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## NDMRB-RA-085

### Risk Assessment: Use of reduced pressure or vacuum

#### Scope

This Risk Assessment refers to the use of ordinary laboratory glassware, including equipment under reduced pressure or vacuum. **It does NOT apply to glassware used under elevated pressure**

*This replaces TDI-RA-022*

<b>Name of assessor:</b>	Andrea Keyte	<b>Date of Assessment:</b>	June 2014	<b>Review Date:</b>	Every 3 years
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### Risk Matrix:

Risk Matrix		Likelihood			
		High	Medium	Low	Negligible
Consequence	Severe	High	High	Medium	Effectively Zero
	Moderate	High	Medium	Medium/low	Effectively Zero
	Insignificant	Medium/Low	Low	Low	Effectively Zero
	Negligible	Effectively Zero	Effectively Zero	Effectively Zero	Effectively Zero

### Risk Assessment:

Hazard (Cause and consequence)	Affected Groups	Existing controls	Risk	Further Action
<p>Glassware under reduced pressure: Implosion and flying glass leading to cuts and lacerations. Any piece of glassware under vacuum <i>e.g.</i> rotary evaporators, vacuum desiccators, Schlenk lines and storage bulbs on vacuum lines has the potential to do harm following implosion.</p> <p>The energy imparted to flying fragments is directly proportional to the volume of the glass vessel evacuated. It follows that the potential to do harm is also directly proportional to the volume of the glass vessel and a rotary evaporator with its associated flasks is a greater hazard than a small Schlenk tube.</p> <p>It is a common misconception that so called "high vacuum" (typically <math>10^{-3}</math> mbars or better) systems present a significantly greater hazard than everyday vacuums produced by <i>e.g.</i> a water pump (around 30 mbars). These may differ by four orders of magnitude but the forces to which the glassware is subjected is essentially the same.</p>	Staff and Students	<p>Lab coats and glasses should be worn. In certain circumstances <i>e.g.</i> when introducing liquid nitrogen or other cryogenic material or when warming storage tubes from low temperature, a facemask and appropriate gloves should be worn.</p> <p>Only suitable glassware should be used: conical flasks, except the heavy walled Buchner type flasks should <b>never</b> be subjected to a vacuum.</p> <p>Glassware should be free from chips, cracks or flaws that would make it unsafe to use. Particular care should be taken to spot any star cracks.</p> <p>Volumes of 1 litre or larger must be enclosed in tape or plastic mesh to restrain fragments in case of implosion. This will normally apply to rotary evaporators, vacuum desiccators and storage bulbs on glass lines. Schlenk lines and tubes are generally of small volume and are quite robust in nature and do not require extra protection in the shape of tape or plastic mesh.</p> <p>Glass dewars should be fully wound in tape or preferably enclosed in a metal container.</p> <p>Depending on the procedure being performed Safety Glasses or Face Shield should be worn. In some circumstances, <i>e.g.</i> when pressure is applied in fitting tubing to glass, leather gloves covering the wrists or towel or tissue padding may be required</p> <p>Glass vessels under vacuum should normally be enclosed in plastic or wire mesh to prevent fragments being scattered after implosion.</p> <p>Broken glass must be disposed of into specially designated bins and not into the normal waste bins.</p>	Medium	<p>Training in the safe use of normal laboratory glassware will be provided before work with glassware under vacuum</p> <p>Depending on the procedure being performed Safety Glasses or Face Shield should be worn. In some circumstances, <i>e.g.</i> when pressure is applied in fitting tubing to glass, leather gloves covering the wrists or towel or tissue padding may be required</p>

Signed By Author:

Approved by (sign and print):

Reviewed by:

Review date: