

**Prepared By**

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**1. SCOPE OF DOCUMENT**

The purpose of this document is to identify the hazards in the SPIRE test facility at RAL Building R25 Room G123/125 and the precautions to be taken to ensure that all work is conducted in a safe manner.

All personnel working in the facility are required to read this document and follow the appropriate procedures.

**2. DATE FOR REVIEW**

The risk assessment will be reviewed prior to the start of a test campaign or other major activity in the lab.

**3. DEFINITIONS**

The terms used in this risk assessment are defined as follows

- HAZARD – Something with the potential to cause harm
- RISK – The likelihood of the hazard occurring
- DANGER – The chance that injury will occur (the combined effect of the hazard and risk)

The relationship between hazard, risk and danger is illustrated in figure 1. Basically we want to ensure that all activities conducted in the test facility present a low danger to people.

Any activity that presents a high chance of injury must not be carried out. If an activity is considered to be dangerous appropriate measures must first be taken to reduce the risk of the hazard occurring (e.g. by following procedures) and/or limiting the hazard (e.g. by providing protective equipment).

Activities that present a medium risk danger may be carried out provided that the appropriate measures are taken (e.g. making sure that protective equipment is used, limiting access during hazardous operations).

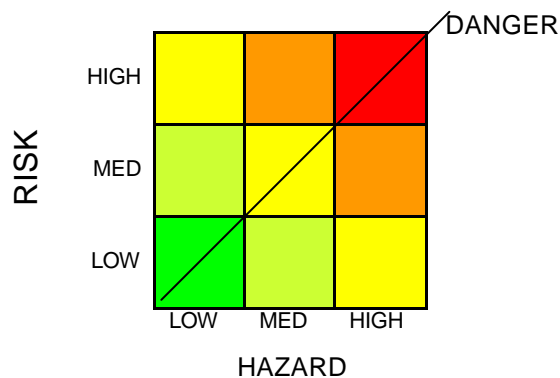


Figure 1: Relationship between hazard, risk and danger



#### 4. RISK ASSESSMENTS

##### 4.1 General Facility Risks

	Hazard	Evaluate Hazard	Evaluate Risk	Danger	Acceptable?	Action/Comment
1.	Restricted space in Laboratory	Low	Medium	Low	Yes	Limit number of people working in laboratory at any one time.  Ensure walkways and access to emergency exit is kept clear.  Keep the lab tidy – put tools and equipment away when work is finished.
2	Equipment left unattended overnight <ul style="list-style-type: none"> <li>• Cryostat</li> <li>• Vacuum System</li> <li>• Monitoring equipment</li> <li>• EGSE</li> <li>• Hot Blackbody</li> <li>• TFTS</li> </ul>	Medium	Low	Low	Yes	Equipment to be checked and made safe before vacating facility.  Security guards to be notified of equipment running overnight and provided with contact details of responsible personnel.
3	Tripping over cables, pipes, etc	Low	Low	Low	Yes	Keep walkways clear and practise good housekeeping.  Cover trailing leads.
4	Electrocution	High	Low	Medium	Yes	All electrical items to be inspected. Schedule A items by R-18 Schedule B items by ELO for lab (Dave Smith)
5	Loading/Unloading of SPIRE instrument into cryostat	Low	Low	Low	Yes	Use GSE provided. Proof load test on GSE completed.



#### 4.2 Cryostat Risks

	Hazard	Evaluate Hazard	Evaluate Risk	Danger	Acceptable?	Action/Comment
1	Collapse of vacuum vessel	High	Low	Low	Yes	Pressure tested by manufacturer.
2	Over-pressurisation of vacuum vessel due to failure of cryogen vessel	High	Low	Medium	Yes	Assumes door clamps removed after start of pump down.
3	Failure of vacuum pump	Low	Medium	Low	Yes	In the event of a power failure, or failure of the vacuum pump the gate valve will automatically shut down to isolate the pump from the chamber.  Cryostat will remain under high vacuum when cryogen vessels are filled.
4	Failure of quartz vacuum vessel window.	High	Low	Medium	Yes	Fit guard and keep people clear of window when vessel is under vacuum. Make regular checks for signs of cracks.
5	Failure of HDPE vacuum vessel window.	Medium	Low	Low	Yes	Most likely failure mode of HDPE window is deformation due to creep resulting in a leak around the vacuum seal.
6	Burns from cryogenes	Medium	Low	Low	Yes	All pipes carrying cryogenes should be insulated. Only trained operators should handle cryogenes.  Safety gloves to be used when using cryogenes.
7	Falls from cryostat	Medium	Low	Low	Yes	Transferring liquid helium to cryostat requires operator to climb onto the cryostat via door hinges. This is considered to be the most practical way of working in the lab due to the limited space provided that:  <ul style="list-style-type: none"> <li>The operator has been shown the correct procedure,</li> </ul>



	Hazard	Evaluate Hazard	Evaluate Risk	Danger	Acceptable?	Action/Comment
						<p>is fit, not under the influence of drugs or alcohol, or is tired.</p> <ul style="list-style-type: none"> <li>There is free access to get down from the cryostat in the event of an emergency.</li> </ul>
8	Asphyxiation due to accumulation of LN2 and LHe boil-off	High	Low	Medium	Yes	<p>Operators should use personal Oxygen monitors. These shall be calibrated at 6 monthly intervals.</p> <p>One person must always be in control room if operators working in calibration area.</p> <p>Prevent access to non-essential personnel.</p> <p>A clear route to exit doors must be kept.</p>
9	Handling of LN2/LHe Dewars	Medium	Medium	Low	Yes	All operators should have attended manual handling course as required by RAL site procedures.
10	Over pressurisation of LN2 vessel	High	Low	Medium	Yes	Liquid nitrogen vessel vents freely to outside
11	Over pressurisation of He vessels	High	Low	Medium	Yes	Helium vessels are protected by pressure relief valves Vessel will vent freely to outside when filled with cryogen.
12	Over pressurisation of transfer lines	High	Low	Medium	Yes	Operators to ensure that after completing liquid transfer, at least one end of the transfer lines are open to air to prevent pressure build up.



### 4.3 Laser Risks

	Hazard	Evaluate Hazard	Evaluate Risk	Danger	Acceptable?	Action/Comment
1	Accidental eye/skin exposure through routine use of FIR (class 3b) test beam	Medium	Low	Low	Yes	Use eye-protection provided. Ensure beam path fixed, controlled & labelled
2	Accidental eye/skin exposure , due to stray beams while changing beam configuration	Medium	Low	Low	Yes	Use eye-protection provided. Check power meter Restrict operation to LRO present
3	Accidental eye/skin exposure due to unexpected actions/reflections caused by accidental intrusion into beam	Medium	Low	Low	Yes	Use eye-protection provided. Check power meter Remove watches & jewellery Enclosure added at shutter
4	Accidental eye/skin exposure due to unexpected actions/reflections due to non-optics lab activities	Medium	Low	Low	Yes	Use eye-protection provided. Check power meter All other activities in lab are restricted during laser operation.
5	Beam generation region Accidental eye/skin exposure due to unexpected actions/reflections due to class 4 pump Laser.	Medium	Nil	Nil	Yes	Laser is in Enclosure Ensure that Laser interlocks and signs are activated when in use