

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

HANDS – GLOVES OR GAUNTLETS	GLOVES / GAUNTLETS EXAMPLES
<p><b>Gloves or gauntlets must be:</b></p> <ul style="list-style-type: none"> <li>• Non-absorbent and Insulated. Must fit the user.</li> <li>• Must always be worn when handling anything that is or has been in recent contact with liquid nitrogen / other cryogenic liquids.</li> <li>• Designed to be used in the vapour phase only (<i>gloves / gauntlets must not be immersed into cold liquids under any circumstance</i>).</li> <li>• Lab coat sleeves should cover the ends of gloves or gauntlets.</li> </ul> <p>Consider longer gloves covering wrist, lower arm or gauntlets if splashes to wrist or arm could occur.</p> <ul style="list-style-type: none"> <li>• Gloves and gauntlets should meet the requirements of standard <b>BS EN 511:2006</b> 'Protective gloves against cold'. <i>The greater the 'rating number', the better the protection of the glove against cold liquids.</i> (Rating markings are found typically on the outside of the glove).</li> </ul> <div> </div> <ul style="list-style-type: none"> <li>• <b>No metal jewellery, rings or watches should be worn on hands or wrists while transferring or handling cryogenic liquids.</b></li> </ul>	<p>At standard atmospheric pressure, Liquid nitrogen is <b>-196°C</b>, Liquid Oxygen <b>-183°C</b>, Liquid Argon <b>-183°C</b> and Liquid Helium <b>-269°C</b>.</p> <p>For prolonged exposure or increased likelihood of splashing / spraying, cryogenic insulated leather gloves / gauntlets recommended (capable of protecting against cold down to <b>-250°C</b>):</p> <div> </div> <p>For minimal cold contact / less likelihood of splashing, insulated gloves / gauntlets providing protection against cold down to <b>-125°C</b> recommended:</p> <div> </div>
<p><b>FACE – FULL FACE VISOR</b></p> <ul style="list-style-type: none"> <li>• Visor must have <b>cheek and brow guards</b>. Must fit the user.</li> <li>• Should be used to protect the eyes and face where splashing or spraying may occur.</li> <li>• In particular, a visor must be used where operations are carried out at eye level <i>e.g. when topping up reservoirs on electron microscopes</i>.</li> </ul> <p>Standard <b>BS EN 166:2001</b> covers the general specifications for protective spectacles, goggles and visors. The following minimal ratings are recommended for cryogenic liquid tasks (<i>typically marked on frame</i>):</p> <ul style="list-style-type: none"> <li>• <b>B rated (frame &amp; lens)</b> - Medium-energy impact (120m/s); <b>A rated</b> recommended for high energy impact (<i>e.g. during high speed filling operations</i>)</li> <li>• <b>3 (frame only)</b> - Resistance to liquid droplets or splashes <i>And where applicable -</i></li> <li>• <b>N</b> - Anti-mist/resistant to fogging.(for prolonged access into storage dewars)</li> <li>• Face PPE constructed of polycarbonate provides good impact and chemical resistance.</li> </ul>	<p><b>FULL FACE VISOR EXAMPLE</b></p> <div> </div>
<p><b>BODY</b> (<i>these may not have specific PPE standards against cold protection</i>)</p> <ul style="list-style-type: none"> <li>• Non-absorbent Laboratory Coat or Overalls should be worn. These must fit the user.</li> <li>• Open pockets and turn-ups where liquid could collect should be avoided.</li> <li>• Trousers bottoms should overlap boots or shoes to prevent liquid collection.</li> <li>• Cold resistant apron may be needed if splashing / spraying to body is anticipated (i.e. during filling operations).</li> </ul>	<p><b>APRON / LAB COAT EXAMPLES</b></p> <div> </div> <div> </div>
<p><b>FEET</b> (<i>these may not have specific PPE standards against cold protection</i>)</p> <ul style="list-style-type: none"> <li>• Handling cryogenic liquids / vessels or cryogenic solids: <b>Sturdy, closed shoes or boots</b> (not wellington boots) are recommended.</li> <li>• 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.</li> <li>• <b>Open toed shoes or sandals must not be worn under any circumstance during filling, transport or handling.</b></li> </ul>	<p><b>SHOES / BOOTS EXAMPLE</b></p> <div> </div> <div> </div>
<p><b>PPE Product Certification / User Instructions / Other hazards</b></p> <ul style="list-style-type: none"> <li>• PPE products must bear the CE mark (indicates conformity with legal requirements for product safety and supply in the European Economic Area, EEA).</li> </ul> <div> </div> <ul style="list-style-type: none"> <li>• PPE products when purchased from a supplier must be accompanied by <b>Product Information, Declaration of EC Conformity and User Instructions</b>.</li> <li>• Keep all PPE clean, maintained and free of defects, and replace if defective.</li> <li>• 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.</li> </ul>	<p><b>Further Information</b></p> <p>Contact - QMUL Health &amp; Safety Directorate  <a href="http://hsd.qmul.ac.uk/Contact%20Us/index.html">http://hsd.qmul.ac.uk/Contact%20Us/index.html</a></p> <p>QMUL H&amp;S Cryogenic Liquids and Solids Topic Page (Policy, Guidance)  <a href="http://hsd.qmul.ac.uk/A-Z/cryogenicliquids/index.html">http://hsd.qmul.ac.uk/A-Z/cryogenicliquids/index.html</a></p> <p>Health &amp; Safety Executive (HSE) <a href="http://www.hse.gov.uk/coshh/index.htm">http://www.hse.gov.uk/coshh/index.htm</a>          British Compressed Gass Association (BCGA) publications  <a href="http://www.bcgga.co.uk/pages/index.cfm?page_id=6&amp;title=publications">http://www.bcgga.co.uk/pages/index.cfm?page_id=6&amp;title=publications</a></p>