

HEALTH IMPACTING FACTORS

OBJECTIVE:

The objective is to prevent harm from exposure to health impacting factors to ALARP, including consideration in design for foreseeable human error.

GENERAL OUTCOME:

The intended design outcome should include/consider:

Engineered controls, which under all operational and environmental conditions, will eliminate or minimise exposure to

- airborne hazards, including harmful particulates, gases and vapours produced by or generated by the equipment
- noise generated by the equipment [and that is not easily damaged or degraded]
- whole-body and hand-arm vibration, under all operational and environmental conditions

Where elimination cannot be achieved, the design should prevent exposure, under all operational and environmental conditions, to

- airborne hazards, including harmful particulates, gases and vapours produced by or generated by the equipment that cause harm to people
- noise levels that cause harm to people
- harmful musculoskeletal risk factors induced by equipment design
- levels of whole-body and hand-arm vibration greater than those recommended by occupational standards

The intended design outcome should also include the ability to warn the operator that design limits have been exceeded

NOTE: Airborne hazards include, but are not limited to, particulates (DPM, fibres, respirable dust, inhalable dust, silica, inspirable dust, etc), gases (nitrous oxides, sulphides, carbon monoxide, carbon dioxide, etc) and vapours (oil droplets, steam containing hazardous substances, etc).



Potential Unwanted Events (PUEs)

6.1

Harm from exposure to health hazards such as:

- a. extreme temperatures
 - i. Inadequate or no climate control
- b. excessive vibration and noise levels
 - i. Inadequate attenuation and restraint systems
- c. particulates, gases, and vapours within the operating workspace due to:
 - i. Open windows/doors
 - ii. Inadequate window/door seals
- d. musculoskeletal risk factors due to poor ergonomic design of equipment and controls

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Potential Unwanted Events (PUEs)

- 6.2 Injury due to failure of critical control systems, such as**
- a. Electronic systems
 - b. Computer systems
 - c. Equipment controls
- being damaged (bridging, abrasion, etc.) by particulates, gases, or vapours**

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Potential Unwanted Events (PUEs)

- 6.3 Harm from inadvertent exposure to health hazards, including**
- a. unacceptable output of particulates, gases, and vapours
 - b. fibrous material generated in brake and other lining materials
 - c. excessive levels of noise
 - d. excessive vibration
- due to operators not being aware of deterioration of equipment, such as uncaptured machine degradation, design limits or conditions**

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Potential Unwanted Events (PUEs)

6.4 Harm from noise levels that induce hearing loss, mental and/or physical fatigue for personnel in the workshop and other working environments due to maintenance activities associated with the equipment

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Potential Unwanted Events (PUEs)

6.5 Harm caused by distraction and/or impaired ability to hear audible warnings or alarms (e.g horns, directional reversing alarms) due to

- a. excessive and/or high impact noise levels generated by equipment
- b. excessive levels of spectator noise penetrating the operator workspace

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Potential Unwanted Events (PUEs)

6.6 Acute or cumulative musculoskeletal injury, adverse health effects to body organs and increased levels of fatigue from excessive levels of whole-body vibration, especially in conjunction with sustained and/or awkward postures, due to poor ergonomic design of equipment

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