liquids

HANDS – GLOVES OR GAUNTLETS

Gloves or gauntlets must be:
- Non-absorbent and Insulated. Must fit the user.
- Must always be worn when handling anything that is or has been in recent contact with liquid nitrogen / other cryogenic liquids.
- Designed to be used in the vapour phase only (gloves / gauntlets must not be immersed in cold liquids under any circumstance).
- Lab coat sleeves should cover the ends of gloves or gauntlets. Consider longer gloves covering wrist, lower arm or gauntlets if splashes to wrist or arm could occur.
- Gloves and gauntlets should meet the requirements of standard BS EN 511:2006 ‘Protective gloves against cold’. The greater the ‘rating number’, the better the protection of the glove against cold liquids. (Rating markings are found typically on the outside of the glove).  

At standard atmospheric pressure, Liquid nitrogen is -196°C, Liquid Oxygen -183°C, Liquid Argon -183°C and Liquid Helium - 269°C.  

For prolonged exposure or increased likelihood of splashing / spraying, cryogenic insulated leather gloves / gauntlets recommended (capable of protecting against cold down to -250°C):  

- No metal jewellery, rings or watches should be worn on hands or wrists while transferring or handling cryogenic liquids.

FACE – FULL FACE VISOR

- Visor must have cheek and brow guards. Must fit the user.
- Should be used to protect the eyes and face where splashing or spraying may occur.
- In particular, a visor must be used where operations are carried out at eye level e.g. when topping up reservoirs on electron microscopes.

Standard BS EN 166:2001 covers the general specifications for protective spectacles, goggles and visors. The following minimal ratings are recommended for cryogenic liquid tasks (typically marked on frame):

- B rated (frame & lens) - Medium-energy impact (120m/s);
- A rated recommended for high energy impact (e.g. during high speed filling operations)  
- 3 (frame only) - Resistance to liquid droplets or splashes  
- N - Anti-mist/resistant to fogging. (for prolonged access into storage dewars)  
- Face PPE constructed of polycarbonate provides good impact and chemical resistance.

For minimal cold contact / less likelihood of splashing, insulated gloves / gauntlets providing protection against cold down to -125°C recommended:

BODY (these may not have specific PPE standards against cold protection)

- Non-absorbent Laboratory Coat or Overalls should be worn. These must fit the user.
- Open pockets and turn-ups where liquid could collect should be avoided.
- Trousers bottoms should overlap boots or shoes to prevent liquid collection.
- Cold resistant apron may be needed if splashing / spraying to body is anticipated (i.e. during filling operations).

FEET (these may not have specific PPE standards against cold protection)

- Handling cryogenic liquids / vessels or cryogenic solids: Sturdy, closed shoes or boots (not wellington boots) are recommended.
- For cryogenic liquid filling / decanting: Shoes/boots should not allow liquefied gas to enter them in the event of a spill i.e. no lace holes through to the inside of the shoe.
- Open toed shoes or sandals must not be worn under any circumstance during filling, transport or handling.

PPE Product Certification / User Instructions / Other hazards

- PPE products must bear the CE mark (indicates conformity with legal requirements for product safety and supply in the European Economic Area, EEA).
- PPE products when purchased from a supplier must be accompanied by Product Information, Declaration of EC Conformity and User Instructions.
- Keep all PPE clean, maintained and free of defects, and replace if defective.
- Consider other hazards (e.g. pathogens, noise) that may be present during tasks and ensure PPE is compatible, and is also effective in combination with warning devices such as a personal oxygen depletion alarm.

Further Information

- Contact - QMUL Health & Safety Directorate  
http://hsd.qmul.ac.uk/Contact%20Us/index.html

- QMUL H&S Cryogenic Liquids and Solids Topic Page (Policy, Guidance)  
http://hsd.qmul.ac.uk/A-Z/cryogenicliquids/index.html

- Health & Safety Executive (HSE)  
http://www.hse.gov.uk/coshh/index.htm

- British Compressed Gass Association (BCGA) publications  
http://www.bcga.co.uk/pages/index.cfm?page_id=6&title=publications

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