

Design for Safety (DfS) Library

Examples of Hazards

– Mechanical & Electrical Design

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- i. The information presented below is for consideration only, and not an official guide for Design for Safety, as the actual needs may vary between projects.
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S/No	Potential hazard	Risk	Proposed DfS Control Measure(s), where applicable
1	<p>Difficult to access multiple equipment that are suspended at ceiling level.</p> 	<p>Worker falls from height during maintenance.</p>	<ol style="list-style-type: none"> 1. Build a safe platform for access.  2. Place equipment at ground level, where possible, with clear walkways  3. Cable trunking should not block access to the equipment.
2	<p>Multiple pipes and services (i.e. fire sprinkler, water, air-con) suspending from ceiling</p> 	<p>Worker falls from height when maintaining the services</p>	<p>Build a safe platform for access.</p>
3	<p>Congestion around equipment inhibits movement and maintenance</p> 	<p>Worker trips and falls when maintaining the equipment</p>	<ol style="list-style-type: none"> 1. Design min 600mm clearance for access. 2. Locate motor controls near entrance of equipment room.

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4	Equipment noise from pumps and motors at carpark area.	Noise created can affect general users hearing, causing a safety and health concern	Provide an insulated cover/casing for better acoustic design without compromising the heat dissipation requirement for the equipment;
5	Fan Coil Unit (FCU) installed at unreachable location. Need to crawl within false ceiling for maintenance.	Worker falls from height; Worker works in confined space.	Install FCU with proper access openings for maintenance
6	Fan Coil Unit (FCU) installed at confine location above ceiling 	Worker falls from height; Worker works in confined space.	Build proper access for maintenance
7	Condenser Unit (CU) installed near the edge of building and without guard rail	Worker falls from height.	<ol style="list-style-type: none"> 1. Relocate the CU away from the edge of building. 2. Install guard rail if near to edge.
8	DB panel located at high and confine space which are difficult to access for maintenance 	Worker falls from height; Worker works in confined space.	Relocate DB panel to an accessible area.

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9	<p>No proper machine guarding of the moving/rotating parts of the lift machine</p> 	Worker injured or trapped by moving parts	<ol style="list-style-type: none"> Design proper machine guarding to prevent contact with moving/rotating parts  <ol style="list-style-type: none"> Ensure lift machine is properly shutdown & isolated before contact with the moving/rotating parts.
10	Pump shaft is not fully covered		Install protective shield.
11	Lift door with single beam sensor	User smash by the lift door	Install multi-beam sensor on lift door
12	Big gap between lift door and door jamb.	User's hand get trapped in between and injured	Reduce the gap.
13	Lift intercom for both speakers and microphone installed at high level	Impede the management of lift emergency operations.	<ol style="list-style-type: none"> Install intercom speakers and microphone within the height reachable by users. Use quality speaker and microphone so that the intercom communication between users and FCC will be clear.
14	<p>Insufficient height clearance from the top of the fridge to the sprinkler.</p> 	Unable to activate the Sprinkler system during fire.	<ol style="list-style-type: none"> Ensure all equipment and furniture do not block and interfere the proper functioning of the fire protection system (E.g. Sprinkler)  <ol style="list-style-type: none"> Specify minimum clearance requirement in DfS Register for reference by owner

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15	<p>Access the cooling tower for maintenance</p> 	Worker falls from height	<p>Install handholds, catwalk and safety barriers/ guard rails for worker</p> 
16	Maintenance of water tank	Worker steps directly on the cracked/damaged water tank surface and falls into the tank	<ol style="list-style-type: none"> 1. Provide a cat ladder with extension to the opening of the water tank: <ul style="list-style-type: none"> - Extend the cat ladder to the opening access; - Create a platform beside the water tank access area; 2. Periodic check on the tank surface for possible wear & tear crack lines.
17	No hand hold for water tanks access manhole	Worker falls when accessing the manhole	Install proper handhold.
18	<p>Lighting located on high ceiling and along driveway.</p> 	Workers falling from ladder or ladder getting hit by car.	<ol style="list-style-type: none"> 1. Locate ceiling light at reachable level or out of vehicular path. 2. Provide wall mounting lights at reachable height. 3. Provide platform cantilevered out from wall for worker to stand on for light maintenance.
19	<p>Loose wiring resting on the light diffuser</p> 	Electrical hazard to maintenance crew.	Tidy up the loose wiring.

S/No	Potential hazard	Risk	Proposed DfS Control Measure(s), where applicable
20	<p>Electrical wires too close to water source.</p> 	<p>Wiring come in contact with water in the midst of work and cause electrocution.</p>	<ol style="list-style-type: none"> 1. Ensure sufficient power points and at suitable locations. 2. Remove the electrical wiring near to the washing areas if possible. 3. Provide electrical plugs that come with cover.
21	<p>Air-conditioning units installed on the exterior of buildings.</p>	<p>Maintenance workers falling over the edge.</p>	<p>Provide safety barriers.</p> 
22	<p>High ceiling with lighting.</p> 	<p>Maintenance workers falling from height when maintaining and replacing false ceiling or lighting.</p>	<ol style="list-style-type: none"> 1. Locate ceiling light at reachable level. 2. Provide wall mounting lights at reachable height. 3. Design false ceiling and use light bulbs that require minimal maintenance.
23	<p>Low headroom/restricted access in equipment rooms.</p> 	<p>Difficult for workers to access for maintenance; not ergonomic.</p>	<ol style="list-style-type: none"> 1. Ergonomic design for human access. 2. Provide sufficient lighting. 3. Provide warning signages.

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24	<p>No proper access to flat roof where AHUs and ACPUs are located.</p> 	<p>Technicians need to climb over the parapet wall for routine servicing, risk of falling over the edge.</p>	<p>Provide proper access for maintenance.</p>
25	<p>High ceiling height of aircon vents and no proper access for servicing and maintenance.</p> 	<p>Workers falling from height during maintenance.</p> 	<ol style="list-style-type: none"> 1. Provide alternative cooling method. 2. Place aircon vents elsewhere that is easier for maintenance. 3. Provide proper access for aircon servicing.