

PL/2025/02/0009/87973/RFP Health and Safety Specification

INSTALLATION OF THE SMALLBORE STEEL PIPE SPILL BASIN WASTEWATER
SYSTEM TO MUNICIPAL SEWER LINE AT THE ALRODE AND WITBANK
TRANSNET PIPELINES PETROLEUM PRODUCTS STORAGE AND HANDLING
FACILITY.

Health and Safety Specifications

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Project Name: Installation of the Smallbore Steel Pipe Spill Basin
Wastewater System to Municipal Sewer Line at the Alrode and
Witbank Transnet Pipelines Petroleum Products Storage and
Handling Facilities

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1. Purpose.

This Health and Safety Specifications has been compiled to provide the principal contractor and contractors working on the Installation of the smallbore steel pipe spill basin wastewater system to municipal sewer line at the Alrode and Witbank Transnet Pipelines Petroleum Products Storage and Handling Facility with the relevant health and safety information to be taken into consideration during the planning and execution project.

The Health and Safety Specification is also compiled to give guidance to the principal contractor and contractors when compiling their Health and Safety Management Plans, including other health and safety file documents. All contractors should take careful note of these requirements and must ensure that adequate provision has been made to ensure compliance.

This Health and Safety Specification further identifies and encompass the working behaviors and safe work practices that are expected of all TPL employees, principal contractor, contractors, visitors and service providers, engaged in the project.

The Health and Safety Specification will be reviewed and updated periodically as and when necessary to address and/or include:

- Changes in legislation,
- Client requirements,
- Leading practices, and
- Lessons learnt from incidents.

2. Project scope.

The Health and Safety Specification applies to all personnel involved during planning and execution of the Installation of the smallbore steel pipe spill basin wastewater system to municipal sewer line at the Alrode and Witbank Transnet Pipelines Petroleum Products Storage and Handling Facility, which includes TPL employees, principal contractor, Contractors, visitors and service providers. It is the principal contractor's responsibility to ensure that all their contractors comply fully with all legal requirements as well as the requirements of this Health and Safety Specification.

The project scope includes the Installation of the Smallbore Steel Pipe spill basin Wastewater System to municipal sewer line at the Alrode and Witbank Transnet Pipelines Petroleum Products Storage and Handling Facility.

3. Scope.

This Health and Safety Specification applies to all personnel involved during design and construction of Installation of the Smallbore Steel Pipe spill basin Wastewater System to municipal sewer line at the Alrode and Witbank Transnet Pipelines Petroleum Products Storage and Handling Facility project, which includes TPL employees, designers, principal contractor, contractors, visitors and service providers. It is the principal contractor's responsibility to ensure that all their contractors comply fully with all legal requirements as well as the requirements of this Health and Safety Specification.

4. Definitions.

Acceptable Risk

A risk that has been reduced to a level that can be tolerated having regard for the applicable legal requirements and the Health and Safety Policy adopted for the project.

ALARP (As Low As Reasonably Practicable)

The concept of weighing a risk against the sacrifice needed to implement the measures necessary to avoid the risk. With respect to health and safety, it is assumed that the measures should be implemented unless it can be shown that the sacrifice is grossly disproportionate to the benefit.

Applicant (Permit to Work)

A person requesting permission to perform work for which a Permit to Work is required. Applicants must be authorized (in writing) to receive (or accept) Permits to Work and must be competent to do so by virtue of their training, experience and knowledge of the area or plant in which the work is to be performed.

Authorized Person (Permit to Work)

A person (typically a project employee or an employee of the client) who has been authorized (in writing) by the nominated project management representative to issue Permits to Work within the scope of his designation. A person may only be appointed to issue Permits to Work if he has undergone training and has been assessed and found competent in systems, plant, and equipment operation within the scope of his designation.

Barricade

A temporary structure that is erected as a physical barrier to prevent persons from inadvertently coming into contact with an identified hazard.

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Battering

Sloping the sides of an excavation to a predetermined angle (usually less than the natural angle of repose) to ensure stability.

Benching

The creation of a series of steps in the sides of an excavation to prevent collapse.

Consequence

The outcome of an event expressed qualitatively or quantitatively.

Contractor

Means an employer who performs construction work and includes an organization and or self-employed person that contracts with a client, principal contractor, or a contractor to carry out construction work.

Competent Person

Means a person:

- (a) has in respect of the work or task to be performed the required knowledge, training and experience and, where applicable, qualifications specific to that work or task,
- (b) is familiar with the OHS Act and with the applicable Regulations made under the Act.

Construction Manager

Means a competent person responsible for the management of the physical construction processes and the coordination, administration and management processes on a construction site.

Construction Supervisor

A competent person responsible for supervising construction activities on a construction site.

Construction Work

Means any work in connection with:

- (a) the construction, erection, alteration, renovation, repair, demolition or dismantling of or addition to a building or any similar structure, or
- (b) the construction, erection, maintenance, demolition or dismantling of any bridge, dam, canal, road, railway, runway, sewer or water reticulation system; or the moving of earth, clearing of land, the making of excavation, piling, or any similar civil engineering structure or type of work.

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Clearance Certificate

A signed declaration by an Isolation Officer that a specified hazardous energy source associated with a particular system, plant or item of equipment has been isolated in accordance with an approved Isolation and Lockout Procedure.

Designer

A competent person who prepares a design, checks and approves a design, or arranges for any person at work under his or her control to prepare a design, including an employee of that person where he or she is the employer or an architect or engineer contributing to, or having overall responsibility for a design.

Discipline Lock (many locks with a restricted number of identical keys)

Attached at a Lockout Station or at a Local Isolation Point to lock out a system, plant, or equipment. A Discipline Lock (e.g. A Low Voltage Electricity Discipline Lock) is owned by an Isolation Officer who has been authorized in writing to isolate and lockout a particular hazard (e.g. Low voltage electricity).

Excavation

The making of any man-made cavity, trench, pit or depression formed by cutting, digging or scooping read with the definition of construction work.

Equipment Lock (many locks with one unique key)

Attached directly to pieces of equipment to lock them out. Equipment locks may only be used by Isolation Officers who have been authorized in writing to perform isolation and lockout procedures. The key must have a solid key ring that fits over an Isolation Bar.

First-Aid Injury (FA)

A first-aid injury is any one-time treatment, and any follow-up visit for observation of minor scratches, cuts, burns, splinters, and the like which do not normally require medical care. Such treatment is first aid even if administered or supervised by a medical practitioner.

First aid includes any hands-on treatment given by a first aider. (E.g. Band-Aid, washing, cleansing, pain, relief). The following procedures are generally considered first aid treatment:

- Application of antiseptics,
- Application of butterfly adhesive dressing or sterile strips for cuts and lacerations,
- Administration of tetanus shot(s) or booster(s). However, these shots are often given in conjunction with more serious injuries, consequently injuries requiring these shots may be recordable for other reasons,
- Application of bandages during any visit to medical personnel,

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- Application of ointments to abrasions to prevent drying or cracking,
- Inhalation of toxic or corrosive gas, limited to the removal of the employee to fresh air or the one-time administration of oxygen for several minutes,
- Negative X-Ray diagnosis,
- Removal of foreign bodies not embedded in the eye if only irrigation is required,
- Removal of foreign bodies from a wound if procedure is uncomplicated, for example by tweezers or other simple technique,
- Treatment for first degree burns,
- Use of non-prescription medications and administration of single dose of prescription medication on first visit for any minor injury or discomfort.

Hazard

A source of potential harm in terms of human injury, ill health, property damage and adverse environmental impact.

Hierarchy of Controls

A sequence of control measures, arranged in order to decrease effectiveness, used to eliminate, or minimize exposure to workplace health and safety hazards:

- Elimination – Completely removing a hazard or risk scenario from the workplace,
- Substitution – Replacing an activity, process, or substance with a less hazardous alternative,
- Engineering Controls – Isolating a hazard from persons through the provision of mechanical aids, barriers, machine guarding, interlocks, extraction, ventilation, or insulation,
- Administrative Controls – Establishing appropriate policies, procedures, and work practices to reduce the exposure of persons to a hazard. This may include the provision of specific training and supervision, and
- Personal Protective Equipment – Providing suitable and properly maintained PPE to cover and protect persons from a hazard (i.e. Prevent contact with the hazard).

Isolation and Lockout Procedure

A plant or equipment-specific procedure that describes the method, and sequence to be followed, for rendering equipment, plant, and systems safe to work on.

Isolation Bar

A device used at a Lockout Station to which anyone can attach a Personal Lock making it impossible for an Isolation Officer to remove the key to the Equipment Locks, thus preventing the de-isolation of a system, plant or equipment while it is still being worked on. A Discipline Lock must always be the first lock attached to an Isolation Bar and last to be removed.

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Isolation Officer

A person (typically a Project employee or an employee of the client) who has been authorized (in writing) by the nominated project management representative to perform isolation and lockout procedures. A person may only be appointed as an Isolation Officer if he has undergone training and has been assessed and found competent in the isolation and lockout of systems, plant, and equipment within the scope of his designation. The training needs to be formalized and completed by a competent trainer and certification issued.

Incident

An event (or a continuous or repetitive series of events) that results or has the potential to result in a negative impact on people (employees, contractors, service providers and visitors), the environment, operational integrity, assets, community, process, product, legal liability and/or reputation.

Likelihood

A description of probability or frequency, in relation to the chance that an event will occur.

Lost Time Injury (LTI)

A lost time injury (LTI) occurs when a person is injured in the execution of his/her duties and as a result of this injury is unable to perform his/her regular duties for one full shift or more on the day following day which the injury was incurred. Note: Regular duties are those duties associated with the job description of the injured.

Lost Time Injury Frequency Rate (LTIFR)

Number of LTI's multiplied by 200,000 and divided by manhours worked.

Light Vehicle

A vehicle that:

- Can be licensed and registered for use on a public road,
- Has four or more wheels and seats a maximum of 12 adults (including the driver),
- Requires the driver to hold only a standard civil driving license; and
- Does not exceed 4.5 tons gross vehicle mass (GVM), which is the maximum loaded mass of the motor vehicle as specified by:
 - The vehicle's manufacturer, or
 - An approved and accredited automotive engineer, if the vehicle has been modified to the extent that the manufacturer's specification is no longer appropriate.

Examples of light vehicles include passenger cars, four-wheel drive vehicles, sports utility vehicles (SUVs), pick-ups, minibuses, and light trucks. Any vehicle falling outside of this definition must be considered mobile equipment.

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Medical Treatment Case (MTC)

A work injury requiring treatment by a Medical Practitioner and which is beyond the scope of normal first aid including initial treatment given for more serious injuries. The procedure is to be of an invasive nature (e.g. Stitches, removal of foreign body). The following procedures are generally considered medical treatment:

- Application of sutures (stitches),
- Cutting away dead skin (surgical debridement),
- Loss of consciousness due to an injury or exposure in the work environment.
- Positive X-Ray diagnosis (fractures, broken bones etc.)
- Removal of foreign bodies embedded in the eye,
- Removal of foreign bodies from the wound by a physician due to the depth of embedment, size or shape of object or the location wound,
- Reaction to a preventative shot administered because of an occupational injury,
- Sprains and strains series (more than one) of hot and cold soaks, use of whirlpools, diathermy treatment or other professional treatment,
- Treatment of infection,
- Use of prescription medications (except a single dose administered on first visit for minor injury or discomfort), and
- Treatment for second- or third-degree burns.

Mobile Equipment

A vehicle (wheeled or tracked) that generally requires:

- The driver to hold a specific state or civil license, or
- The operator to hold a nationally recognized certificate of competency.

Examples of mobile equipment include, but are not limited to dump trucks, water trucks, graders, dozers, loaders, excavators, forklifts, tractors, back-actors, bobcats, mobile cranes, tele-handlers, drill rigs, buses and road-going trucks. See the Construction Regulations 23, for construction vehicles and mobile plants as required.

Near Miss

An incident that has occurred that did not result in any injuries, illnesses, environmental or property damage but had the potential to cause an injury, illness, environmental or property damage.

Personal Lock

A single lock with one unique key controlled by the owner. Used for personal protection.

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Project Management

TPL competent members that are authorized to make decisions and approvals within their area of expertise.

Regulation

In the context of this guideline, Regulation(s) refers to the latest version of the Construction Regulations, as required by Section 43 of the Occupational Health and Safety Act 85 of 1993.

Risk

A combination of the likelihood of an occurrence of a hazardous event or exposure and the severity of injury or ill health that can be caused by the event or exposure.

Risk Assessment

A process of evaluating the risk arising from a hazard, taking into account the adequacy of any existing control measures, and deciding on whether or not the risk is acceptable.

Risk Management

The systematic application of management policies, processes, and procedures to identifying hazards, analyzing, and evaluating the associated risks, determining whether the risks are acceptable, and controlling and monitoring the risks on an ongoing basis.

Shoring

A system used to support the sides of an excavation, and which is intended to prevent the cave-in or the collapse of the sides of an excavation.

Structure

any building, steel or reinforced concrete structure (not being a building), railway line or siding, bridge, waterworks, reservoir, pipe or pipeline, cable, sewer, sewage works, fixed vessels, road, drainage works, earthworks, dam, wall, mast, tower, tower crane, bulk mixing plant, pylon, surface and underground tanks, earth retaining structure or any structure designed to preserve or alter any natural feature, and any other similar structure.

Temporary Works

Any false work, formwork, support work, scaffold, shoring or other temporary structure designed to provide support or means of access during construction work.

5. Abbreviations.

AIA	Approved Inspection Authorities
BOQ	Bill of Quantities
CI	Classified Injuries
COIDA	Compensation for Occupational Injuries and Diseases Act
CR	Construction Regulations
DoEL	Department of Employment and Labour
DMR	Driven Machinery Regulation
DRW	Days of Restricted Work to each RWC
DSTI	Daily Safety Task Instruction
DWLTl	Days of work lost due to each LTI
EIA	Environmental Impact Assessment
EMR	Electrical Machinery Regulation
EMPr	Environmental Management Programme
ERP	Emergency Response Plans
EPCM	Engineering Procurement and Construction Management
FAC	First Aid Cases
FAI	First Aid Incident
FR	Facilities Regulations
GMR	General Machinery Regulations
GSR	General Safety Regulations
HAZOPS	Hazard and Operability Study
HAZCON	Hazard Construction Related Study
HSE	Health Safety and Environment
H&S	Health and Safety
JET	Aviation Turbine Fuel
LPG	Liquefied Petroleum Gas
LSD	Low Sulphur Diesel
LTI	Lost Time Injuries
LTIFR	Lost Time Injuries Frequency Rate
MOC	Management of Change
Nebosh	National Examination Board in Occupational Safety and Health (UK)
Nebosh IGC	Nebosh International General Certificate
Nebosh ICC	Nebosh International Certificate in Construction

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MS	Method Statement
MTC	Medical Treatment Cases
MTI	Medical Treatment Injury
NER	Noise Exposure Regulations
OEL	Occupational Exposure Limit
OHSA	Occupational Health and Safety Act (85 of 1993) as amended
OH&S	Occupational Health and Safety
ORTIA	OR Tambo International Airport
PAR	Physical Agents Regulations
PHA	Preliminary Hazard Assessment
PPE	Personal Protective Equipment
PTO	Planned Task Observations
PTW	Permits to Work
RA	Risk Assessments
RPD	Respiratory Protection Device
RPL	Recognition of Prior Learning
RPM	Revolutions per minutes
RWC	Restricted Work Cases
SACPCMP	South African Council for Project Construction management Professions
SANS	South African National Standards
SAPS	South African Police Services
SCR	Site Cardinal Rules
SDS	Safety Data Sheets
SHEQ	Safety Health Environment and Quality
SOC'S	Safety Observations and Conversations
SWL	Safe Working Load
SWP	Safe Work Procedure
TI	Total Injuries
TIMS	Transnet Integrated Management System
TOMS	Transnet Occurrences Management System
TPL	Transnet Pipelines
TIFR	Total Injury Frequency Rate
ULP	Unleaded Petrol
ULSD	Ultra Low Sulphur Diesel
VFL	Visible felt leadership

6. Health and Safety Management Plan.

The contractor must prepare, implement, and maintain a project-specific Health and Safety Management Plan. The Plan must be based on the requirements set out in this Specification as well as all applicable legislation. It must cover all activities that will be carried out on the project site(s), from mobilization to commissioning to hand over for that contractor based on their intended scope of work.

The Plan must demonstrate the contractor's commitment to health and safety and must, as a minimum, include the following:

- A copy of the contractor's Health and Safety Policy in terms of the OHS Act Section 7,
- Procedures concerning Hazard Identification and Risk Assessments,
- Arrangements concerning the identification of applicable Legal and Other Requirements, measures to ensure compliance with these requirements, and measures to ensure that this information is accessible to relevant personnel,
- Details concerning Health and Safety Objectives. A process must be in place for setting objectives (and developing associated action plans) to drive continual improvement,
- Details concerning Resources, Accountabilities and Responsibilities. This includes the assignment of specific health and safety responsibilities to individuals in accordance with legal or project requirements, including the appointment of a Project Manager, Health and Safety Officers, Supervisors, Health and Safety Representatives, and First Aiders, etc.,
- Details concerning Competence, Training and Awareness. A system must be implemented to ensure that each employee is suitably trained and competent, and procedures must be in place for identifying training needs and providing the necessary training,
- Communication, Participation and Consultation arrangements concerning health and safety, including Safety Observations and Coaching, Toolbox Talks, Daily Safe Task Instructions, project health and safety meetings, and notice boards,
- Documentation and Document Control project-specific documentation required for the effective management of health and safety on the project must be developed and maintained, and processes must be in place for the control of these documents,
- Processes and procedures for maintaining Operational Control, including rules and requirements (typically contained in Safe Work Procedures) for effectively managing health and safety risks, particularly critical risks associated with excavation, working at heights, confined spaces, mobile equipment and light vehicles, lifting operations, hazardous chemical agents, hot work, etc.,

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- Emergency Preparedness and Response procedures,
- Management of Change. A process must be implemented to ensure that health and safety risks are considered before changes are implemented,
- For a principal contractor a process must be in place for the assessment of their contractors and service providers regarding health and safety requirements and performance (before any contract or purchase order is awarded),
- Measuring and Monitoring plans, including a plan for the measuring and monitoring of employee exposure to hazardous chemical agents (e.g. Noise, dust, etc.) to determine the effectiveness of control measures,
- Incident Reporting and Investigation procedures describing the protocols to be followed regarding incident reporting, recording, investigation and analysis,
- Non-conformance and Action Management procedures concerning the management of corrective actions,
- Performance Assessment and Auditing procedures concerning health and safety performance reporting, monthly internal audits to assess compliance with the project health and safety requirements, and daily site health and safety inspections, and
- Details concerning the Management Review process followed to assess the effectiveness of health and safety management efforts.

Prior to mobilization, the Health and Safety Management Plan together with other health and safety file documents shall be forwarded electronically, and as a hard copy, to the SHEQ Specialist or designated personnel for review and if found to be adequate, will be accepted (typically "with comments"). Work may not commence until the Health and Safety Management Plan and other health and safety file documents have been accepted/approved. There are two types of approval, PROVISIONAL meaning site establishment and FULL meaning the contractor can commence with executing work.

The contractor shall take action and resolve any issues within 30 days from commencement of work if PROVISIONALLY approved. If the issues requiring corrective action are not resolved within this 30-day period, the contractor will be required to stop any work related to the outstanding actions until they have been resolved. Any proposed amendments or revisions to the contractor's Health and Safety Management Plan and other health and safety file documents must be submitted to the SHEQ Specialist or designated personnel for acceptance. Should it be identified that the contractor has overlooked a high-risk activity, and as a result has omitted the activity and associated control measures from the Health and Safety Management Plan, it will not be approved.

7. Health and Safety Policy.

The contractor must develop, display, and communicate a Health and Safety Policy that clearly states the contractor's values and objectives for the effective management of

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health and safety in terms of the OHS Act Section 7. These values and objectives must be endorsed by the contractor's management representatives and must be consistent with those adopted for the project. The policy must be signed, dated and reviewed periodically. The Health and Safety Policy must commit to:

- Compliance with all applicable legal and other requirements,
- The effective management of health and safety risks,
- The establishment of measurable objectives for improving performance, and the provision of the necessary resources to meet these objectives,
- The prevention of incidents, and
- Achieving continual improvement regarding health and safety performance.

All employees of the contractor as well as the employees of any contractor and service provider under their control shall be made aware of the policy. A copy of the policy must be displayed in each meeting room and on each notice board.

8. Hazard Identification and Risk Assessment.

Detailed hazard identification and risk assessment processes must be followed for all work to be performed as well as for all associated equipment and facilities. TPL as the client will provide a Baseline Risk Assessment informing the contractor on inherent hazards and risks within the project site. Contractor must ensure that effective procedures and risk assessment systems are in place to control hazards and to mitigate risks to levels that are as low as is reasonably practicable. The risk assessment processes must be applied to:

- The full life cycle of the project,
- Routine and non-routine activities,
- Planned or unplanned changes,
- All employees, contractors, service providers, and visitors, and
- All infrastructure, equipment, and materials.

The risk assessment processes and methodologies must be appropriate for the nature and scale of the risks and must be implemented by competent persons.

The process of analyzing and managing risk must include the following:

- Establishing the context of the risk assessment,
- Identifying hazards and determining possible risk scenarios (unwanted events),
- Evaluating risks and assigning ratings (classification),
- Recording the risk analysis in a risk register,
- Managing risks according to their classification (prioritizing for action),

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- Identifying and implementing control measures (through the application of the Hierarchy of Controls) to ensure that risks are managed to levels that are as low as is reasonably practicable (ALARP),
- Developing action plans for reducing risk levels (where possible),
- Verifying the completion of actions,
- Re-evaluating the risks and classifications as appropriate, and
- Reviewing and updating the risk register.

8.1 Baseline Risk Assessments.

Prior to site establishment, TPL as the client shall conduct a detailed Baseline Risk Assessment identifying foreseeable hazards and risk scenarios, including proposed control measures as required to mitigate such hazards and risk scenarios associated with the overall project scope as required by Construction Regulations 5(1)(a). The Risk Assessment process shall be facilitated by a team of competent persons, including subject matter experts as required. The Baseline Risk Assessment shall be reviewed and approved by project management prior to implementation.

When carrying out a Risk Assessment, Hazard (Energy) Types must be specified in accordance with the categorization detailed in Table 8-1 below. Risk scenarios must be described indicating the way a person may come into contact with, or be exposed to, a specific hazard. An initial risk rating must be assigned to each risk scenario without taking any control measures into consideration. Control measures for managing the risks to levels that are as low as is reasonably practicable must then be identified for implementation on the project, and a residual risk rating must be assigned to each risk scenario taking the identified control measures into consideration.

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Table 8-1: Hazard (Energy) Types

Gravitational					
Falling object	Rolling object	Person falling from heights	Slip, trip or fall on same level	Collapsing structure	Collapsing, slumping or flowing material or substance
Mechanical					
Moving person and moving hand tool	Moving component of fixed machinery or power tool	Moving object mechanically or manually	Projectile	Sharp object	Moving mobile equipment or light vehicle
Elastic					
Object under Tension or Compression			Compressed fluid, liquid or gas		
Acoustic					
Noise					
Vibrational					
Hand and arm vibration			Whole body vibration		
Electrical					
Electricity			Electromagnetic field		
Radiation					
Ionising radiation			Non-ionising radiation		
Illumination					
Lighting					
Thermal					
Heat			Cold		
Fire					
Fire ignition					
Explosion					
Explosion					
Particulates and Aerosols					
Dust	Fibres	Fumes	Spray	Mist	Smoke
Chemical Agents					
Corrosive and irritant	Asphyxiate and poison	Narcotic/Anaesthetic	Allegen/Sensitizer	Carcinogen	Teratogen/Mutagen
Microbiological					
Virus	Bacterium	Parasite	Fungus		
Weather					
Lightning	Heavy wind	Flooding	Hail storm		
Physiological					
Stress		Fatigue			
Ergonomics					
Exertion	Repetitive movement	Awkward posture	Awkward movement		

A Risk Register comprised of all significant risks (i.e. Risks rated as major or catastrophic) identified for the project will be compiled using the information contained in the project Baseline Risk Assessment. Key control measures for managing each of these risks will be specified in the register. For the significant risks in particular, action plans will be developed for reducing the risk levels (where possible). The project Risk Register will be reviewed and, if necessary, updated on an annual basis during the execution of the project as well as when changes are made to a design and/or the construction scope,

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schedule, methods, etc. that result in a change to the risk profile and following an incident.

The contractor must ensure that the hazards, risk scenarios and control measures identified in the contractor's Risk Assessments are taken into consideration when developing, implementing and maintaining the various elements of the contractor's health and safety management system for the project (e.g. Competence, training and awareness requirements). All persons potentially affected must be made aware of the hazards, risk scenarios and control measures identified in the contractor's Risk Assessments. The contractor shall develop its own Risk Register that comprises of all significant risks (i.e. Risks rated as major or catastrophic) identified when developing their Risk Assessments.

8.2 Task-Based Risk Assessments.

The contractor must carry out detailed project-specific Task-Based Risk Assessments which must be reviewed and approved by the SHEQ Specialist or designated personnel prior to the commencement of any work. The risk assessment process must be facilitated by a competent person who has been appointed in writing in terms of the Construction Regulations 9(1). The contractor's site management representatives, supervisory personnel, technical experts (as required) and workforce personnel directly involved with the task being examined must participate in the Risk Assessment process. An attendance register must be completed and retained. It must be noted that under no circumstances may a contractor's Health and Safety Officer perform a risk assessment in isolation. The active participation of all people referred to above is mandatory.

A Task-Based Risk Assessment must at least:

- Be accompanied by a Safe Work Procedure (describing in sufficient detail how the specific job or task is to be performed in a logical and sequential manner),
- Provide a breakdown of the job or task into specific steps,
- Identify the hazards and potential risk scenarios associated with each step,
- Include consideration of possible exposure to noise, heat, dust, fumes, vapours, gases, chemicals, radiation, vibration, ergonomic stressors, or any other occupational health hazard or stressor,
- Describe the control measures that will be implemented to ensure that the risks are managed to levels that are as low as is reasonably practicable, and
- Assign an initial risk rating (without taking any control measures into consideration) and a residual risk rating (taking the identified control measures into consideration) to each risk scenario.

A Task-Based Risk Assessment must be reviewed and, if necessary, updated:

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- On an annual basis (as a minimum),
- Where there are changes in legislation,
- When changes are made to a design and/or the construction scope, schedule, methods, and
- Following an incident.

8.3 Pre-Task Hazard Assessments.

A pre-task hazard assessment must be completed whenever a change is identified while carrying out an activity. Any deviation from what was discussed during the Daily Safe Task Instruction (DSTI) (prior to the activity commencing), or anything that was not discussed, constitutes a change. Before carrying out the task that involves the identified change, a few minutes must be spent identifying the hazards and risks associated with that task as well as suitable control measures.

8.4 DSTI/Continuous Risk Assessment.

A Daily Safe Task Instruction (DSTI) is a simple and effective tool for the management of hazards and risks within the workplace. It enables supervision, work teams and individual employees to quickly assess a situation for hazards and to introduce controls to make the situation safe. A DSTI is based on a simple checklist/evaluation tool that is completed prior to commencing work. It can be made task specific, rather than using a generic one for all activities.

The DSTI shall be completed in the presence of the entire team daily prior to commencing work related tasks as well as at the end of the shift to record any incidents, changes that occurred during the shift, and lessons learnt. Due consideration must be given to changes in the work environment e.g. terrain, weather and health hazards when conducting the DSTI.

Where a DSTI identifies a hazard or risk not previously identified in a risk assessment, the supervisor shall ensure the existing Task-Based Risk Assessment is amended and revised, as necessary. All visitors to a particular work area must also sign the DSTI for that area as acknowledgement of identified hazards.

8.5 Issue-based Risk Assessment.

An Issue-Based Risk Assessment will be conducted as soon as an issue arises. They are appropriate for the management of change in the workplace, for example:

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- When a near-miss incident occurred,
- New machinery/equipment is introduced into the workplace,
- Processes or procedures change, and
- New knowledge comes to light, to name a few.

The same technique and approach is applied when Task-Based Risk Assessments are conducted. The outcomes of all Issue-Based Risk Assessments will be incorporated into the Baseline and Task-Based Risk Assessments respectively.

8.6 Specialized Studies.

Specialized studies must be facilitated by a specialist risk person utilizing specialist risk management tools and methods. This can typically include critical health and safety risks, strategic business management, project risk workshops, HAZOP studies, HAZCON studies, change management and safety in design issues where controls are required to achieve ALARP and/or approval to proceed must be given by the authorized project representative.

8.7 Risk Assessment Monitoring and Reviews.

The contractor shall conduct and document risk assessment monitoring and reviews to support their planning processes. Planned review dates can be included in the Risk Assessment Register.

8.8 Safe Work Procedures.

The contractor shall compile safe work procedures based on its project-specific Task-Based Risk Assessments which must be reviewed and approved by the SHEQ Specialist or designated personnel prior to the commencement of any work. Safe work procedures shall include reference to:

- The specific method statements,
- Control measures to mitigate or reduce risk,
- Supervisory requirements, including level and frequency,
- Responsibilities of competent persons,
- Responsibilities of legal appointees,
- Required personal protective equipment,
- Required plant, tools, and equipment,
- Inspection regime relating to plant, tools, and equipment,
- Medical certificates of fitness,

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- Relevant risk assessments, and
- Emergency management procedure, and any special arrangements required for the task.

9. Legal and Other Requirements.

The contractor must comply with the requirements of all applicable health and safety legislation and project-specific standards and procedures as amended from time to time. The contractor must compile and maintain a register of all legal and other requirements applicable to the work that will be carried out and/or services that will be provided. This register must be updated regularly to ensure that it remains relevant. Applicable laws and standards must be appropriately communicated to all employees of the contractor as well as the employees of any contractor and service provider under their control.

10. Health and Safety Objectives.

To drive continual improvement, the contractor must set project-specific health and safety objectives and must develop improvement action plans to achieve these objectives. Eliminating health and safety hazards, minimizing health and safety risks, preventing incidents, injuries, and illnesses, and ensuring legal compliance must be the primary considerations for setting objectives. When setting objectives, consideration must be given to the following:

- Leading indicators such as inspection findings, audit findings, hazard reporting, and observations,
- Lagging indicators (i.e. Incidents including Near Misses),
- Leading practices and lessons learnt, and
- Injury frequency rates with due understanding that the goal is "zero harm".

The objectives must be specific and measurable. The improvement action plans must specify the resources (both human and financial) required to achieve the objectives, the person's responsible, and realistic timeframes for completion. The contractor must ensure that adequate resources are allocated and that progress towards meeting the objectives is monitored regularly.

The objectives and associated improvement action plans must be documented and must be communicated to all contractor employees, including employees of other contractors and service providers under their control. Furthermore, to ensure that the objectives remain relevant, they must be reviewed on a quarterly basis and whenever significant change has taken place on the project (i.e. Changes to activities, scope of work, operating conditions, etc.).

11. Resources, Accountabilities and Responsibilities.

The contractor must adequately allocate resources, responsibility, and accountability to ensure the effective implementation, maintenance and continual improvement of the contractor's health and safety management system on the project. For each role that carries health and safety accountability and/or responsibilities (including legislative requirements), a role description detailing the accountability and/or responsibilities must be documented.

All health and safety appointments (i.e. the assignment of specific health and safety responsibilities to individuals in accordance with legal or project requirements) must be done in writing. Documented proof of each appointment (i.e. a signed appointment letter) must be retained. The contractor should not discharge any legal responsibilities to employees who are not legally appointed.

The contractor must comply with the requirements of all applicable legislation concerning health and safety related appointments and delegations for the project. A health and safety organizational chart specific to the project must be documented and maintained. All roles that carry health and safety accountability and/or responsibilities must be included, and all individuals that carry health and safety appointments must be clearly identified.

The provision of dedicated health and safety professionals on the project must be appropriate for the nature and scale of the work to be carried out. The contractor is solely responsible for carrying out the work under the contract whilst having the highest regard for the health and safety of all persons on the project site. Health and safety are the responsibility of each individual on the project site, but in particular, it is the responsibility of the contractor's management team who must set the tone.

Visible commitment is essential to providing and maintaining a safe workplace. The contractor's managers and supervisors at all levels must demonstrate their commitment and support by adopting a risk management approach to all health and safety issues. These individuals must consistently take immediate and firm action to address violations of health and safety rules and must actively participate in day-to-day activities with the objective of preventing harm. The contractor's management representatives are responsible and accountable for health and safety performance on the project. Key responsibilities include the following:

- Preparing, implementing, and maintaining a risk-based Health and Safety Management Plan specific to the work that will be carried out,

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- Establishing, implementing, and maintaining health and safety systems and procedures to ensure that all work is carried out in compliance with the requirements of this specification, the contract, and all applicable legislation,
- Establishing, implementing, and maintaining effective hazard identification and risk management processes and procedures to ensure that all reasonably foreseeable hazards are controlled to minimize risk,
- Providing the resources necessary to meet the requirements of this specification,
- Ensuring that all contractor employees have clearly defined responsibilities regarding health and safety, and that these responsibilities are clearly communicated and understood,
- Establishing, implementing, and maintaining a system for ongoing training and assessment of skills and competence,
- Establishing, implementing, and maintaining procedures to ensure that only qualified and competent personnel are permitted to work on the project site,
- Establishing, implementing, and maintaining effective communication and consultative processes concerning health and safety for the duration of the contract,
- Maintaining operational control for the protection of all persons on the project site as well as the public,
- Establishing, implementing, and maintaining effective emergency preparedness and response procedures,
- Establishing, implementing, and maintaining effective management of change processes and procedures,
- Establishing, implementing, and maintaining effective incident reporting, investigation and recording processes and procedures,
- Establishing, implementing, and maintaining effective auditing and inspection processes and procedures, and
- Formally reviewing the contractor's Health and Safety Management System annually to ensure that the system continues to be effective in managing health and safety performance and meeting project requirements.

All costs associated with meeting these responsibilities shall be borne by the contractor. Any cost associated with any work stoppage due to non-compliance with a health and safety requirement shall be for the contractor's account.

11.1 Contractor Construction Manager.

The principal contractor shall appoint a competent Construction Manager who shall be responsible for the successful and safe completion of all work to be carried out by contractors as required by Construction Regulations 8(1). The Construction Manager shall be responsible for the following:

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- Ensuring that a Health and Safety Policy that clearly states the contractor's values and objectives for the effective management of health and safety on the project is in place and is communicated to all contractors and their employees,
- Ensuring that all applicable legal and project health and safety requirements are always identified and complied with,
- Ensuring that effective hazard identification and risk management processes are established and implemented for all work to be carried out by contractors,
- Participating in (and approving) all Task-Based Risk Assessments conducted for the work to be carried out by contractors,
- Driving the achievement of agreed health and safety objectives,
- Ensuring that the necessary resources are made available for the effective implementation of the contractors' Health and Safety Management Plans,
- Ensuring that all work is adequately and competently supervised,
- Ensuring that all contractors' employees have clearly defined responsibilities regarding health and safety (assigned in writing), and that these responsibilities are clearly communicated and understood,
- Ensuring as far as is reasonably practicable that contractors and their employees are competent to perform their roles and have received appropriate workplace health and safety training and instruction,
- Managing all appointed contractors regarding health and safety performance,
- Establishing and maintaining effective communication and consultative processes to ensure that contractors and their employees are kept up to date regarding health and safety information (e.g. Incidents and lessons learnt, leading practices, hazards, risks and control measures, etc.) and that feedback is provided promptly regarding issues and/or concerns raised,
- Participating in the project's Visible Felt Leadership (VFL) programme,
- Chairing monthly Contractor Health and Safety Meetings and attending monthly Site Health and Safety Meetings,
- Implementing programmes that encourage continual improvement and providing recognition for suggestions made by contractors' employees,
- Implementing contractors' Health and Safety Management Plans and associated Safe Work Procedures,
- Acting consistently and strictly against any contractor employee who transgresses a health and safety rule or requirement,
- Ensuring that an effective management of change process is in place,
- Implementing, testing, and maintaining an effective Emergency Response Plan for contractors' activities, and ensuring that the plan is adequately resourced,
- Ensuring that workplace exposure of contractors' employees to hazardous substances or agents is measured and monitored to determine the effectiveness of controls and compliance with legal (and project) requirements,
- Ensuring that all incidents are reported without delay and are investigated thoroughly,
- Participating in investigations into significant incidents,

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- Ensuring that accurate health and safety statistics are maintained, and that health and safety performance reports are compiled as required,
- Providing the necessary resources for regular health and safety audits and inspections to be conducted and supporting the auditing process,
- Participating in health and safety audits and carrying out workplace inspections,
- Ensuring that corrective actions (arising from incident investigations, audits, inspections, etc.) are implemented, and that adequate resources are provided for this purpose,
- Participating in an annual review of the contractors Health and Safety Management Systems,
- Ensuring that mandatory agreement in terms of OHS Act Section 37 is in place as well as principal contractor and contractor appointment in terms CR 5(1)(k) and CR 7(1)(c)(v) respectively have been signed and is in the health and safety file, and
- Ensure that the letter of good standing in terms of COIDA is up to date and is in the health and safety file as well as the proof of public liability insurance as required with the bonds for the contract.

11.2 Contractor Health & Safety Officer.

Contractor Health and Safety Officer

The Contractor's Health and Safety Officer shall be duly registered by the SACPCMP as CHSO. The Health and Safety Officer shall be appointed on a full-time basis on site and responsible for the following:

- Reviewing all applicable legal and project health and safety requirements and providing guidance to the contractor's management personnel to ensure continual compliance.
- Assisting with the implementation of effective hazard identification and risk management processes for all work to be carried out by the contractor.
- Participating in all Task-Based Risk Assessments conducted for the works to be carried out by the contractor and ensuring that identified control measures are implemented.
- Conducting contractor's health and safety induction training for all contractor's personnel.
- Compiling and maintaining all health and safety related documents and records required of the contractor.
- Communicating relevant health and safety information to contractor's personnel (e.g. incidents and lessons learnt, leading practices, hazards, risks, and control measures, etc.).
- Carrying out Safety Observations and Coaching.

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- Evaluating the content of the DSTI's conducted by the contractor's appointed supervisor and attending at least one DSTI each day.
- Attending the contractor's site health and safety meetings.
- Assisting with the implementation of the contractor's Health and Safety Management Plan and associated procedures.
- Carrying out Planned Task Observations on an ad hoc basis.
- Assisting with the implementation, testing and maintenance of an effective Emergency Response Plan for the contractor's activities.
- Responding to workplace incidents (as appropriate).
- Participating in incident investigations.
- Maintaining accurate health and safety statistics for the contractor and compiling health and safety performance reports as required.
- Monthly auditing of the health and safety management system and workplace activities by the contractor, to assess compliance with the project health and safety requirements.
- Tracking and reporting on the implementation of corrective actions (arising from incident investigations, audits, inspections, etc.).

The Contractor's Health and Safety Officer shall possess qualifications and have acquired the necessary experience as follows:

- Minimum 5 years post registration with the SACPCMP and a total of 8 years' experience in assisting with development, implementation and maintenance of Health and Safety Management Systems in similar related projects.
- Minimum Certificate in Safety Management (NQF Level 5) or Environmental Health or SAMTRAC or NEBOSH IGC/ICC or an equivalent training course with an accredited institution or training provider.

Further Requirements

The contractor shall appoint full-time Health and Safety Officer(s) for the duration of the contract who are registered with the SACPCMP as CHSO. Where more than 50 employees are appointed, an additional Health and Safety Officer should be appointed and a ratio of 1:50 should be maintained. Where more than 200 employees are appointed, a Health and Safety Manager shall be appointed to support the contractor on a full-time basis on site. Should this be the case, requirements for the Health and Safety Manager will be shared by TPL with the appointed contractor. Additional resources may be required depending on the scope, complexity, budget, high risk activities involved and other reasonably justifiable requirements.

The Health and Safety Officer shall be on site when work commences at the start of the day and must remain on site until all activities for that day have been completed. A Health and Safety Officer shall be present during all shifts, so if work is carried out over

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more than one shift per day, the contractor must make provision for an additional Health and Safety Officer.

The contractor must ensure that each Health and Safety Officer is adequately equipped to enable him to perform his duties effectively. Each Health and Safety Officer and/or Manager shall be provided with the following:

- A computer with access to all necessary systems, including access to e-mail and the internet, and
- A mobile telephone on contract or with adequate pre-paid airtime.

A Health and Safety Officer must over and above the SACPCMP registration as CHSO be computer literate, fluent in English, and must have the following minimum competences:

- Experience and appropriate training regarding implementing and maintaining a health and safety management system compliant with national legislation or an international standard,
- Experience and appropriate training regarding construction related hazard identification and risk management processes,
- Competence, experience, and relevant training regarding incident investigation procedures and causation analysis,
- Health and safety auditing experience and training,
- A valid First Aid certificate of competency,
- Fire prevention and protection training; and

Prior to placing a Health and Safety Officer on the project site, the contractor must forward a copy of the candidate's resume to the SHEQ Specialist or designated personnel for review and acceptance. A proposed candidate may be rejected should he not meet the experience and/or qualification requirements, or due to poor work performance on previous projects.

11.3 Contractor Construction Supervisors.

The contractor must ensure that all project and/or construction works are always supervised by an adequate number of qualified, competent and appointed Construction Supervisors who have experience in the type of work being carried out as required by the Construction Regulations. No work may be carried out without an appointed Construction Supervisor being physically present in the work area and during completion of the Daily Safety Task Instruction (DSTI). Contractor Construction Supervisors shall be responsible for the following:

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- Ensuring that all work carried out under his supervision is done in accordance with the requirements of all applicable legislation, rules, standards, specifications, plans and procedures,
- Participating in Task-Based Risk Assessments including other relevant risk assessments,
- Ensuring that all employees under his supervision are made aware of the hazards, risk scenarios and control measures identified in relevant risk assessments,
- Ensuring that the control measures stipulated in all relevant risk assessments are in place and are implemented fully for all work carried out under his supervision,
- Ensuring that all employees under his supervision conduct pre-task hazard assessments, when necessary,
- Driving the achievement of health and safety objectives set for his team,
- Ensuring that the necessary written appointments are in place for each employee under his supervision (e.g. First aider, mobile crane operator, etc.),
- Ensuring that all employees under his supervision attend all required training,
- Ensuring that no employee carries out any work that he is not competent to perform or has not been appointed to perform,
- Identifying training needs within his team,
- Carrying out Safety Observations and Coaching,
- Conducting Toolbox Talks with his team,
- Leading a Daily Safe Task Instruction (DSTI) discussion with his team,
- Attending Health and Safety Meetings as required,
- Maintaining a Health and Safety Management Information Notice Board in the work area for which he is responsible,
- Recording, daily, a description of the day's activities as well as a breakdown (by occupation) of the personnel on site under his supervision (e.g. 5 bricklayers, 2 carpenters, 3 welders, 22 general workers, and 1 supervisor),
- Ensuring that all Safe Work Procedures applicable to the work carried out under his supervision are adhered to and are fully implemented,
- Maintaining discipline and taking the necessary action whenever an employee under his supervision does not adhere to a rule or requirement,
- Carrying out Planned Task Observations,
- Ensuring that emergency response procedures are understood by all employees under his supervision and that these procedures are followed in the event of an emergency,
- Reporting all incidents immediately, participating in incident investigations, communicating the lessons learnt to all employees under his supervision, and implementing corrective actions where required, and
- Carrying out workplace health and safety inspections.

The Construction Supervisor must accept these responsibilities in writing as part of his appointment. The Construction Supervisor must be equipped with a mobile telephone to ensure that effective communication can be maintained for the duration of the contract.

11.4 Health and Safety Representatives.

The team of employees on site shall have a Health and Safety Representative deployed on the project site. A Health and Safety Representative must be elected and appointed. Taking into consideration the number of employees deployed, the geographical area in which the work is taking place, the different work disciplines, and the shift pattern (if applicable), the contractor must ensure that an adequate number of Health and Safety Representatives (at a minimum ratio of one Health and Safety Representative per 50 employees) are elected and appointed to effectively represent all site personnel as required by the OHSA Section 17 and 18.

Each Health and Safety Representative must attend an accredited training course for health and safety representatives. The cost of this training shall be for the contractor's account. The contractor must make the necessary allowances for the Health and Safety Representatives to carry out their functions as specified in the applicable legislation. The contractor must ensure that an appropriate sticker is affixed to the safety helmet of each Health and Safety Representative for identification purposes.

11.5 First Aiders.

If 10 or more employees are deployed on the project site, at least one trained and competent First Aider shall be in place and must be appointed. Taking into consideration the number of employees deployed, the geographical area in which the work is taking place, the different work disciplines, and the shift pattern (if applicable), the contractor must ensure that an adequate number of First Aiders (at a minimum ratio of one First Aider per 50 employees) are in place and have been appointed to administer first aid treatment should this be required.

First Aid training shall be done through an accredited training institution. The cost of this training shall be for the contractor's account. The contractor shall ensure that an appropriate sticker is affixed to the safety helmet of each First Aider for identification purposes. The contractor shall make provision for an emergency facility on site or arrange with a nearby hospital to be on standby in case of an emergency.

11.6 Duties of the Client.

As per Construction Regulations 5, TPL as the client shall:

- Prepare a Baseline Risk Assessment for an intended construction work project,

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- Prepare a suitable, sufficiently documented, and coherent site-specific Health and Safety Specification for the intended construction work based on the Baseline Risk Assessment contemplated in CR 5(1)(a),
- Provide the Designer with the Health and Safety Specification contemplated in CR 5(1)(c),
- Ensure that the Designer takes the prepared Health and Safety Specification into consideration during the design stage,
- Ensure that the Designer carries out all responsibilities contemplated in CR 6,
- Include the Health and Safety Specification in the tender documents,
- Ensure that potential principal contractors submitting tenders have made adequate provision for the cost of health and safety measures,
- Ensure that the principal contractor to be appointed has the necessary competencies and resources to carry out the construction work safely,
- Take reasonable steps to ensure co-operation between all contractors appointed by TPL as the client to enable each of those contractors to comply with the requirements of Construction Regulations and other applicable requirements,
- Ensure before any work commences on a site that every principal contractor is registered and in good standing with the compensation fund or with a licensed compensation insurer as contemplated in the COIDA,
- Appoint every principal contractor in writing for the project or part thereof on the construction site,
- Discuss and negotiate with the principal contractor the contents of their Health and Safety Management Plan contemplated in CR 7(1) and thereafter finally approve that plan for implementation,
- Ensure that a copy of the principal contractor's Health and Safety Management Plan is available on request to an employee, inspector, or contractor,
- Take reasonable steps to ensure that each contractor's Health and Safety Management Plan is implemented and maintained,
- Ensure that periodic health and safety audits and document verification are conducted at intervals mutually agreed upon between the principal contractor and any contractor, but at least once every 30 days,
- Ensure that a copy of the health and safety audit report contemplated in CR 5(1)(o) is provided to the principal contractor within seven days after the audit.
- Stop any contractor from executing a construction activity which poses a threat to the health and safety of persons which is not in accordance with the Health and Safety Specifications and the principal contractor's Health and Safety Management Plan for the site,
- Where changes are brought about to the design or construction work, make sufficient health and safety information and appropriate resources available to the principal contractor to execute the work safely,
- Ensure that the health and safety file contemplated in CR 7(1)(b) is kept and maintained by the principal contractor,

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- Where a fatality or permanent disabling injury occurs on the construction site, ensure that contractors provide the Provincial Director with a report contemplated in OHS Act Section 24 and in accordance with GAR 8 and 9, and
- Where additional work is required to be performed because of a design change or an error in construction due to the actions of TPL as the client, ensure that sufficient safety information and appropriate additional resources are available to execute the required work safely.
- Where more than one principal contractor is appointed as contemplated in CR 5(1)(k), take reasonable steps to ensure co-operation between all principal contractors and contractors to ensure compliance with the requirements of Construction Regulations and other applicable requirements.

11.7 Duties of the Designer.

As per the Construction Regulations 6(1) and 6(2), the Designer shall:

- Ensure that the applicable safety standards incorporated into the Construction Regulations under OHS Act Section 44 are compiled within the design,
- Take into consideration the Health and Safety Specification submitted by TPL as the client.
- Before the contract is put out to tender, make available in a report to TPL as the client, all relevant health and safety information about the design of the relevant structure that may affect the pricing of the construction work, the geotechnical-science aspects, where appropriate; and the loading that the structure is designed to withstand,
- Inform TPL as the client in writing of any known or anticipated dangers or hazards relating to the construction work, and make available all relevant information required for the safe execution of the work upon being designed or when the design is subsequently altered,
- When modifying the design or substituting materials, consider the hazards relating to any subsequent maintenance of the relevant structure and make provision in the design for that work to be performed to minimize the risk,
- When mandated by TPL as the client to do so, carry out the necessary inspections at appropriate stages to verify that the construction of the relevant structure is carried out in accordance with his design,
- When mandated stop any contractor from executing any construction work which is not in accordance with the relevant design's health and safety aspects,
- When mandated in his or her final inspection of the completed structure in accordance with the National Building Regulations, include the health and safety aspects of the structure as far as reasonably practicable, declare the structure safe for use, and issue a completion certificate to TPL as the client and a copy thereof to the contractor, and

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- During the design stage, take cognizance of ergonomic design principles to minimize ergonomic related hazards in all phases of the life cycle of a structure.

The Designer of temporary works must ensure that:

- All temporary works are adequately designed so that it will be capable of supporting all anticipated vertical and lateral loads that may be applied,
- The designs of temporary works are done with close reference to the structural,
- The designs of temporary works are done with close reference to the structural design drawings issued by the contractor, and in the event of any uncertainty consult the contractor,
- All drawings and calculations pertaining to the design of temporary works are kept at the office of the temporary works designer and are made available on request by an inspector, and
- The loads caused by the temporary works and any imposed loads are clearly indicated in the design.

11.8 Duties of the Principal Contractor.

As per Construction Regulations 7(1), the Principal Contractor shall:

- Provide and demonstrate to the client a suitable, sufficiently documented and coherent site-specific Health and Safety Management Plan, based on this Health and Safety Specification, which plan must be applied from the date of commencement of and for the duration of the construction work and which must be reviewed and updated by the principal contractor as work progresses,
- Open and keep on site a Health and Safety File, which must include all documentation required in terms of the OHS Act and Construction Regulations, which must be made available on request to interested parties, and on appointing any other contractor to ensure compliance therefrom,
- Provide contractors who are tendering to perform construction work for the principal contractor with the relevant sections of this Health and Safety Specifications pertaining to the construction work which must be performed,
- Ensure that potential contractors submitting tenders have made sufficient provision for health and safety measures during the construction process,
- Ensure that no contractor is appointed to perform construction work unless the principal contractor is reasonably satisfied that the contractor that he or she intends to appoint has the necessary competencies and resources to perform the construction work safely,
- Ensure prior to work commencing on the site that every contractor is registered and in good standing with the compensation fund or with a licensed compensation insurer as contemplated in the COIDA,

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- Appoint each contractor in writing for the part of the project on the construction site,
- Ensure that each contractor's Health and Safety Management Plan is implemented and maintained on the construction site,
- Ensure periodic site audits and documents verification are conducted every 30 days for each contractor,
- Stop any contractor from executing construction work which is not in accordance with this Health and Safety Specification including the principal contractor's Health and Safety Management Plan, or which poses a threat to health and safety of any person,
- Ensure that a copy of his or her Health and Safety Management Plan contemplated in CR 7(1)(a) as well as the contractor's Health and Safety Management Plan contemplated in CR 7(2)(a), is available on request to interested parties,
- Hand over a consolidated Health and Safety File to TPL as the client upon completion of the construction work and in addition to the documentation referred to in CR 7 (2)(b), include a record of all drawings, designs, materials used and other similar information concerning the completed structure, Health and Safety Management Plan, Health and Safety File approval, prequalification status Bill of Quantities (BOQ) for health and safety resources, OHS Act Section 37 agreements and CR 5(1)(k) appointment to be in place,
- In addition to the documentation required in the Health and Safety File in terms of CR 7(1)(c)(v) and CR 7 (2)(b), include and make available a comprehensive and updated list of all the contractors on site accountable to the principal contractor, the agreement between the parties and the type of work being done, and
- Ensure that all his or her employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner in the form of Annexure 3.

11.9 Duties of the Contractor.

In terms of the Construction Regulations 7(2) - 7(8), the contractor shall

- Prior to performing any construction work provide and demonstrate to the principal contractor a suitable and sufficiently documented Health and Safety Management Plan, based on the relevant sections of this Health and Safety Specification and the principal contractor's Health and Safety Management Plan, which plan must be applied from the date of commencement of and for the duration of the construction work and which must be reviewed and updated by the contractor as work progresses,

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- Open and keep on site a Health and Safety File, which must include all documentation required in terms of the OHS Act and Construction Regulations and must be made available on request to interested parties,
- Before appointing another contractor to perform construction work be reasonably satisfied that the contractor that he or she intends to appoint has the necessary competencies and resources to perform the construction work safely,
- Co-operate with the principal contractor as far as is necessary to enable each of them to comply with the provisions of the OHS Act and Construction Regulations, and
- As far as is reasonably practicable, promptly provide the principal contractor with any information which might affect the health and safety of any person at work carrying out construction work on the site, any person who might be affected by the work of such a person at work, or which might justify a review of the Health and Safety Management Plan,
- Where a contractor appoints another contractor to perform construction work, the duties that apply to the principal contractor shall apply to the contractor as if he or she were the principal contractor,
- Ensure co-operation between all contractors appointed by the principal contractor to enable each of those contractors to comply with the OHS Act and Construction Regulations,
- No contractor may allow or permit any employee or person to enter any site unless that employee or person has undergone health and safety induction training pertaining to the hazards prevalent on the site at the time of entry,
- Ensure that all visitors to a construction site undergo health and safety induction pertaining to the hazards prevalent on the site and must ensure that such visitors have the necessary personal protective equipment,
- Keep on his or her construction site records of the health and safety induction training and such records must be made available on request to interested parties,
- Ensure that all his or her employees have a valid medical certificate of fitness specific to the construction work to be performed and issued by an occupational health practitioner in the form of CR Annexure 3.

12. Competence, Training and Awareness.

Each employee on site shall be suitably trained, competent, and must understand the health and safety hazards, risks scenarios and control measures associated with his work as required by the OHS Act Section 8(2)(e) and 13(a). Contractors shall implement systems and procedures to ensure that the necessary competencies required by employees are identified (by occupation), along with selection, placement, and any training requirements.

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Please Note: Specific competency profiles and selection criteria (fitness for work) must be developed for all roles where significant health or safety risk exists by contractors.

Please Note: A formal training needs analysis must be carried out based on the competency profiles and a training matrix must be developed for the project by contractors.

Roles requiring technical certification, registration or licensing shall be identified and documented, and these roles shall be filled only by suitably qualified personnel. The contractor shall further ensure that:

- Minimum core health and safety skills required by employees in leadership and supervisory roles are identified and suitable training is provided including hazard identification and risk assessment, incident investigation, health and safety interactions (i.e. Observation and coaching techniques),
- Competency-based training is provided, and it includes operational controls (procedures and work instructions), management of change, and emergency response,
- All employees hold and maintain the required competencies (including appropriate qualifications, certificates, and licenses) and are under competent supervision,
- A site-specific induction and orientation programme that highlights health and safety requirements, procedures, significant hazards, risks and associated control measures is in place for all new employees and visitors (understanding must be assessed),
- Personnel are trained and/or briefed on new or amended standards, rules, safe work procedures, risk assessments, etc.,
- Refresher training is carried out as required (e.g. Re-induction following an absence from site),
- Records of education, qualifications, training, experience, and competency assessments are maintained on site for all employees, and
- The effectiveness of training is reviewed and evaluated.

Prior to the commencement of any works the contractor must provide, to the satisfaction of the SHEQ Specialist or designated personnel, current documentation verifying that the contractor's employees, as well as the employees of any appointed contractors and service providers, are competent and have the necessary qualifications, certificates, licenses, job skills, training and experience (as required by this specification and applicable legislation) to safely carry out the work that is to be performed.

The contractor shall also ensure that the following training takes place as applicable to their scope of works within the project:

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- Health and safety induction training pertaining to the hazards prevalent on the site at the time of entry,
- Training on excavation and trenching considering existing services,
- Training for all persons required to erect, move, or dismantle temporary works structures and instruction to perform those operations safely,
- Training of employees working from a fall risk position,
- Training to work or to be suspended on a platform which includes at least:
 - ✓ How to access and egress the suspended platform safely.
 - ✓ How to correctly operate the controls and safety devices of the equipment.
 - ✓ Information on the dangers related to the misuse of safety devices and
 - ✓ Information on the procedures to be followed in the case of:
 - ✓ an emergency,
 - ✓ the malfunctioning of equipment,
 - ✓ the discovery of a suspected defect in the equipment,
 - ✓ an instruction on the proper use of body harnesses.
- Training for all operators of construction vehicles and mobile plant.
- The handling of hazardous chemicals agents

12.1 Health and Safety Induction Training.

Each employee shall attend all mandatory health and safety induction training applicable to the project. No employee will be permitted to enter any project work site until he or she has attended this training. Each employee must carry proof that he has completed the induction training and may be removed from a site if such proof cannot be produced on request. Induction training shall be valid for 12 months and re-induction to be conducted thereafter.

Furthermore, employees must attend (where applicable) area-specific health and safety induction training pertaining to the hazards identified in the area where the employees will be working. No employee will be permitted to enter a work area until he has attended the relevant area-specific training.

All visitors must receive a visitor induction briefing before entering any project work site. However, this induction does not permit a visitor to enter a site unescorted. Visitors must always be accompanied by an appropriately senior employee who has been fully inducted.

12.2 Specific Training and Competency Requirements.

The following specific training and competency minimum requirements must be complied with. An employee must be trained, assessed, and found competent before he will be given authorisation to perform certain tasks or fill certain roles.

Specific Training and Competency Requirements

Training	Applicability
Health and Safety Induction	All employees
Safety Observations and Coaching (Safety Interactions)	All employees
Risk Assessment*	All managers and supervisors
Incident Investigation*	All managers and supervisors
Safety Leadership	All managers and supervisors
Legal Liability*	All managers and supervisors
Health and Safety Rep*	All elected Health and Safety Representatives
First Aid Levels 1 and 2*	All nominated First Aiders
Fire Fighting (Fire Extinguisher Use) *	Fire-fighting team members
Working at Height*	All employees using a safety harness
Confined Spaces*	All confined space entry officers and Standby Persons
Permit to Work	All Authorised Persons (i.e. Permit issuers) and all Applicants (i.e. Employees who will be applying for permits)
Isolation and Lockout	All Authorized Persons (i.e. Persons who authorize work that requires Isolation and Lockout), all Isolation Officers, and all Applicants (i.e. Persons who request permission to work on systems or equipment requiring Isolation and Lockout)
Mobile Equipment Site License	All mobile equipment operators

Training requirements marked with a '*' must be arranged through accredited external training institutions by the contractor.

13. Communication, Participation and Consultation.

The contractor shall establish and maintain effective communication and consultative processes (allowing for a two-way dialogue) for the duration of the project to ensure that:

- All personnel are kept up to date regarding health and safety matters (e.g. Hazards and risks, incidents and lessons learnt, leading practices, performance against objectives, etc.).
- General health and safety awareness levels are kept high.

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- Prompt feedback is given to personnel regarding health and safety issues or concerns that they raise, and
- Relevant, and often critical, health and safety-related information (e.g. Design changes, instructions, reporting of hazardous conditions or situations, etc.) is effectively disseminated.

This must be achieved as follows:

13.1 Visible Felt Leadership (VFL) & Safety Observations & Coaching (SOC's).

The contractor's supervisory personnel (i.e. Managers and supervisors) must participate in the project's Visible Felt Leadership (VFL) programme. Each manager and each supervisor must, as part of his normal duties, perform Safety Observations and Coaching (SOC's). The intention of this programme is to encourage interaction between supervisors and workers concerning health and safety matters to:

- Reinforce behaviors consistent with standards, procedures, and management system requirements,
- Correct behaviors inconsistent with standards, procedures, and management system requirements, and
- Verify whether employees have the necessary training, certification, equipment, etc. to perform the work that they are carrying out.

It is recommended that each manager and each supervisor must carry out at least one SOC per week. SOC template shall be determined by the contractor and information deriving therefrom shall be gathered, analyzed and any trends that are identified must be acted on to correct unsafe behavior and/or conditions.

13.2 Toolbox Talks.

The contractor shall prepare a toolbox talk daily and must share it with all personnel for which the contractor is responsible. Toolbox talks shall address health and safety issues that are relevant to the work performed on the project site and must include information and/or knowledge sharing, lessons learnt from incidents that have occurred, information concerning specific hazards and/or risks and control measures to prevent injury, etc. Toolbox talks discussed and attendance records shall be kept and maintained in the contractor's Health and Safety File.

13.3 Health and Safety Suggestions.

All employees must be encouraged to submit suggestions to enhance health and safety management on the project site. A process must be in place for documenting, evaluating, implementing (as appropriate), archiving, and recognizing the improvement ideas.

13.4 Contractor Health and Safety Meetings.

The contractor shall schedule and consistently hold monthly health and safety meetings. These meetings must be chaired by the contractor's Construction Manager and the following persons shall be in attendance:

- Contractor management representatives,
- Contractor supervisors,
- Contractor Health and Safety Representatives,
- Contractor Health and Safety Officers and/or Managers

The meeting shall address the following as a minimum:

- New incidents for the period and corrective actions taken or to be taken,
- Implementation status of outstanding actions associated with previous incidents,
- SOC's, PTO's and DSTI's carried out for the period and action required to correct trends identified,
- Results of any audits, inspections (including H&S Rep inspections) or site visits carried out,
- A look ahead to ensure that appropriate health and safety planning and preparation is done for upcoming work,
- Risk Assessments, Safe Work Procedures, etc. that are outstanding or due for review (as well as the quality of these documents), and
- Any other health and safety related matter.

The contractor must compile the minutes of each meeting and attendance records must be kept. These records must be maintained in the contractor's health and safety file.

13.5 Project Health and Safety Meetings.

In addition to the contractor health and safety meetings, the project management shall schedule monthly health and safety meetings that the contractor must attend. These meetings will be chaired by project management and the following persons shall be in attendance:

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- Contractor management representatives,
- Contractor Health and Safety Officers,
- SHEQ Specialists,
- Environmental Specialist,
- Project Manager.

The meeting will address the following as a minimum:

- Feedback from the contractor concerning health and safety performance for the period,
- New incidents for the period and corrective actions taken or to be taken,
- Implementation status of outstanding actions associated with previous incidents,
- SOC's, PTO's and DSTI's carried out for the period and action required to correct trends identified,
- Results of any audits, inspections or site visits carried out,
- A look ahead to ensure that appropriate health and safety planning and preparation is done for upcoming work,
- Risk Assessments, Safe Work Procedures, etc. that are outstanding or due for review (as well as the quality of these documents), and
- Any other health and safety related matter.

13.6 Health and Safety Performance Boards.

The contractor shall provide and maintain a Health and Safety Performance Board to be approved by the nominated project management representative and to be positioned at the entrance to the contractor's site office area. This board must display the following information as a minimum:

- The contractor's logo,
- Current manpower (heads) on site,
- Man-hours worked for the current month and project to date.
- Lost Time Injury Frequency Rate (LTIFR),
- Dates of last injuries (FA, MTC and LTI),
- Number of hours worked since the last recorded LTI, and
- Names and contact telephone numbers for the Construction Manager and the Health and Safety Officers and/or Manager.

13.7 Health and Safety Management Information Notice Boards.

The contractor must provide, for each appointed supervisor, a portable Health and Safety Management Information Notice Board to be placed in the work area. The following information and documentation, as a minimum, must be posted on these boards:

- The relevant Risk Assessments and Safe Work Procedures for the work that is being performed that day,
- The DSTI for the day,
- The most recent toolbox talk,
- Where applicable, all required permits and permissions for the work that is being performed,
- Safety Data Sheets (SDS's) for any hazardous chemical agent being used,
- Details of the last incident involving the work team,
- The most recent weekly health and safety report,
- Emergency procedures,
- A site plan indicating evacuation routes and emergency assembly point locations,
- First Aider names and contact telephone numbers, and
- The appointed supervisor's contact details.

14. Documentation and Document Control.

The contractor must develop and maintain project-specific documentation required for the effective management of health and safety on the project. All documents related to the contractor's health and safety management system must be effectively controlled. The document control process must:

- Provide for the review, revision, and version control of documents,
- Uniquely identify documents (as appropriate) to control their use and function,
- Require approval of the documents for adequacy prior to issue,
- Clearly identify changes and record the status of any revisions to documents, and
- Provide for the effective distribution of documents to, and where necessary the timely removal of obsolete documents from, all points of issue and use.

The contractor must establish a process for the systematic control of health and safety records and related data. Controls must be in place for the creation, receipt, secure storage, maintenance, accessing, use and disposal of such records and data. All information/data for the daily weekly monthly and annual reporting shall be aimed at ensuring a professional close out report by all the contractors leading to the SHEQ Specialist project close out report.

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Each record must be legible, identifiable, and traceable, and must contain adequate information and data for its purpose.

The confidentiality and security of records and data must be maintained in a manner that is appropriate for the nature of the records and data, and in accordance with any applicable data or privacy protection legislation.

Medical surveillance and occupational hygiene monitoring must be reported in a form that respects the privacy of the individual but enables management to fulfil their duty of care obligations to employees. The names of individuals must not be disclosed without their written authorization.

Retention periods for all records (based on legal requirements and/or knowledge preservation considerations) must be established and documented in accordance with applicable legislation.

15. Contractor Health and Safety File Requirements.

The contractor must compile and maintain a file containing all necessary health and safety related documentation. The contents of the file will be audited by the SHEQ Specialist monthly.

Required documentation includes, but is not limited to, the following:

- Letter of Good Standing from the Workman's Compensation Commissioner,
- Signed OHSA Section 37(2) agreement and contractor appointment letter,
- Proof of Public Liability Insurance,
- Scope of Work under the contract,
- List of Contacts and their Telephone Numbers,
- Health and Safety Policy,
- Health and Safety Management Plan,
- Legal Register,
- Organizational Chart for the project,
- Appointment Letters (appointment of the contracting company, and appointments for all persons with health and safety related responsibilities),
- Notifications to the relevant authorities that construction work is in progress,
- Baseline and Task-Based Risk Assessments,
- Health and Safety Objectives, and associated Improvement Action Plans,
- Safe Work Procedures,
- Planned Task Observations,
- Fall Protection Plan (for work at height),

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- A dossier (Equipment Profile) for each fuel-driven vehicle or machine,
- Inspection Registers, Forms and Checklists (e.g. For portable electrical tools, ladders, safety harnesses, light vehicles, mobile equipment, lifting equipment and lifting tackle, first aid boxes, fire extinguishers, etc.),
- PPE Issue Registers,
- Safety Data Sheets,
- Emergency Response Procedures,
- Incident Records,
- A copy of the employee's Identity Document or Passport,
- Certificate of Fitness (Pre-Employment/Annual Medical Examination),
- Proof of Induction Training,
- Other Training Records,
- Copies of Qualification Certificates and/or Certificates of Competency and Copies of Licenses,
- Health and Safety Meeting Minutes,
- Health and Safety Performance Reports,
- Copies of Inspection and Audit Reports,
- Daily Safe Task Instructions (DSTI's) and Toolbox Talks, and
- Lifting Plan for critical lifting if applicable

16. Notification of Construction Work.

The principal contractor shall keep a copy of the CWP in his/her Health and Safety File.

Notification of Construction Work (NOCW) – The contractor shall notify DoEL OHS Inspectorate where the intended construction work will include the following activities:

- Excavation work,
- Working at a height where there is risk of falling,
- Demolition of a structure, or
- Use of explosives to perform construction work.

This notification shall be done 7 days prior to executing such construction work involving the activities above. CR Annexure 2 or a similar form shall be used, and a stamped copy shall be kept in the Health and Safety File.

17. General Rules of Conduct.

All persons are required to conform to the following rules of conduct while on the site. This shall be included in induction programmes, and the following actions are prohibited:

- Engaging in practical jokes, horseplay, scuffling, wrestling, fighting, or gambling,

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- Assault, intimidation, or abuse of any person,
- Insubordination towards any supervisor or manager,
- Refusing to carry out lawful instructions concerning health and safety,
- Entry into any restricted area (including barricaded areas), unless authorized to do so by the person responsible,
- Unauthorized use/operation of any equipment or machinery,
- Negligently, carelessly, or willfully causing damage to any property,
- Destroying or tampering with safety devices, signs, or signals,
- The use of water from fire hydrants or hose reels for any purpose other than extinguishing a fire,
- The willful and unnecessary discharging of fire extinguishers,
- Refusing to give evidence or deliberately making false statements during incident investigations,
- Bringing alcohol, drugs, or any other intoxicating substance onto site,
- Bringing a firearm, ammunition, or any other offensive weapon onto site,
- Bringing animals onto site,
- Sleeping on the job,
- Building fires on site, unless in a suitably constructed barbequing facility, and
- Pouring/pumping/flushing any substance (chemical/hydrocarbon/wastewater) into a storm water drain, onto bare soil, or into any area where the substance is not effectively contained.

Any of the above actions may result in the temporary or permanent removal of the offending person(s) from site, as well as possible prosecution. The decision of the project management shall be final and binding in respect of any dispute that may arise from the interpretation of these requirements.

TPL as the client will not get involved in contractor disciplinary rules and procedures. The contractor will simply be informed (with reasons) that the offending employee(s) will be denied access to the project site. Once the contractor has been informed, the employee(s) must be removed from the site immediately.

18. Site Establishment.

The contractor shall provide facilities that from a humane perspective have a sense of management care. Site facilities should include facilities that provide shelter in times of heavy rain and lightning storms and be conducive for extended toolbox talks. Contractor's facilities should comply with relevant legal requirements below.

The contractor site facilities shall include, but are not limited to the following as required by the CR 30, FR and GSR:

- Sheltered eating facilities,

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- Change rooms and facilities for safe keeping,
- Ablution facilities (sufficient) both genders when required,
- Site sheds, offices and amenities,
- Lay down and storage,
- Temporary site services,
- Waste storage facilities and receptacles, and
- Designated smoking areas.

The contractor shall have a detailed site layout plan with listing of access points, buildings positions, emergency evacuation assembly point, pedestrian routes, amenities, lay down areas, hazardous/flammable chemicals storage, tools/equipment storage, stacking areas, sheltered eating facilities, ablution facilities, temporary site services, waste separation bins, and designated smoking areas.

Contractor shall include a risk assessment identifying all hazards, risks and control measures of the contractor site facility. The contractor shall be responsible in organizing with an electrical registered person to conduct the inspection and testing of the electrical installation and will issue the contractor with a COC on temporary electrical installations.

19. Access Control.

The contractor may not hire any security services for the project site unless authorization has been obtained in writing from project management. The contractor shall comply with all access control, procedures, and systems applicable to the project site. Failure to comply with these requirements will be viewed as a serious safety breach and may result in the permanent removal of the individual(s)/contracting company from site or suspension.

The project will be executed within TPL controlled areas including other private and public areas. Access to the site and access control shall be established as part of site establishment after consultation with TPL security and project management. The security personnel shall also conduct alcohol testing as part of access control.

Failure to comply with these requirements will be viewed as a serious safety breach and may result in the permanent removal of the individual(s)/contracting company from site or suspension.

Access cards will be issued as follows:

- One day access (visitor access card) – this card will be issued by security on site,

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- Five-day access – these cards will only be issued in special circumstances, with conditions, and with a detailed motivation to project management for approval, and
- Contract period access – an access card valid for the full contract period will be issued to an individual once the following requirements have been met:
 - ✓ Completion of a pre-employment medical examination,
 - ✓ Completion of all required project induction training,
 - ✓ Completion of special training/licensing if applicable (e.g. driving/operating license), and
 - ✓ Provision of proof of job/trade-specific qualifications, licenses, training, experience and competency (as required).
- It is mandatory to have the access card in your possession while within the project site(s).

Note: No access card will be issued unless proof of identification is provided (i.e. an identity document or a valid passport). For foreign labour, an access card will only be issued if a valid work visa is produced.

Detailed requirements on access control for people, material, equipment, vehicles and mobile plants shall be incorporated onto the Security Management Plan for the project.

The contractor shall ensure that no employee trespasses on any land lying beyond the boundaries of the project site(s). The contractor's activities shall be confined to the specified construction areas, and access to these areas may only be by means of specified routes. All required barricading (fencing) must be erected and maintained by the contractor.

20. Visitors.

Visitors (including reps and suppliers) shall be advised in advance of the mandatory PPE requirements for the site and must arrive with all PPE as specified. Visitors shall follow the same access requirements in terms of access control. Upon arrival, all visitors shall report to the security office at access point where they must sign in. All visitors shall undergo a visitor induction briefing before entering the site. A visitor access card will be issued to each visitor and in conclusion of the induction briefing, an induction card shall be issued as well.

Whilst on site, visitors must always be accompanied by an appropriately senior employee who has been inducted fully. The visitor(s) must be met at the Security Office, and when the visit is over, must be escorted back to the security office/access point.

When leaving the site, each visitor must return his or her visitor access card to the security personnel posted at the access point. A visitor will not be permitted to leave the

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site until he or she produces the access card that was issued. Visitors are not permitted to perform any work on site.

21. Alcohol, Drugs and Other Intoxicating Substances.

The contractor shall ensure that all personnel under his authority do not at any time enter the site or perform any work whilst under the influence of alcohol, a drug, or any other intoxicating substance. Selling or possessing drugs, alcoholic beverages or any other intoxicating substance on site is strictly prohibited.

A drugs and alcohol testing program will be implemented. Persons entering the site will be randomly tested. Any person who tests positive for alcohol or drug consumption will be subject to disciplinary action and shall be permanently removed from the site.

Should the actions and/or demeanor of an employee suggest possible narcosis or drunkenness, the employee must be removed from the site. This may be done without testing.

22. Light Vehicles.

All vehicles brought onto site shall meet the safety requirements stipulated in the Road Traffic Act. No vehicle shall be permitted to enter the site unless it is duly authorized. Vehicle access permits shall be issued based on availability of designated parking space and the permit may not be transferred between vehicles.

The contractor shall allow any vehicle that is brought onto site (including privately owned vehicles) to be searched at any time while on the premises, or when entering or leaving the premises. The contractor is solely responsible for the safety and security of all vehicles (including private vehicles) that he or she brings onto the site.

All vehicles entering the site must be roadworthy and registered with the relevant traffic authority. A vehicle will not be permitted to enter the site in an un-roadworthy condition. Access will be denied if, for example:

- The vehicle has a defective exhaust system,
- A serious oil or fuel leak is evident,
- The vehicle has unsafe bodywork or is carrying an unsafe load,
- The vehicle is fitted with extraneous or non-standard equipment,
- Passengers are not seated properly,
- The vehicle is not fitted with a seat belt for each occupant,
- The vehicle has any obvious mechanical defect,
- Pre-inspection requirements are not met, or
- The vehicle is overloaded.

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The vehicle driver shall:

- Be in possession of the valid vehicle type driving license,
- Comply with all project site rules pertaining to traffic and the safe operation of vehicles,
- Obey all road signs.
- Obey all instructions given by security or emergency services personnel,
- Remain within the boundaries of the site, and
- Ensure that the vehicle that he or she is operating is never overloaded, and that loads are always properly secured.

The contractor shall ensure that light vehicles have the following minimum safety features:

- Fixed seats and suitable seat (safety) belts for all occupants (i.e. driver and all passengers).
- Roll-over protection for all vehicles intended to be driven on dirt or steep roads.
- An air bag on the driver's side, and where available as a manufacturer fitted item, a passenger's air bag.

The contractor shall ensure that light vehicles that interact with mobile equipment are equipped or fitted with:

- Systems that enable positive communication with the equipment operators (e.g. A two-way radio).
- An amber flashing light (revolving or strobe).
- Reflective taping, and
- High visibility signage facilitating easy and positive identification from a reasonable distance.

In the interest of safety, only the minimum number of vehicles required by the contractor to complete the work under the contract will be permitted to enter the site. When not in operation, the contractor's vehicles shall be parked within the boundaries of his lay-down area or yard.

Parking is only permitted in designated parking areas. All cars are parked on site at the owner's risk. Always follow the reverse parking method special parking outside the construction area. Access to the site could be restricted due to the MHI requirements intrinsically safe zones as classified.

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In the event of a vehicle accident on site, the driver(s) must report the incident immediately and must remain at the scene until the H&S and security personnel arrive, or until drivers are authorized to leave (unless the driver requires medical attention).

23. Mobile Equipment.

The contractor shall provide evidence to the SHEQ Specialist or designated personnel that mobile equipment to be used on the project (including, but not limited to, mobile cranes, forklifts, tractors, excavators, side booms, loaders, back-actors, and road-going cars, light delivery vehicles, and trucks) comply with the requirements of CR 23 and DMR 18, including other applicable legislation.

The contractor remains responsible for meeting this requirement even if the equipment to be used is leased or provided by other service provider (i.e. not owned directly by the contractor). All mobile equipment used for work purposes must be subjected to a Risk Assessment.

The assessment shall:

- Involve operators and maintenance personnel who will use and work on the equipment, and
- Address all aspects of safe operation including handling, driver vision, brake failure, tyre blow out, and access and egress for operators and maintenance personnel.

Mobile equipment shall be serviced and maintained as prescribed by the manufacturer's requirements. No major repairs or services may be carried out on site and no repairs may be carried out by an operator. Only suitably qualified and competent persons may carry out repair work and maintenance work on mobile equipment.

An appropriate pre-operation safety check based on a Risk Assessment shall be carried out for each item of mobile equipment driven or operated for work purposes. An approved checklist shall be in place. The pre-operation safety check shall include, but not be limited to, inspection and/or testing of the following safety critical features:

- Braking system,
- Wheels and tyres (including the spare),
- Lights and indicators,
- Steering,
- Seats and seat belts,
- Windscreen and windows, including windscreen wipers and washers.

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Should any critical feature be defective or damaged, mobile equipment may not be operated until it has been fully repaired. Supervisors must review the completed checklists daily to satisfy themselves that there are no major deficiencies that could place the operator at risk.

The contractor shall ensure that mobile equipment has the following minimum safety features:

- Fixed seats and seat belts for all occupants,
- Adequate lighting, including headlights, tail, turn and brake lights, and an amber flashing light (revolving or strobe),
- An identified isolation and lockout point,
- Adequate walkways, railings, steps and grab handle combinations, and boarding facilities including an alternative path of disembarking in the event of an emergency,
- A reversing alarm or warning device,
- Chock blocks for preventing uncontrolled movement of rubber-tyred equipment when parked,
- A horn,
- Effective windscreen wipers,
- Effective guarding on accessible moving parts,
- A speedometer (if equipment can exceed the lowest applicable speed limit),
- High visibility signage facilitating easy and positive identification from a reasonable distance, and
- A security system to prevent unauthorized operation,

No operator shall operate any mobile equipment without authorization. All mobile equipment operators shall be appointed in writing by the contractor's authorized representative. No operator may be appointed without proof that the individual has been trained, tested, and found competent, or is currently licensed.

The appointment letter shall specify the type of mobile equipment for which authorization is being given and must clearly confirm that the operator:

- Is 21 years of age or older,
- Has undergone a medical examination and has been declared fit for work by an occupational medical practitioner, and
- Has received suitable training and has been found competent or is in possession of a valid driving license issued by a state, provincial or civil authority that is applicable to the class of mobile equipment that is to be driven or operated.

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The principal accountability for preventing related incidents lies with the operator of the mobile equipment, as he or she is in full control of any given situation at any given time. It must be stressed to each operator that safety is his prime responsibility, and this shall be clearly instructed and understood.

Operators shall be empowered to stop driving or operating immediately should an unsafe condition arise and refuse to drive or operate any mobile equipment that is defective and/or has any inoperative safety features. Similarly, supervision shall never force the operator to drive or operate defective mobile equipment.

If the operator does not adhere to the site rules and regulations, his or her appointment shall be withdrawn, and he or she shall not be permitted to continue with his or her duties. If necessary, site access will be denied (either temporarily or permanently) to any operator who is deemed to not be adhering to site requirements.

No person may drive or operate a light vehicle or item of mobile equipment if he suffers from a medical condition that places both him and those around him at risk of injury. A fit-for-work policy shall be in place, incorporating clearly defined maximum levels of drugs (including prescribed medication) and alcohol permitted in the system of a driver or operator. Daily alcohol testing and random drug testing shall be carried out. A system shall be in place to manage operator's fatigue.

A mobile phone, whether hands-free or not, may only be used by the operator of mobile equipment when the equipment is stationary and in a safe location. Behavior-based observations and coaching shall include operation of mobile equipment.

24. Traffic Management Plan.

A site-specific Traffic Management Plan, where required, shall be compiled and submitted to project management for approval. The plan shall include, but not be limited to, the following:

- Segregation of pedestrians, light vehicles, and mobile equipment where possible (using barriers where feasible),
- Systems to control the movement of mobile equipment in areas accessible to pedestrians, the movement of mobile equipment into and out of workshops, and pedestrian and light vehicle movement around mobile equipment,
- Setting appropriate speed limits for vehicle types, road surfaces and environmental conditions,
- Installation and maintenance of road traffic control signs,
- Right-of-way rules (including overtaking restrictions),
- Overtaking protocols,

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- Clear communication protocols for interactions between all vehicles and equipment,
- Procedures for light vehicles and/or mobile equipment entering hazardous or restricted areas,
- Standards for safe following distances based on operational circumstances, environmental conditions and near sight (blind spot) limitations of mobile equipment,
- The minimum safe distance to be maintained between light vehicles and mobile equipment (i.e. 20 meters unless positive contact is made),
- Designated parking areas for mobile equipment and light vehicles, including parking associated with maintenance areas,
- Parking procedures (e.g. Safe parking distances, safe parking locations, requirements for reverse parking, etc.),
- Systems to control approaching, refueling, parking, boarding and disembarking mobile equipment (a driver or operator must exit the cabin and must disembark the vehicle or equipment entirely when his direct involvement with maintenance or servicing is not required),
- Guidelines for abnormal road conditions (e.g. Heavy rain, fog, or high winds) providing "go/no go" criteria and contact details for the person(s) responsible for making the "go/no go" decisions,
- Truck loading and unloading procedures to avoid material or objects falling from the vehicle,
- Guidelines for wide or abnormal loads including offsite transport,
- Systems to control mobile equipment use in the vicinity of overhead power lines,
- There is a requirement for the flagmen duties.

The design and layout of the road system (including entrance and exit points, intersections, and other potential points of interaction between pedestrians, light vehicles, and mobile equipment) must be reviewed periodically.

A Risk Assessment must be carried out prior to any changes being made to traffic movements or road systems.

Designated walkways shall be provided for pedestrians, and pedestrians shall make use of these walkways. Good lighting must be provided along all walkways, particularly at road junctions. Wherever possible, rigid barricading must be used to separate pedestrians from moving light vehicles and/or mobile equipment.

The Act requires solid barricading, so no barricade tape and snow netting is allowed. These can be added for visibility, but then proper maintenance of the flapping flying pieces must be in place with good housekeeping.

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Controls must be in place to ensure the safety of people working on roads, including those working on broken-down vehicles. Ensure there are flagmen, spotters, riggers, etc. to execute the work safely. High visibility clothing must always be worn by all persons whilst on the project site.

Speed limits and traffic rules must be reviewed regularly and must be rigorously enforced. Local traffic rules must always be complied with.

25. Loading and Offloading of Containers and Material.

During loading and offloading of containers and material, the contractor shall adhere to the Task-Based Risk Assessment, Safe Work Procedure and Lifting Plan (for critical lifting) approved by project management. A competent rigger shall be appointed, and proof of competency with previous experience shall be presented.

Crane and/or truck mounted crane outriggers need to be operated in accordance with the operating manual for the equipment such as the safe handling of the vehicle where required and to keep non-essential people out of the lifting and/or stacking area.

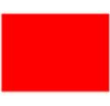
26. Signs and Notices.

The contractor shall ensure that all required safety signs and notices are prominently displayed in accordance with the General Safety Regulations and other applicable legislation.

All symbolic signs shall comply with SANS 1186-1. The standard shall be the reflective or night-suited one's glow in the dark, the metal and not plastic ones for better fastening and long-lasting i.e. project duration. All road traffic signs shall be in accordance with the South African Road Traffic Signed (SARTS) Manual.

No person may deface or damage any safety sign or notice. No person may remove or alter any safety sign or notice unless authorized to do so. Safety signs shall follow the standard as illustrated below:

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Shape	Meaning	Color	Examples
 Circle with diagonal bar	Prohibition	RED (contrast: white)	No smoking 
 Circle	Mandatory Action	BLUE (contrast: white)	Wear Eye protection 
 Equilateral Triangle	Warning	YELLOW (contrast: black)	Danger Flammable material 
 Square / Rectangle	Information about safe condition	GREEN (contrast: white)	Escape Route – Left 
 Square / Rectangle	Fire Safety	RED (contrast: white)	Fire Extinguisher 

27. Machinery.

The contractor shall ensure that all plant and equipment brought onto the site are:

- Appropriate for the type of work to be performed,
- Approved, inspected, tested, numbered, and tagged (if appropriate) before being brought onto site,
- Properly maintained according to the manufacturer's recommendations, and
- Placed on a register and checked at least once per month or as required by the applicable legislation.

The contractor shall supply, at his cost, all items of plant and equipment necessary to perform the work and must maintain all items in good working order as per the OHSa and where required CR, GMR, DMR, EMR, etc.

Should any plant or equipment become inoperable for a period and has or will have a significant impact on the work schedule, the contractor must, on instruction from project management, remove the out of service plant or equipment and replace it with similar fully operational plant or equipment at no additional cost.

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No item of plant or equipment delivered to site for use on the contract may be removed from the site prior to the completion of the contract without approval in writing from project management.

Items of plant or equipment brought onto site by the contractor may be inspected by project management. Should project management determine that any item is inadequate, faulty, unsafe or in any other way unsuitable for the safe and satisfactory execution of the work for which it is intended, the contractor shall, on instruction from project management, immediately remove the item from the site and replace it with a safe and adequate substitute. In such a case, the contractor shall not be entitled to additional payments or deadline extensions in respect of any delay caused.

28. Barricading.

All applicable legislation concerning barricading shall always be complied with. A contractor required to erect barricading on the project site shall develop, document, and implement Safe Work Procedures that are aligned with the requirements as detailed below and as shown on the relevant traffic accommodation drawings. Barricading shall be erected to:

- Prevent persons from making contact with an identified hazard,
- Provide warning of the existence of a hazard,
- Prevent unauthorized access (by people, vehicles, and mobile equipment) into an area where a hazard exists or where a hazardous activity is being carried out,
- Define the boundaries of a hazardous location and/or restricted area, and
- Allow a work team to perform hazardous tasks without persons unfamiliar with the hazard(s) accessing the area, including special temporary barricades for the x-ray, etc.

Although not limited to these situations, barricading shall be erected or installed:

- Around excavations where pipe trenches are located within built-up areas and where access is possible by members of the public,
- To protect openings and edges (to prevent persons from falling, all openings and edges associated with floors, stairs, and the open sides of buildings and structures during construction must be protected by sturdy, rigid barriers capable of withstanding a force of at least 110 kilograms applied in any direction at any point).
- To prevent access into areas where overhead work is in progress,
- To route vehicles safely through (or around) construction areas, and
- To protect members of the public who may be in the vicinity of work or construction site (by preventing access).

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In all cases, the erection of barricading shall be a temporary measure. It must only remain in place until the hazard is eliminated, or the potentially dangerous situation is rectified.

A barricade shall present a sturdy physical barrier to entering an area. Therefore, plastic cones, post, and chain systems, "danger tape" and "snow netting" shall not be accepted as barricading and may only be used for the purposes of low-risk demarcation.

Acceptable forms of barricading include:

- Hoarding panels (no less than one meter in height) that can be securely fastened together to form a fence line may be used. Hoarding panels may be constructed from a variety of materials (e.g. wooden board, steel sheeting, wire mesh on a steel frame, etc.),
- Wire mesh fencing (no less than one meter in height with sturdy posts spaced at intervals of no more than 3 meters) may be used in certain circumstances, e.g. Around excavations,
- Sturdy, rigid, and securely fixed (i.e. bolted, welded, clamped, etc.) Metal guard rails may be used, particularly for protecting openings, holes and edges associated with floors, platforms, walkways, etc. The top rail shall be positioned at a height of one meter above the working surface, and a mid-rail shall be provided,
- Concrete Jersey barriers shall be used for the routing of traffic and when work is being conducted in or alongside a roadway.

Regardless of the type of barricade used, the following requirements shall be met:

- The installation, alteration and removal of barricades shall be supervised by a competent person,
- The barricading shall be uniformly and intelligently configured,
- The barricading shall be stable, conspicuous, and effective,
- The barricading shall completely surround the work or hazardous area,
- General access requirements around work or hazardous area (such as pedestrian walkways, operational access, or general thoroughfares) shall be taken into consideration when erecting a barricade.
- There need to be always entrances and even emergency response sections created to allow safe entry and exit.
- No walking over or under any barricading should be able or allowed if proper access is given,
- The extent of the area that is barricaded shall be kept to a minimum so as not to unnecessarily restrict access to other areas. If access routes to other areas are blocked by the barricade, alternative routes shall be identified and signposted,

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- All barricaded areas shall have properly designated points of entry and exit for persons and/or vehicles. Each pedestrian access point shall be fitted with a closing gate. A sign indicating, "DESIGNATED ACCESS POINT - AUTHORISED PERSONNEL ONLY", shall be fitted to each gate,
- Additional signage providing warning of specific hazards (e.g. falling objects, electricity, etc.) Including, "NO UNAUTHORISED ENTRY", shall be attached to all gates and, where required, to the barricading itself. The signage shall be visible from all angles and shall be large enough to be read from a distance,
- Barricading shall always be clearly visible (day and night). If necessary, flashing warning lights shall be used,
- Tags shall be attached to the barricading displaying the name and cell phone number of the person responsible for the barricade and specifying the reason for the barricading,
- Should a person require access to a barricaded area, authorization must be obtained from the person responsible for the erection of the barricade. The hazards that are present and the Personal Protective Equipment that must be worn within the barricaded area must be communicated to the person seeking access,
- Each barricade shall be listed in a register, and each must be inspected daily to ensure that it is still intact and that its positioning is still effective. Barricading, like any other equipment, should be inspected on a regular basis by a competent person so it can be attended to daily/weekly and/or after inclement weather,
- All barricades shall be properly maintained and repaired as required,
- When the work has been completed and the hazard has been eliminated, all barricading shall be removed without delay. A barricade may not be left in place if no hazard exists,
- Before a barricade is removed (allowing general access), the area shall be inspected by the person responsible for the work that was carried out, to ensure that the area is once again safe. If applicable, the person accepting the area back for general use shall do so on completion of his own safety inspection, and
- Authorization to remove (or modify) a barricade may only be granted by the person responsible for the erection of the barricade.

29. Excavations.

All applicable legislation concerning excavation work shall always be complied with. A contractor carrying out excavation work on the project site shall develop, document, and implement Safe Work Procedures that are aligned with the requirements as detailed below.

All excavation work shall be properly planned. Site-specific conditions and hazards shall be considered, including traffic, overhead and buried utilities, proximity to nearby

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structures, soil properties, presence of surface and/or ground water, position of the water table, and weather conditions. Excavation work may only be carried out under the personal supervision of a competent Excavation Supervisor who has been appointed in writing in terms of CR 13(1)(a).

Before any excavation work is carried out, a Permit to Work authorizing the activities shall be obtained. Similarly, no person may enter an excavation unless a Permit to Work has been issued providing authorization for specific tasks to be carried out within the excavation. Before issuing a Permit to Work for excavation works, the Authorized Person (i.e. Permit issuer) must verify that:

- A detailed Risk Assessment has been conducted for the work to be performed.
- A Safe Work Procedure is in place, and
- No buried services are present in the area where the excavation works are to be carried out.

As a minimum, the Risk Assessment must consider hazards and risks associated with:

- A person being trapped or buried as a result of an excavation collapse,
- A person being struck by an object falling into an excavation,
- A person falling into an excavation,
- A person being exposed to a hazardous atmosphere within an excavation (i.e. an oxygen deficiency, explosive or flammable gases, and/or harmful concentrations of a contaminant),
- Contact with belowground services, and
- Mobile equipment and/or light vehicle movement in proximity to an excavation.

Prior to any excavation by machine, the contractor shall review all available service information, including GIS data and drawings and wayleaves indicating the position of existing services. Copies of available shapefiles and drawings will be made available by project management.

The GIS data and drawings are not certified as being accurate. The location of all services shall be independently verified by the Contractor as described below, with the contractor taking full responsibility for the location and protection of all existing services whether indicated or not.

The contractor shall undertake a Ground Penetrating Radar (GPR) survey along the full length of the pipeline route to verify the exact locations of services, which shall be identified in the field by suitable markers. Where such services are encountered, the contractor shall excavate trial pits and proving trenches by hand to locate and expose the service prior to any machine excavations.

The contractor shall ensure that any exposed services are suitably supported and protected before commencing with any excavations. Where machine excavations cannot

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be undertaken due to the proximity of any service, the contractor shall conduct excavations by hand or using hand-held tools.

All personnel working in or near any excavation shall wear high visibility protective clothing. Unexpected structures (e.g. Tanks, brick work, concrete work, etc.) or services (e.g. Cables, pipelines, etc.), as well as unusual conditions (e.g. inconsistent materials, voids, etc.), that are encountered during excavation work shall be reported immediately. All work must cease until project management provides authorization to continue.

If an excavation is more than 1.2 meters deep and people have to enter it, then the sides of the excavation must be suitably battered, benched, or shored, unless a registered professional geo-technical engineer confirms in writing that there is no risk of the excavation collapsing (i.e. That the sides of the excavation are stable without battering, benching or shoring).

If the sides of an excavation are battered (sloped), then this must be done at an angle that is suitable for the given soil conditions (to be determined by a registered professional geo-technical engineer). Access into the excavation must be as per the Construction Regulations but there needs to be stairs, scaffolding, slopes etc. for good access and emergency access and for transportation of goods by person and/or by vehicles.

When it is not possible to batter (or bench) the sides of an excavation to a safe angle, then the sides of the excavation must be suitably shored. Shoring may only be installed, altered, or removed under the personal supervision of a competent person using a predetermined safe method.

Only approved shoring systems and equipment may be used. Shoring requirements must always be determined and designed by a competent person for the specific conditions encountered at the excavation site.

All material removed from an excavation (spoil) must be placed no closer than three times the depth of the excavation away from the edges of the excavation. The profile of this spoil must be flattened out to prevent the material from being washed back into the excavation by rainwater.

Scaling must be carried out on the sides of all excavations to remove loose material. Protective shields or barriers must be erected (when required) between the sides of an excavation and the work area in order to protect employees from falling, rolling, or slumping rock, soil, or materials. Persons may not work on the faces (sides) of battered (sloped) or benched excavations at levels above other persons.

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Tools, equipment, and materials may not be placed within two meters of the edges of an excavation. Alternatively, a suitable retaining device may be used to prevent tools, equipment, and materials from falling, rolling, or sliding into an excavation.

No vehicle or item of mobile equipment is permitted near the edge of an excavation. Mobile equipment may not operate in or near an excavation whilst persons are working within the excavation.

To ensure that adjacent structures (such as buildings, walls, or sidewalks) remain stable during excavation work, support systems such as shoring, bracing, or underpinning must be provided if required.

Excavation below or near the base or footing of any foundation or retaining wall is prohibited unless:

- A support system (designed by a registered professional geo-technical or Structural engineer) is provided, such as underpinning, or
- A registered professional geo-technical engineer determines that the structure is far enough away from the excavation that no hazard exists.

If a hazardous atmosphere exists within any excavation (i.e. an oxygen deficiency, the presence of explosive or flammable gases, and/or harmful concentrations of a contaminant) or if there is a possibility that a hazardous atmosphere may develop, then the excavation must be declared a confined space. Furthermore, an excavation must be considered a confined space if any risk of entrapment or engulfment exists. If an excavation is declared a confined space, then all precautions and requirements pertaining to confined spaces must be implemented and complied with.

Internal combustion engines may not be used in or near the edge of an excavation unless the exhaust emissions are ducted away, or suitable mechanical (forced air) ventilation is used to maintain a safe atmosphere within the excavation.

Any water and/or sludge present within an excavation must be removed completely before any work commences in the excavation. Using ditches, dikes, sumps and pumps, or other suitable means, surface water must be prevented from entering an excavation and areas lying adjacent to an excavation must be adequately drained. If equipment is used to prevent water from entering an excavation or to prevent water accumulation within an excavation, then the equipment must be monitored by a competent person to ensure that it remains operational and effective.

Suitable lighting must be provided in and around any excavation in which work must be carried out at night. A high standard of housekeeping must be maintained in and around all excavations. Tools that are not in use and materials that are no longer required must

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be removed from an excavation to prevent these items from causing injury or being lost (buried). A register for all excavations must be compiled and maintained.

A competent person (i.e. an appointed Excavation Supervisor) must inspect each excavation as well as the areas around it:

- At the start of each day (or shift) before work commences within the excavation,
- After any alteration is made to the excavation or shoring,
- After rainfall,
- After any blasting activity carried out in the vicinity of the excavation, and
- After any event that may have affected the strength or stability of the excavation or the shoring.

An excavation must be inspected for collapses, signs of instability, failures, or signs of overloading of protective systems and equipment, hazardous atmospheres, water accumulation, and any other hazardous condition that may arise.

The sides of an excavation as well as the surface of the ground around the excavation must be carefully inspected for signs of instability including fissures (cracks), slumping, and bulging.

Shoring must be carefully inspected for signs of overloading (e.g. Distortion). If a hazardous condition is identified, no person may enter the excavation until suitable corrective actions have been taken and/or suitable controls have been put in place to either eliminate the hazard or reduce the risks to acceptable levels.

A record of each inspection (including date, time, findings, and signature of the Excavation Supervisor who carried out the inspection) must be captured in the excavations register. Each inspection record must include a declaration as to whether the excavation is safe to work in or not. All excavations must be monitored closely throughout each workday (or shift) by the Excavation Supervisor.

If an excavation has been declared a confined space, a safety observer (who will be able to initiate emergency response procedures if required and identify the location of any trapped or buried persons in the event of a collapse) must be stationed at ground level outside of the excavation whenever work is being carried out in the excavation.

If a hazardous condition is identified while work is being carried out in an excavation, then all persons in the excavation must be evacuated to safety without delay.

Under no circumstances may a person work alone in an excavation that is more than 1.2 meters deep without at least one other person being present in the immediate vicinity of where the work is being carried out.

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Excavations must be backfilled as soon as possible, and the material used (usually the original material) must be properly compacted. Where belowground services are present, the material used to backfill an excavation must be such that the services will not be damaged. A layer of screened material must be placed immediately above any buried service. An excavated area must be restored to its original condition if possible.

Explosives may not be brought onto the site unless the contractor has fully implemented all regulatory and legislative requirements for storage, handling and transportation of explosives.

30. Cranes and Lifting Equipment.

All applicable legislation concerning cranes and lifting equipment shall always be complied with. A contractor carrying out lifting operations on the project site shall develop, document, and implement Safe Work Procedures that are aligned with the requirements as detailed below.

30.1 Design, Manufacturing and Safety Features.

Before any crane or side boom is operated on the project premises (i.e. New to site), it must be formally accepted (authorized) by project management. The acceptance process must be based on an inspection and Risk Assessment and must take the crane or side boom safety features and cabin ergonomics (if applicable) into account. The same process must be followed before any crane or side boom is returned to service following any modification or repair. An Equipment Profile (dossier) must be compiled for each crane or side boom.

As a minimum, the design and manufacturing of each side boom used on the project premises must comply with the requirements of the relevant national and ISO standard.

For each crane or side boom, the manufacturer's operating manual must be available to the operator. All lifting hooks must be fitted with a safety latch to prevent the load from accidentally detaching. Each crane or side boom must be fitted with a load cell (with the mass of the load displayed in the visual range of the operator) and a load limiting device to prevent the crane or side boom from being operated outside of its safe working limits.

Under no circumstances may a load limiting device be bypassed or disconnected to lift a load that exceeds the rated capacity of the crane or side boom. Load limiting

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devices MAY NOT be used to "measure" or "test" the mass of a load. These are safety devices, and as such, should not be used as operating tools.

Only items of lifting equipment (tackle) that have been designed and manufactured with adequate factors of safety may be used on site. The following minimum factors of safety (with respect to the SWL) must be met:

- Ten (10) for natural-fiber ropes,
- Six (6) for synthetic-fiber ropes or woven webbing,
- Six (6) for steel-wire ropes,
- Five (5) for steel chains, and
- Four (4) for high-tensile or alloy steel chains.

30.2 Planning and Risk Assessment.

For each critical lift that must be carried out on site, a documented and detailed Lift Plan and Risk Assessment must be prepared to address all associated hazards. Only suitably qualified, competent, and experienced persons (lift planners) may evaluate critical lifts and prepare Lift Plans.

The lifting supervisor, crane operators, riggers, and spotters responsible for carrying out a critical lift must have input into the Lift Plan and Risk Assessment and must be consulted before these documents are finalized.

All lift planners, lifting supervisors, crane operators, riggers, and spotters (safety observers) must be appointed in writing. No critical lift may commence until the Lift Plan and Risk Assessment have been authorized by project management and a Permit to Work has been issued. Critical lifts include:

- All multiple (including dual) crane lifts,
- Lifts where the operational arcs of two or more cranes can overlap,
- Lifts over operating facilities where this may endanger personnel,
- Lifts over or adjacent to power lines,
- Any lift carried out in close proximity to equipment or a vessel containing a flammable or toxic substance,
- Lifts where the center of gravity of the load could change,
- Any lift where the total weight on the hook exceeds 20 tons,
- Lifts near the rated capacity of the crane (i.e. Exceeding 85% of the rated capacity at the working radius),
- Any lift when the wind speed (including gusting) exceeds 30 Km/h,
- Lifts involving a man basket (safety cage). DoEL has to give approval for the man cages before use with the required checks in place,

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- Lifts to and from water and use of life jackets and other equipment as the emergency response plan requires,
- Lifts requiring specialized equipment or involving complicated lifting or rigging configurations,
- Lifts requiring non-standard rigging or slinging techniques,
- Lifts involving the simultaneous use of more than one hoist on the same crane,
- Any other lift deemed to be critical by project management representative or assessed as critical during a Risk Assessment.

The Lift Plan for a critical lift must include:

- General information of the crane manufacturer, crane model, items to be lifted, and reason for lift,
- Lift data load weight, lifting block and hook weight, hoist rope weight, rigging weight, total weight, height of lift, radius of lift, surface area of load, and center of gravity of load,
- Rigging data sling material (chain, wire rope, or synthetic), sling diameter, sling length, sling configuration, sling capacity, hook type, shackle size and capacity,
- Lift computation boom length, jib length, radius of lift, crane capacity as configured, size of outrigger footplates, and wind speed.
- Proximity to power lines and process areas. Mobile cranes working in proximity to energized power lines must operate under a Permit to Work, which must define exclusion zones and spotter duties.
- Local Hazards and Controls including the route for the crane, ground stability, proximity of people or equipment, and agreed communication method, and
- Rigging diagram and a crane set-up diagram illustrating the positioning of the crane(s) in relation to surrounding structures and the initial and final positions of the load.

Lifts that are not subject to detailed Lift Plans (i.e. Lifts that are not considered critical) must nevertheless be subject to a Risk Assessment and be properly planned and executed. The use of a crane-suspended man basket (safety cage) may only be considered when all other avenues to safely perform the work (e.g. Scaffolding, mobile elevating work platform, etc.) have been exhausted.

Cranes used to lift or suspend personnel must be approved as suitable for this purpose. If a crane must be operated in proximity to energized overhead power lines (or any other exposed electrical conductors) then minimum clearance distances (specified by the electrical power utility or project management) must be observed. Whenever possible, power lines must be deenergized and isolated while lifting operations are carried out.

30.3 Operation.

At the start of every day or shift, the crane or side boom operator must carry out a pre-operation safety check using a prescribed checklist. The specific requirements of the pre-operation safety check (and associated checklist) must be based on:

- A Risk Assessment that addresses all aspects of safe operation of the crane or side boom, and
- The inspection recommendations of the manufacturer.

As a minimum, the pre-operation safety check must include:

- A thorough visual inspection of all wire ropes, chains, hooks and safety latches, hook blocks, sheaves, hydraulic hoses, electrical cables, and the general condition of the crane or hoist,
- Checks to confirm the serviceability of the operating controls,
- Tests to confirm the correct operation of all limit switches, emergency shutdowns, load indicators, alarms, and other safety devices, and
- A thorough visual inspection of all lifting equipment (tackle) to be used.

The operator must:

- Check for any loose or missing parts,
- Make sure that the wire rope (or chain) of the hoist is properly seated in its drum and sheave grooves without any slack or overlapping,
- Operate each control to make sure it functions properly, releases immediately, and does not stick. Each control must be labelled to indicate its function,
- Listen for any unusual mechanical noises and look for any jerky movements while operating the side boom several feet in each direction that it travels,
- Check the functionality of the upper and lower hoist limit switches (if applicable) by slowly raising and then lowering the block to trip the respective switches,
- Check all hooks. Hooks must not be cracked, stretched, bent, or twisted. Each hook must have a safety latch that automatically closes the throat of the hook. If the latch is bent, has a broken spring, or is otherwise damaged, it must be repaired before use. Hooks must rotate freely in the block assembly without any "grinding" felt or heard,
- Check the wire rope by lowering the block to its lowest level and looking for the following signs of damage:
 - ✓ Reduced rope diameter. This may indicate that the rope has been stretched, has lost its inner core support, or has worn outside wires.
 - ✓ Broken wire strands (any number).
 - ✓ Kinked, crushed, cut, or "bird caged" wiring, or wiring with heat damage.

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- Check all chains for damage including wear at contact points, cracks, or distorted links (bent, twisted, or stretched). All mechanical coupling links must be inspected to ensure that the linking pins are secure and in good condition. The capacity rating of each chain must be adequate for the load and the attachment method, and
- Check the condition and capacity of wire rope and synthetic web slings. Capacity ratings must be legible on the manufacturer's label. The capacity of the sling being used must be adequate for the load and the attachment method. A sling must be replaced immediately if it is excessively worn.

The operator must report any fault, defect, or damage to his or her supervisor immediately. A crane or side boom must not be operated if any safety device is out of order or defective, or if any rope, chain, hook, or other component is worn or damaged. Completed checklists must be made available (on request) for inspection by interested parties.

All lifting operations must be supervised by suitably qualified, competent, and experienced supervisors. An effective method of communication between the side boom operator and those assisting with the lift must be in place. Documented Safe Work Procedures must be in place to ensure the following:

- Access into an area where lifting operations are being carried out must be restricted. Such an area (i.e. where there is a risk of a load falling and striking a person) must be barricaded and only authorized persons may enter (i.e. those directly involved with the lifting operations). Warning signage must be conspicuously displayed,
- Where a load is being moved from one location to another (i.e. lifting operations are not being carried out in a discrete area that can be barricaded), measures must be taken to ensure that all persons in the path of the suspended load are made aware of the approaching hazard and that they move, and remain, well clear of it. All persons potentially affected must be given warning before the load is lifted,
- A lift must be directed and controlled by a single person (a suitably qualified, competent, and experienced rigger),
- Dedicated spotters must be in place during lifting operations to observe and provide warning (if necessary) to prevent incidents and ensure that safety protocols are adhered to,
- Before commencing with a lift, it must be verified that the load being lifted is both within the rated capacity of the crane or side boom and within the limits set out in the Lift Plan and/or Risk Assessment. The rated load capacities of the crane or side boom, rope, chains, slings, or other components may never be exceeded,
- Only certified lifting equipment (tackle) may be used to lift a load,

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- No equipment (tackle) that has been used for towing may be used for lifting operations,
- Only an approved material box (skip box) may be used for lifting loose items or materials,
- Before commencing with a lift, it must be verified that no safety devices (including load limiting devices) have been bypassed, overridden, or disconnected,
- To prevent the load from swinging as it is lifted, the hoist must be centered over the load (when using slings or chains) or positioned directly above the lifting point of the load,
- Two full wraps of rope must always remain on the hoisting drum. If a lower hoist limit switch has been fitted, and it is working correctly, it should not be possible to lower the block below the point where less than two full wraps of rope are on the drum,
- Before commencing with a lift, it must be verified that all rigging connections are correct and secure. Slings, chains, or other lifting devices must be fully and securely seated in the saddle of the hook,
- Slack must be removed from the slings, chains and/or hoisting ropes before lifting the load. It must be ensured that multiple lines are not twisted around each other and that the hoist rope is not wrapped around the load,
- To ensure that the load is properly secured and balanced, it must initially only be lifted a few centimeters. Slings must be repositioned if required,
- Before moving a suspended load, it must be lifted high enough to clear all obstructions. The load must only be lifted to the height necessary to clear obstructions, and no higher,
- Directional movement must be made smoothly and deliberately (there must be no sudden acceleration or deceleration of the moving load). Abrupt, jerky movements of the load in any direction must be avoided,
- A suspended load must always be monitored closely,
- A load MAY NOT be moved over, or be suspended above, any person or any occupied building. No person may walk beneath, or position himself below a suspended load,
- No person may be positioned between a suspended load and a solid object where there is a risk of being crushed should the load swing,
- No person may be positioned within the radius of the boom of a crane unless directly involved with the lift,
- Under no circumstances may any person ride on a hook or on a load,
- No load shall be left suspended unless the operator is at controls and is monitoring the load. In such a situation, the load must be kept as close as possible to the ground or floor to minimize the possibility of injury should the load drop. The suspended loads must be brought down to a stable position. In an emergency special permission has to be given for a load to be left hanging but should be able to be lowered down safely,

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- The controls of any lifting equipment may never be left unattended while a load is suspended. If it becomes necessary to leave the controls, the operator must lower the load to the ground or floor. Follow the correct procedure in an emergency to leave the area safe,
- Load spreaders or packing under the outriggers must be used irrespective of the underfoot conditions,
- Before a crane or side boom is moved into position to carry out a lift, the area must be inspected by a suitably qualified person who must verify that the underfoot conditions are satisfactory,
- Unauthorized use of the crane, side booms or hoists must be prevented by removing the keys, locking the cabin, isolating the controls, etc. when lifting operations have been completed,
- When not in use, lifting equipment must be stored off the ground and must be protected from the elements (rain, harsh sunlight, etc.) and contamination (dust, solvents, and other chemicals) in order to prevent damage and/or deterioration, and
- A side boom or an item of lifting equipment may only be used for the purposes for which it was designed.

30.4 Inspection, Testing and Maintenance.

Any crane or side boom and other items of lifting equipment brought onto the project premises must have a current test certificate and record of inspection as well as a suitable checklist (derived from the manufacturer's inspection recommendations) for use by the operator(s) when carrying out pre-operation safety checks and as per the DMR 18 Approved Inspection Authority.

A register of cranes or side booms and other items of lifting equipment (tackle) brought onto the project premises must be compiled and maintained.

Each crane or side boom and other items of lifting equipment must have a unique identification code or number, which must be referenced in the register. For each crane or side boom and other items of lifting equipment, the following documentation must be kept on site and must be made available (on request) by interested parties for inspection:

- Test records and certificates,
- Inspection records,
- Maintenance records, and
- Details of any modifications or repairs made as per the engineering design and inspection reports for modifications.

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All cranes or side booms and other items of lifting equipment must be inspected, tested, and confirmed fit for purpose (i.e. Safe for use):

- Before being operated or put into service,
- Before being returned to service following any repair or modification, and
- Periodically as follows (unless local regulations require examination more frequently):
 - ✓ Each crane or side boom and other item of lifting equipment (including all ropes, chains, hooks or other attaching devices, sheaves, brakes and safety devices that form an integral part) must be thoroughly examined by a competent, experienced and appointed person every 6 months,
 - ✓ Each crane or side boom and other item of lifting equipment must be subjected to an annual performance test (i.e. A load test) by a competent, experienced, and appointed person, and
 - ✓ All lifting tackles must be thoroughly inspected by a competent, experienced, and appointed person every 3 months.
- The system of inspection and testing must provide verification that each Side boom and items of lifting equipment is able to function to its design specifications, and must verify the integrity of:
 - ✓ Mechanical and electrical components,
 - ✓ Controls,
 - ✓ Cables and all lifting attachments,
 - ✓ Structural components including boom, hoist, brakes, wheels, hooks, baskets, out-riggers, hook-blocks, and rails, and
 - ✓ Load limiting devices, hoist limit switches, alarms or warning devices, and other safety devices and control systems (including independent fail-safe braking systems, devices to stop the crane or hoist such as a dead man's switch, and emergency shut-off switches) as per the DMR 18.

A preventative maintenance system must be implemented to ensure that all cranes or side booms and other items of lifting equipment are maintained in a safe and serviceable condition. For any crane or side boom and other item of lifting equipment, all inspections, testing, maintenance and repairs must, as a minimum, be carried out in compliance with the requirements and specifications of the manufacturer as well as all applicable regulatory requirements (in terms of both the frequency of inspection, testing and maintenance, and the physical condition of the crane or hoist).

Repairs shall only be carried out by competent persons. After repairs have been made, it must be tested and recertified fit for purpose (unless the repairs did not affect the integrity of the lifting mechanism).

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As per the DMR 18, any modifications must be subject to the approval of the original equipment manufacturer and a rigorous change management process. Each item of lifting equipment (tackle) must be tagged following each quarterly (3-monthly) inspection. Details of these inspections must be recorded in the lifting equipment register which must be made available to project management or other interested parties on request.

The following color-coding system must be used for the tagging of all lifting equipment:

Quarter	Colour
January - March	Blue
April - June	Red
July - September	Green
October - December	Yellow

The tag placed on an item of lifting equipment must be traceable to an entry in the lifting equipment register where the following information concerning the inspection of that item of equipment must be recorded:

- Item description,
- Unique item identification code or number,
- Item owner,
- Item location,
- Date of inspection,
- Name and signature of competent person who carried out the inspection, and
- Any comments concerning the inspection.

Any item of lifting equipment that is found to be damaged or defective must be removed from service (and tagged, "out of service") immediately and must then either be repaired and recertified (if possible) or destroyed to prevent further use. Similarly, any lifting equipment that is known (or is suspected) to have been overloaded must be removed from service immediately and destroyed to prevent further use. If an item of lifting equipment is removed from service or destroyed (scrapped), this must be indicated in the lifting equipment register. Any item of lifting equipment without a tag or with an out-of-date inspection may not be used.

30.5 Training and Competency.

Only suitably trained, competent, and experienced persons who have been authorized in writing by the contractor's project or construction manager are permitted to:

- Evaluate and plan critical lifts,
- Supervise lifting operations,
- Operate side booms and other lifting equipment,
- Use lifting equipment, and rig (sling) loads,
- Provide signals for controlling lifts, and
- Inspect, maintain and testing of such equipment.

Each operator must meet the competency requirements for the class or type of equipment to be operated.

31. Fall Protection.

Whenever there is a risk of falling from heights, falling onto dangerous equipment or machinery or falling off any equipment or machinery, or whenever work must be carried out adjacent an opening through which (or an edge over which) a person could fall, no work may commence unless the contractor has the following in place:

- A Fall Protection Plan (prepared by a competent person, approved by the SHEQ Specialist or designated personnel and implemented by the contractor).
- A detailed Task-Specific Risk Assessment has been carried out.
- A Safe Work Procedure for the task to be performed.
- A Permit to Work has been obtained, and
- Each person has been provided with suitable fall protection equipment. The safety harness requirements are double lanyard, with length determination as per risk, possible one with added leg straps for hanging.

Fall protection equipment (either fall restraint or fall arrest equipment) must always be used whilst the work is being carried out. To prevent persons from falling, fall restraint equipment must be used whenever work must be carried out adjacent to an opening through which (or an edge over which) a person could fall.

Fall arrest equipment must be used whenever the potential exists for a person to fall from heights. The fall arrest equipment should be the first (prevention from falling) and secondly the fall rescue if the person has fallen then rescued.

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A person has been provided with suitable fall protection equipment if he is secured by means of an approved full body harness (well fitted) with two shock absorbing lanyards or an inertia reel (when fall arrest equipment is required) or two short restraining lanyards (when fall restraint equipment is required), double or triple action snap hooks (or karabiner type rings), and secure anchorage points (a person's lanyard may be attached either directly to an anchorage point or indirectly through the use of a variety of systems that incorporate a lifeline). A dual lanyard system must be used to ensure that at least one connection point is always maintained. Practice 100% tie off whenever required.

Note: While selecting fall arrest equipment, care must be taken to ensure that the potential fall distance is greater than the height of the person plus the length of the lanyard with its shock absorber deployed (taking the height of attachment into account).

Anchorage points must, where practical, be above the head of the person, and must ensure that in the event of a fall the person will neither swing nor touch the ground. All permanent anchorage points must be designed and approved by a professional structural engineer.

All anchorage points must be periodically inspected and tested by a competent person to ensure that they are secure and can support the required load. A system must be in place to identify anchorage points as authorized for use. Temporary anchorage points (and lifeline systems) may only be used if a competent person has certified them safe to use.

If an elevating work platform is used, such equipment must be fitted with a fixed anchorage point for the attachment of fall protection equipment and be secured for the emergency rescue requirement of 2 x 120 kilograms.

The use of fall protection (fall restraint or fall arrest) systems must be avoided wherever and whenever possible through design, the installation of physical barriers that protect persons from falling and employing alternative methods of working. Only if physical barriers protecting against free falls cannot be installed must fall protection equipment be used.

Fall protection (fall restraint or fall arrest) systems are items of personal protective equipment and, if required, must be purchased and provided to employees. Where special training for the type of harness is required, the necessary certificate must be issued.

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Prior to commencing with any work at height, an assessment must be conducted to determine if the work requires the use of fall protection equipment, and if so, which fall protection system is the most appropriate for the work.

There must be a system for ensuring that fall protection equipment is:

- Tested and certified for use,
- Inspected by the user before use,
- Destroyed following a fall or where inspection has shown evidence of excessive wear or mechanical malfunction, and
- Regular emergency response drills are to be performed and recorded and communicate the findings.

All persons that are required to work at height (to carry out routine or non-routine tasks) must first be trained and certified competent to do so. Furthermore, each person must be in possession of a valid medical certificate of fitness specifically indicating that the person is fit to work at height.

All persons required to use personal fall protection equipment must be trained and certified competent in the correct selection, use, maintenance, and inspection of such equipment.

All fall protection equipment must be thoroughly inspected monthly by competent persons appointed in writing and each item of equipment must be tagged to show when it was last inspected. All inspections must be recorded in a register. On finding defective or damaged equipment, appropriate action must be taken by the competent person (i.e. the destruction of the equipment to prevent further use).

Persons making use of personal fall protection equipment must do so in strict accordance with the instructions or requirements specified by the manufacturer or supplier of the equipment or system. Specific pre-use inspection, maintenance and fitting protocols must be established in accordance with the manufacturer's requirements or guidelines and these protocols must be followed by all users of the fall protection equipment. Ensure special places for storage during lunch and after shift.

Solvents may not be used to clean fall protection equipment. Only manufacturer approved cleaning solutions may be used. No person required to use personal fall protection equipment may work in isolation (a minimum of two persons working together is required). Competent supervision must always be in place for all work carried out at height. Supervisors must be appointed in writing.

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Emergency response (rescue) procedures for the rapid retrieval of suspended persons in the event of a fall from height must be prepared and tested.

Note: Even though there is no risk of free fall, fall protection equipment may be required in situations where there is a risk of falling, slipping or sliding down a slope of more than 45 degrees.

Note: The maximum service life of fall protection equipment manufactured of synthetic fiber shall be 5 years from the date of first use and/or manufacture unless otherwise specified by the manufacturer.

A person may climb or descend a ladder without fall protection if he is able to use both hands and legs to do so, faces the ladder, and uses one step at a time. The ladder must be tied off or supported at its base. Always maintain three-point contact and special bags for the tools and equipment.

31.1 Risk Assessment and Permitting.

The following documentation is required for any work where fall protection is required (i.e. where a risk of falling exists):

- A Fall Protection (and Rescue) Plan.
- A Risk Assessment for the task to be performed.
- A Safe Work Procedure for the task to be performed, and
- A Permit to Work.

As part of the Risk Assessment and planning processes, the following must be considered:

- Hazards relating to accessing the location at height,
- The nature of the work location,
- The nature of the work activities to be undertaken at height,
- Environmental and weather conditions,
- The presence of nearby persons who may be at risk due to falling objects (potentially) or whose activities may be affected by the work being performed at height,
- The selection of fall protection equipment (considering fall clearances) and/or access equipment,
- The selection of anchorage points,
- The load ratings of access platforms, work areas, anchorage points, etc,
- The condition of supporting structures such as roofs,

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- The need for the work to be carried out by multiple persons and the means of communication,
- A rescue plan that addresses retrieval or rescue contingencies,
- Working above open furnaces or molten metal,
- Exposure to heat sources,
- Any other conditions that may affect the safe execution of the task.

32. Permit to Work.

All personnel must comply with the Permit to Work system applicable to the project. A Permit to Work must be obtained before carrying out any work that involves:

- A hazardous energy source or system, including electricity, compressed fluids (e.g. hydraulics and pneumatics), hazardous chemical agents (e.g. toxic, corrosive, flammable or explosive gases and liquids), heat, radiation, and machinery or materials with potential energy (gravitational and elastic) isolation and lockout may be required,
- Confined space entry,
- Working at height,
- A critical lift,
- Hot work outside of designated workshops,
- Excavation, or
- A service (e.g. water supply, fire suppression systems, etc.).

Note: A Permit to Work may only be issued by an Authorized Person and may only be received (or accepted) by an appointed Applicant (see Definitions).

Each Permit to Work that is issued must refer to an approved Task-Based Risk Assessment for the work that is to be carried out.

The Permit to Work system that is employed must incorporate the following basic procedures:

- Prior to meeting with the Authorized Person, the Applicant must familiarize himself with all of the hazards associated with the system, plant, equipment, structure, or area on or in which the work must be performed. He or she must also consider the risks that may arise because of the tasks that will be carried out. A Task-Based Risk Assessment must be in place.
- The Applicant must then request permission to carry out the work and must meet with the Authorized Person to discuss and document the scope of the work as well as the hazards, risks, and associated control measures. Isolation and lockout requirements must be identified (if applicable). The isolation and lockout process

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must be initiated by the Authorized Person who must contact the necessary Isolation Officers.

Note: The Applicant must ensure his or her own safety and that of his team and has the right to accompany the Isolation Officers to verify that all of the necessary locks have been fitted to all of the isolation and lockout points in accordance with the applicable plant or equipment-specific Isolation and Lockout Procedure.

- Once all of the necessary isolations have been completed and the necessary Clearance Certificates have been issued by the Isolation Officer(s) (if applicable), and the Authorized Person is satisfied that the system, plant, equipment, structure or area is safe to work on or provided all identified precautions are observed by the Applicant, then he must issue (sign) the Permit to Work to the Applicant.
- The Applicant must accept (sign) the Permit to Work. If equipment has been isolated, the Applicant must attach his Personal Lock to the relevant Isolation Bar (or Local Isolation Point) and must ensure that every other person working on the isolated equipment also attaches his or her Personal Lock to the Isolation Bar (or Local Isolation Point) before starting any work,
- Before commencing with any work, the Applicant must discuss the hazards, risks, control measures, precautions and limitations as stated in the Permit to Work (and associated Task- Based Risk Assessment) with all personnel who will be carrying out the work. A register must be kept, and all personnel must sign the register once they have been briefed by the Applicant.
- The work performed must be limited to what is described in the Permit to Work.
- When a particular employee has completed his work, he must sign the personnel register to this effect and (if applicable) must remove his Personal Lock from the Isolation Bar (or Local Isolation Point).
- Once all work is complete, the Applicant must:
 - ✓ Ensure that all machine guards have been replaced,
 - ✓ Ensure that all tools and materials have been removed from the work area,
 - ✓ Ensure that the work area is clean and tidy,
 - ✓ Ensure that all Personal Locks (including his) have been removed from the Isolation Bar or Local Isolation Point (if applicable),
 - ✓ Inform the Authorized Person that the work has been completed, and
 - ✓ Sign off the Permit to Work.
- Once the work is complete and the Applicant has signed off the Permit to Work, the Authorized Person must:
 - ✓ Ensure that the relevant Isolation Officers perform all of the necessary de-isolations (if applicable).
 - ✓ On completion of the de-isolations, sign off the Permit to Work accepting the system, plant, equipment, structure, or area back for service; and

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- ✓ Inform all relevant personnel that the system, plant, equipment, structure, or area is ready to use.

Where the work must continue over more than one shift, the Permit to Work must be reviewed at every shift change by an Authorized Person. If the scope of work has changed, the permit must be cancelled and a new permit must be issued.

If any of the original conditions or precautions pertaining to the work is not being complied with, are no longer adequate or is no longer applicable, the Authorized Person must cancel the Permit to Work and must ensure that all work stops until full compliance with either the original or amended (as required) conditions and precautions is achieved and a new permit has been issued.

The Applicant must ensure that the Permit to Work (including the personnel register) is kept where the work is being carried out (i.e. posted on a portable Health and Safety Management Information Notice Board) and that the work is monitored against the permit conditions.

All Permit to Work records must be retained and must be made available for inspection when required. The implementation of the Permit to Work system applicable to the project must be audited on a regular basis by project management. Furthermore, planned task observations must be carried out periodically.

32.1 Isolation and Lockout.

Isolation and Lockout Procedures that make it impossible to inadvertently energize any system, plant or equipment so isolated, must be in place for all work where hazardous energy sources exist, including electricity, compressed fluids (e.g. hydraulics and pneumatics), hazardous chemical agents (e.g. toxic, corrosive, flammable or explosive gases and liquids), heat, radiation, and machinery or materials with potential energy (gravitational and elastic). These procedures must be strictly enforced.

All personnel must comply with the Isolation and Lockout System and Procedures applicable to the project. All Isolation and Lockout Procedures must incorporate the following basic requirements:

- The issuing of a formal Permit to Work for any work that requires the isolation of any system, plant, or equipment,
- The use of defined Equipment, Discipline and Personal Locks (see Definitions), and multiple lockout systems (i.e. Isolation Bars and lockout hasps),

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- Clear identification of all isolation and lockout points ensuring there is no duplication,
- Isolation of the main energy source,
- The use of slip plates or the blanking off of pipelines or ducting, in addition to the chaining and locking of valves, as determined by a risk assessment.
- Suitable methods of preventing the movement of equipment, and
- Methods to test the effectiveness or completeness of the isolation.

Note: No work may commence on a system, plant, or equipment until a Permit to Work has been issued by an Authorized Person.

Note: A Permit to Work may only be issued by an Authorized Person once all required Clearance Certificates have been issued by appointed Isolation Officers.

The Isolation and Lockout System that is employed must incorporate the following basic procedures:

- In accordance with a system, plant or equipment-specific Isolation and Lockout Procedure, an appointed Isolation Officer(s) must isolate all points that need to be isolated in order to render the system, plant or equipment safe to work on. An Equipment Lock (and a suitable, highly visible warning tag) must be attached to each isolation point.
- On completion of an isolation (and lockout), the Isolation Officer must clear the area of all persons and must then carry out tests to ensure that the isolation is effective. Special care must be taken to ensure that the attempted starting of the equipment has not been deactivated by another interlock forming part of the system, or by a different up-stream isolation. Alternatively, appropriate equipment may be used to test energy (e.g. voltage verification or continuity tests). Note: In the case of electrical isolation, a test for voltage must be carried out, after the switching device, to ensure the absence of voltage.
- The Isolation Officer must place the key to the Equipment Locks on an Isolation Bar (at a Lockout Station) and must then attach a Discipline Lock (to prevent the key from being removed) before issuing a Clearance Certificate.
- The Discipline Lock must remain in place when handing over to subsequent shifts. All Discipline Locks for a particular discipline (e.g. low voltage electricity) must be keyed-alike so that any Isolation Officer appointed for that discipline (and issued with a key) can open any of the Discipline Locks used for that discipline. This enables an Isolation Officer to de-isolate equipment that may have been isolated by another Isolation Officer during an earlier shift. Appointed Isolation Officers for a particular discipline are the only persons permitted to hold keys to the Discipline Locks used for that discipline.

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Note: Local isolations do not require the use of Equipment Locks (a Discipline Lock may be attached to the Local Isolation Point by the Isolation Officer, followed by the necessary Personal Locks).

Note: For local isolations, if the Isolation Officer is the only person who will be working on the isolated equipment, then he must attach his Personal Lock to the Local Isolation Point.

- Once all required Discipline Locks are in place (i.e. attached to the Isolation Bar) and all Clearance Certificates have been issued, the Permit to Work may be issued by the Authorized Person.
- Each person who will be working on the isolated system, plant or equipment must then attach his or her Personal Lock to the Isolation Bar before starting any work (including the Isolation Officer, if he intends to work on the isolated unit).
- The attachment of a Personal Lock to the Isolation Bar prevents the removal of the key to the Equipment Locks even if the Discipline Lock is removed.
- When called (by an Authorized Person) to de-isolate the system, plant or equipment (on completion of the work under the Permit to Work), the Isolation Officer must ensure that all Personal Locks have been removed from the Isolation Bar before removing the Discipline Lock and the key to the Equipment Locks.
- Before removing the Equipment Locks and de-isolating the energy source, the Isolation Officer must inspect the system, plant or equipment that was worked on to ensure that it is safe to perform the de-isolation. This includes guard inspections, housekeeping, ensuring that all doors and covers are in place, and most importantly, ensuring that no persons are present.
- Once all Equipment Locks have been removed and the system, plant or equipment is safe for use, the Isolation Officer must cancel the Clearance Certificate and inform the Authorized Person that the unit has been deisolated.

Where a system, plant or equipment is sequence interlocked and a hazard could be created through the inadvertent start up or shut down of a system, plant or equipment before or after the unit is to be worked on, then that system, plant or equipment must also be isolated and locked out. Redundant or out of service equipment must, in addition to being isolated and locked out using the relevant Discipline Lock, be fitted with a tag indicating why it is out of service, who performed the lockout, and the hazards associated with that equipment.

Where it is necessary to work on live equipment for the purposes of commissioning, testing, adjusting and sampling, such work must be carried out in accordance with a written Safe Work Procedure and controls must be in place to prevent unauthorized access into the work area.

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The implementation of the Isolation and Lockout System and Procedures applicable to the project must be audited on a regular basis by project management. Furthermore, planned task observations must be carried out periodically.

32.2 Personal Locks.

A Personal Lock must be such that it can only be unlocked by the person to whom it belongs. Combination locks may not be used. A Personal Lock, as well as the key(s) to the lock, must be kept under the exclusive control of the person to whom the lock belongs.

A Personal Lock must be issued to each person who requires one, and the person's details must be clearly and permanently engraved directly onto his Personal Lock. Alternatively, a thick durable plastic identification tag may be used that clearly displays the company's name, the employee's name, the employee's company number, and a contact telephone number (the tag must be securely fastened to the Personal Lock). Where the above is handwritten, it must be done using a permanent marker pen and it must be legible.

Each person issued with a Personal Lock must be trained and certified competent in the correct use of such a lock.

A Personal Lock may NEVER be removed by anyone other than the person to whom it belongs, except if the removal (cutting) of the lock is authorized by the nominated project management representative (in the absence of this person, authorization can only escalate upwards).

Furthermore, the removal of the lock must be done under the personal supervision of the nominated project management representative, and in accordance with a written procedure. The removal (cutting) of a Personal Lock may be required if the person who applied for the lock is unable or unavailable to remove it on completion of the work (e.g. lost his key, failed to remove his lock before going home, etc.).

33. Electrical Safety.

All electrical work must be carried out by competent personnel in accordance with all legal requirements, codes, design criteria and safety standards applicable to the project.

Each contractor carrying out electrical work on the project site must develop, document, and implement Safe Work Procedures that are aligned with the requirements of this Health and Safety Specification and applicable legislation.

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All persons who will be carrying out electrical work must be certified against the requirements of job and equipment-specific electrical competency standards for the project, which must address job and equipment-specific Safe Work Procedures.

Each person potentially exposed to electrical hazards must receive electrical training at the commencement of his employment on site and thereafter on an annual basis. The training must address the equipment and conditions specific to the area where the individual will be working. The training material must be documented, and training records must be kept. Adhere to the Electrical Classifications and always issue the certificate of compliance.

33.1 Arc Flash Safety.

Depending on the scope and nature of the work, a documented arc flash protection programme must be in place that specifies:

- The methodology for calculating incident energies and determining flash protection boundaries, and
- The PPE required (specific to a task and the equipment on which the task is performed) and associated procedures to mitigate the hazard.

The method of calculation must be based on regional electrical code requirements, or if none exist, the Institute of Electrical and Electronics Engineers (IEEE) Standard 1584, or the United States National Fire Protection Association "Standard for Electrical Safety in the Workplace" (NFPA 70E), or published equivalent.

An Arc Flash Hazard Assessment must be carried out based on accurate and current data. All electrical cabinets where the potential for an arc flash hazard exists must be labelled in accordance with the hazard assessment and the potential incident energies calculated.

A process must be in place for updating the Arc Flash Hazard Assessment and labelling as changes and electrical upgrades occur that might affect the available short circuit current on the system. In order to mitigate the hazard, Safe Work Procedures must be in place and all persons potentially exposed to arc flash hazards must be trained in these Safe Work Procedures and must be supplied with appropriate arc flash PPE.

33.2 High Voltage Power Lines.

Before any mobile equipment (such as a crane, bulldozer, back-actor, boom truck or drill rig) is mobilized to a work site, an assessment must be carried out (including a

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thorough inspection of the work site and the access route) to clearly identify any overhead or underground power lines. Contractor to do a site visit and to prepare drawings of the services.

A system must be in place to mitigate the risks associated with working near power lines and suitable measures must be taken to prevent personnel or equipment from coming into contact with power lines. Extreme caution must be exercised. Where possible, exclusion zones (based on minimum clearance distances specified by the electrical power utility or project management) must be created with rigid barriers and warning signs.

Only in exceptional circumstances, and then only after a detailed Risk Assessment has been approved, all necessary mitigation or control measures are in place (including the use of a spotter), and a Permit to Work has been issued, may equipment be operated within one boom length of energized overhead power lines. Suitable protective insulating barriers may need to be used.

If possible, the power lines must be de-energized and isolated while the work is carried out. All equipment operators and rigging personnel must be trained in the hazards and the applicable safe approach distances (exclusions zones) associated with overhead power lines.

A procedure must be in place for the evacuation of mobile equipment or a vehicle in the event of accidental contact with power lines. All operators must be trained in this procedure and must follow it implicitly.

Scaffolding may not be erected within 5 meters of power lines or overhead track equipment.

33.3 Portable Electrical Equipment.

Prior to site establishment, each contractor must provide a complete inventory of all portable electrical equipment that they intend to use on the site (including plant, machines, appliances, generators, hand tools, lighting, extension cords, etc.). The nameplate data for each item of equipment must be included.

All portable electrical equipment to be used on the site must be supplied and maintained in a serviceable condition. Any electrical equipment that is in poor condition or is not in proper operating order may not be used. Any electrical equipment that project management deems to be unsafe or unsuitable must be removed from site.

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Electrical repair work or diagnostic work on electrical equipment may only be performed by personnel who are competent and authorized to perform this work (i.e. qualified electricians). Except for double-insulated equipment, all electrical equipment must have an equipment grounding (earthing) conductor that connects the frame of the equipment being utilized to the grounding (earthing) conductor of the electricity supply system. The extension cords used by contractors should be those that can be switched off when plugging or unplugging, or there must be a very good earth leakage system in place. Also, the generator system must have a safe earthing and/or tripping device.

All electrical equipment and all electricity supply systems used (including generators) must be inspected and tested by a registered and competent electrician to ensure that all equipment is properly grounded (earthed).

All electrical equipment used on site must be supplied with electricity through (i.e. must be protected by) an approved and tested residual current device (or earth leakage device or unit). If a socket outlet does not have a residual current device in the circuit, a portable residual current device must be used. Outlets without residual current device protection must be labelled as such. Any electrical equipment that causes an earth leakage device to trip or deactivate the circuit may not be used again until an electrician has inspected and tested the equipment and has recorded in a register that the equipment is safe to use. Contractors have to make sure that no equipment will trip and or cause a trip back in the MCC or any of the client's equipment or sub-stations, so proper protection on welders, motors etc. must be well designed, constructed and installed with certificates of compliance.

Interlocks may never be removed or modified, and fuse terminals may never be bypassed to keep current flowing in any circuit.

All generators must be fitted with suitable overcurrent protective devices (i.e. circuit breakers or fuses). All generators must be used in compliance with the manufacturer's requirements. Any proposed modification to a generator must be authorized in writing by the manufacturer prior to the modification being made.

Each welding machine used on site must be fitted with a Voltage Reduction Device (VRD). If this is not practical (i.e. for arc welding processes other than stick welding), a dead man's (isolation) switch in the electrode circuit (operated by a trained observer) may be used as an alternative. All welding machines must be properly grounded (earthed).

All portable electrical hand tools used on the site must be double insulated. Electrical equipment must be disconnected or unplugged when not in use. Portable lights must be stable, and each light bulb must be protected by a substantial guard. Temporary

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festoon lighting must be double-insulated and must be supported at least 2.5 meters above the floor, if possible. The cables must be up and out of the way and/or buried in some manner to prevent tripping and or electrical damage or be damaged by vehicles etc.

Handheld lights must be of all-insulated type and must be extra low voltage (i.e. not exceeding 32V). 120V or 240V handheld lights are not permitted. Any lighting used in hazardous locations (i.e. potentially explosive atmospheres, confined spaces, and damp or wet areas) must be operated at a maximum of 32 volts, unless earthed and protected by earth leakage devices. No person may wear a watch or any jewelry or carry any metal objects such as a lighter or keys, while working on any electrical system or equipment. No person may work on or use electrical equipment if his or her clothing is wet, or any part of his body is in contact with water.

No person may handle electrical equipment, equipment cords or extension cords with wet hands or if the floor or ground surface is wet. Fire extinguishers filled with carbon dioxide must be used to fight electrical equipment fires (water may never be used). If possible, the electrical equipment should be de-energized before fire-fighting activities commence. When cleaning or performing maintenance work on an item of electrical equipment, the equipment must be unplugged.

Equipment may not be unplugged while that equipment is switched on. Nor may equipment be plugged into a receptacle (socket) with the equipment's switch turned on. Electrical equipment that has a defective plug or wiring may not be used. Repair work to defective or damaged electrical equipment may only be carried out by a qualified electrician. Extension cords may be used for temporary applications only. Permanent cables must be installed for long-term needs.

Extension cords may not be run through doors, windows, ceilings, or holes in walls. An extension cord must be uncoiled completely before it is used.

An extension cord must be of sufficient current-carrying capacity to power the equipment that it is supplying electricity to. Cords must not be overloaded. Extension cords must be unbroken and continuous (i.e. no joins or splices in the cord are permitted). Extension cords may not be daisy-chained (i.e. one extension cord plugged into another extension cord).

Extension cords and equipment cords may not be modified to fit a receptacle (socket). Two-conductor extension cords may not be used. A three-conductor extension cord (i.e. a grounded or earthed cord) must be used even if the equipment that it is supplying electricity to uses a two-prong plug.

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Extension cords that are frayed, have insulation tears, cracks, or abrasions, have exposed conductors, or have bent, broken, or "spread" plug prongs may not be used. Extension cords that will be used outdoors must have heavy duty insulation and must be weather and UV resistant.

All electrical equipment cords and extension cords must be covered or elevated to protect them from damage and to eliminate tripping hazards. Each contractor is responsible for protecting his electrical equipment from the weather and from possible mechanical damage.

All portable electrical equipment (including generators) must be inspected, tested, and tagged by a competent and appropriately qualified electrician monthly. Details of these inspections and tests must be recorded in a register which must be made available to interested parties for inspection.

The inspection and testing must include a continuity test of the grounding (earthing) conductor (as applicable) and a complete examination of the equipment or system to assure safe use. Colour code for the year must be added to prevent mis-inspection over the time period of construction (longer than one year).

The following colour coding system must be used for the tagging of all electrical equipment:

Month	Tag Coding	Month	Tag Coding
January	Red	July	Red
February	Blue	August	Blue
March	Orange	September	Orange
April	Green	October	Green
May	White	November	White
June	Yellow	December	Yellow

The tag placed on a piece of equipment must be traceable to an entry in a register where the following information concerning the inspection and testing of that piece of equipment must be recorded:

- Date of inspection and testing,
- Equipment description,
- Equipment owner,
- Equipment location,

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- Name, signature, and license number of the electrician who carried out the inspection and testing, and
- Comments concerning the inspection and testing, and details of any repair work carried out or required.

Any item of electrical equipment that does not pass an inspection or test must be removed from service (and tagged, "Out of Service") immediately and must then either be repaired (if possible) or removed from site. Any item of electrical equipment without a tag or with an out-of-date inspection or test may not be used.

Any item of electrical equipment found without a tag or with an out-of-date inspection or test must be removed from service until it has been inspected and tested. If it is found that more than one item of equipment being used by a contractor has not been inspected and tested as required, all work with electrical equipment must be stopped until it can be demonstrated to the satisfaction of project management that the contractor's systems and controls are adequate and fully implemented.

In addition to the formal monthly inspections and testing carried out by an electrician, electrical equipment (particularly extension cords, portable hand tools, welding machines, compressors and pumps) must be visually inspected by the user on a daily basis prior to use.

Users must be trained to look for cracks in casings, loose casings, outer cord sheathing that is not being held firmly in position at the equipment, cuts or cracks in cord or cable insulation, exposed conductors, damaged plugs or sockets, and missing covers. Damage and/or defects must be reported immediately.

Personnel must immediately stop using and report any electrical equipment or machinery that is shocking, sparking, overheating, or smoking. Corroded outlets, switches and junction boxes must also be reported.

34. Hot Work.

As defined, hot work involves activities where a source of ignition is produced. Metal cutting with a cutting torch produces flames and sparks which could ignite other materials or vapor. The opposite to hot work is cold work, which is that type of works such as painting, cleaning tanks etc. where no source of ignition is possible.

The following operations are considered as hot work:

- Metal cutting or burning,

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- Welding, soldering or brazing,
- Grinding and drilling,
- Chipping of steel breaking of concrete etc.
- Sandblasting and shotblasting, and
- Any activity which could provide a source of ignition for flammable vapors.

All hot work done on site or within hazardous areas will require a hot work permit issued and signed by a trained, competent and appointed permit issuing official of the site. The Construction Manager shall advise the contractor where the hot work can be done on site in a safe area. The contractor must prior to commencing hot work in areas mentioned above, ensure that:

- They are in possession of a signed hot work permit,
- a competent certified fire officer with appropriate fire-fighting equipment is available for immediate use, and
- Permission has been granted by the permit issuing official declaring the area safe to work and the nature of the work and procedures are to his/her satisfaction.

Testing for vapor using explosimeters by a competent person must be done at the start of each day and also frequently during the day while work is in progress for the complete duration of the period on the hot work permit.

All pumping operations which could cause vapor to enter the hot work area should be postponed or the hot work stopped until the hot work area is declared safe again. Operations such as pumping adjacent tanks, dipping adjacent tanks, product spillage or vent valves blowing on adjacent tanks will require the hot work to be suspended.

34.1 Arc Welding.

All welding machines must be fitted with voltage reducers. The supply cable to every welding machine must be correctly rated and fitted with an approved plug to be used only with an approved matching plug socket. The electrical circuit to every plug socket must be protected by a correctly rated circuit breaker and a supply voltage rated earth leakage unit. This is for the supply of electrical and or generator systems and a certificate of compliance to be issued.

Welding cables must be properly insulated and correctly rated for the welding machines on which they are to be used. Contractor to make sure of the connections to prevent smoking (to hot arcing) or even fires (reportable).

Welding cable terminals must either be covered with a properly designed, constructed and installed cover so that inadvertent human contact with the terminals

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is impossible, whether the cables are connected or not, or the welding cables must be fitted with insulated plugs so that inadvertent human contact with any live part is impossible when the cables are plugged into the machine. Also, the plug socket should be such that when the cables are not plugged in, inadvertent contact with a live part of the socket is impossible.

Earth cable clamps and electrode holders must be of an approved type. Earth clamps and electrode holders must be fixed to welding cables with eye terminals and bolts.

All welding machines and safety devices must be subjected to regular planned maintenance and a monthly electrical inspection. The inspection must include a test to ensure that the voltage reducer is functioning properly by measuring and confirming that the open circuit output voltage is reduced.

Before using a welding machine, the welder must ensure that he is wearing all the required and approved PPE for protection and prevention of thermal radiation:

- Leather welding gloves,
- Safety boots with steel toe protection,
- Flame resistant overalls,
- Any other clothing or equipment necessary to perform his work safely and efficiently,
- Welder assistance must also wear the same PPE for protection.

When changing electrodes or moving the earth clamp, the welder or assistants must wear gloves to avoid possible skin contact with live electrical parts and to prevent burns.

When attaching welding cables to the terminals of the welding machine, the welder or assistants must wear gloves, or preferably, the machine should be switched off to avoid possible electric shock. Assistants who may be holding the work piece being welded must wear gloves and protective goggles. Where practicable the welder should place protective screens around the area where he is welding to prevent injury to the eyes of passers-by.

The welder must ensure that the earth cable follows the shortest practical route between the welding machine and the work piece. The earth connection must be directly between the welding machine and the work piece, and no building or other structure must form part of the earth return path. Avoid taking the cables near specialized equipment and or over valve handles etc.

As far as is practicable, the welder should avoid welding under wet or damp conditions. If this is unavoidable, the following precautions should be taken:

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- Use only oil filled or other watertight type welding machine,
- Keep the electrode holder as dry as is practical,
- Keep as dry as possible. Stand on an elevated surface outside of the water and wear watertight boots and a rain suit. Also ensure that the gloves are in good condition, free of holes.
- Under conditions that result in high perspiration levels, the following measures should be implemented:
 - ✓ Use an insulated electrode holder,
 - ✓ Change clothing regularly (if possible),
 - ✓ Use insulated material like rubber mats and/or timber tuck board to separate yourself from the work piece,
 - ✓ Wear dry gloves on both hands during welding,
 - ✓ Use fans and air-conditioning to reduce humidity and temperature, and
 - ✓ Use an observer capable of responding in an emergency.

When working inside metal vessels or under other conditions where parts of the body may come into contact with conducting surfaces, the welder must take precautions to insulate himself from such surfaces. Make sure that one has the best breathing conditions so use good masks and eye protection. When working in confined spaces, the welder must take steps to ventilate the area to prevent inhalation of fumes, which may endanger his or her health and the health of any assistants.

Engine powered welding machines must not be used in any place that is not very well ventilated since the welder and assistants may be overcome by carbon monoxide fumes.

The welder should take the necessary precautions when welding objects that may ignite, explode, or release poisonous fumes or gases (flame or spark containment is required).

34.2 Gas Welding and Burning.

Welding or cutting torches and hoses shall not be connected to cylinders when stored. When work is stopped and equipment is unattended, all valves at the gas and oxygen cylinders shall be closed. The hoses shall be bled, and a check shall be made later for possible pressure build-up. Torches shall be removed from the hoses prior to putting them into the toolbox.

Smoking SHALL NOT be permitted during this stopping procedure. The contractor shall be required to provide smoking pens in designated safe areas.

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Special care shall be taken during overhead cutting and welding operations to safeguard and prevent falling sparks from starting a fire.

Warning signs shall be posted around and at each level below the area of each overhead welding or burning operation. Fire extinguishers shall be available and fire blankets shall be used for protection.

When welding or cutting, adequate ventilation must be ensured/provided. Hoses shall be kept clear from passageways, ladders, and stairs. When hoses are subject to damage, they shall be properly protected. Hoses shall be inspected daily. Double protection flash back arrestors and soap testing must be provided. Soap leak tests must be performed on all flashback arrestors before use.

Fire extinguishers shall be ready for instant use in locations where cutting is performed. Fire prevention at all sections where fuels are and/or where a fire may be created needs to be either water controlled and/or a fire extinguisher is to be placed in close proximity.

Flash-back arrestors must be fitted to all cutting torches at the torch and at the bottle (a total of four arrestors). Lighting of the cutting and welding torches must only be done using a striker and not an open flame. Hoses may only be secured using approved hose clips, and not by wire, cable ties or any other means.

Special care shall be taken when welding with respect to pipe that has been painted, as toxic fumes may be emitted in some cases. The supervisor's advice should be sought prior to the above welding operations being carried out.

34.3 Compressed Gas Cylinders.

The contractor must establish a suitable storage area for oxygen, acetylene, LPG, and argon cylinders, etc. in compliance with the following requirements:

- The storage area must be located at least 10 meters away from any building and must be well ventilated.
- The storage area must have a concrete floor.
- The storage area must be enclosed using wire mesh fencing (as this will ensure adequate ventilation). This enclosure must be kept locked. Access into the storage area must be limited and controlled.
- A protective cover or roof must be fitted to the enclosure to provide shade.
- The enclosure may not be used for the storage of any other materials/equipment and must always be kept completely free of all combustible materials.

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- Appropriate warning signage (i.e. "No Smoking" and "No Naked Flames") must be prominently displayed in the enclosure.
- A 9kg dry chemical powder fire extinguisher must be mounted near the entrance to the enclosure.
- If electrical lighting is required, it must be of an approved intrinsically safe type.
- Oxygen, acetylene, argon, and LPG cylinders must be stored separately in the enclosure. Furthermore, full and empty cylinders must be separated. Separate storage sections must be clearly designated within the enclosure for the different gas types, and for full and empty cylinders, i.e. oxygen full, oxygen empty, acetylene full, acetylene empty, etc.
- When a cylinder is empty, the cylinder cap must be replaced to protect the valve. Empty cylinders must be clearly marked (there must be no need to open valves to check if cylinders are full or empty).
- All cylinders must be stored in an upright position and must be secured in this position by chaining, strapping, or clamping them individually to a wall, a cylinder trolley, rack or carrier, or some other rigid structure.
- Cylinders must be stored in rows (when necessary due to the number of cylinders) with aisles between the rows to facilitate easy and rapid removal in the event of a fire.
- Oxygen cylinders may never be stored near highly combustible materials, particularly oil and grease, or near fuel gas cylinders. When in storage, oxygen cylinders must be separated from fuel gas (LPG and acetylene) cylinders by a distance of 6 meters or by a 2-meter-high wall made of fire-resistant material.
- The total quantity of gases stored on site must be limited to a 2-week supply.

Gas cylinders may not, under any circumstances, be used as rollers or work supports.

If transported by crane, hoist or derrick, compressed gas cylinders must be placed in a suitable cradle, net or skip box. Cylinders may NEVER be lifted using wire rope, fibre rope, a web sling, or a chain sling. Before moving/transporting a gas cylinder, the regulator must be removed, and the protective valve cap must be replaced. Gas cylinders may not be taken into a confined space. Gas hoses that are run into a confined space must be removed during breaks. Gas cylinders may not be placed on scaffolding.

Cylinder valve keys must be in place. If no suitable valve key is available, then the cylinder may not be used. Nothing but the manufacturer-supplied key may be used to open the valve.

A flashback arrestor and a check valve (non-return valve) must be installed between the regulator and the hose and between the hose and the torch on the oxygen line and on the fuel (acetylene) line.

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Connection fittings may not be forced, and safety devices associated with cylinder valves or regulators may not be altered/tampered with.

Gas hoses may not be joined. Only approved hose connectors of the crimp type are permitted. Wire and jubilee clamps are prohibited. Only high-quality ancillary equipment may be used. This includes flashback arrestors, hoses, clamps, spindle keys, nozzles, and torches. Only trained and competent personnel may operate gas welding/cutting equipment and appliances.

When an employee opens the valve to a cylinder, he must stand to one side and open it slowly. Valves may never be left partly open. They must either be closed or be opened fully.

Leaking cylinders must immediately be removed from service and the workplace (if it is safe to do so). Always prevent sudden opening and creating whipping or leaking of hoses. Suitable firefighting equipment must be at hand wherever gas cylinders containing oxygen and/or fuel gas are being used. Gas cylinders must be prevented from coming into contact with electrical circuits, e.g. welding leads. Never strike an arc on a cylinder.

Oxygen may only be used for the purpose for which it is provided. Do not use oxygen in pneumatic tools or tyres, as an explosion may occur. Empty cylinders must immediately be marked as such and must be removed to the cylinder storage area at the end of each day/shift.

35. Tools and Equipment.

35.1 Electrically Powered Tools and Equipment.

All powered hand tools, such as circular saws, drills, chainsaws, percussion tools, jigsaws etc., must be equipped with a constant pressure switch that will shut off the power when the pressure is released. (Exception: this requirement does not apply to concrete vibrators, concrete breakers, powered tampers, jack hammers, rock drills, and similar hand operated power tools).

Electrical power tools must be of the approved double insulated type. The electric cord, pneumatic or hydraulic supply line of powered tools must not be used for hoisting or lowering of the tool.

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Loose clothing, jewelry or gloves that could get caught in the tool must not be worn when operating powered tools. Operators of powered tools who have long hair must keep their hair tied up.

The power source must be disconnected from the tool before making any repairs, servicing, adjustments, or replacing attachments such as drill bits.

35.2 Angle Grinders.

The following personal protective equipment must be worn when using angle grinders:

- Safety helmet.
- Gloves.
- Safety glasses (or safety goggles) and a full-faced shield (i.e. double eye protection).
- Overalls with long sleeves and long pants, avoid any form of loose clothing.
- Safety boots with steel toe protection.
- Hearing protection.
- Breathing apparatus where dust or fumes may be generated.
- Where grinding machines are used, a face shield is to be worn as extra protection to the safety glasses, and
- Certain tasks may require the use of a leather apron as determined by a Risk Assessment.

A 230mm angle grinder may not be used for free cutting purposes. Exceptions may be approved only if alternative methods evaluated proved more hazardous or no alternative exists. The Risk Assessment for the task must then specifically include mitigating measures to ensure the safest possible way of performing the task.

The use of 230mm angle grinders for grinding purposes is acceptable, however should this form of grinding be required, the 115mm or 125mm grinders would be preferable. The 9-inch grinder system is often required for the large pipe wall thickness and pile cutting and special requirements are to be covered in the Risk Assessment.

All angle grinders must have a dead man switch incorporated, with a pressure switch in the handle. All angle grinders must always be equipped and operated with disc guarding and must not be stored with fitted discs as this will lead to damaging of the discs. All angle grinders must have a spindle lock to assist with changing the disc or grinding wheel.

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A 230mm electrical angle grinder unit must incorporate a soft start to reduce the starting strain and a braking system to reduce run on after the unit has been switched off. Anti-vibration handles are recommended to further reduce stress if used for extended periods. Before the use and mounting of discs it is essential to check the safety codes and specifications printed on the upper side of the disc. Such specifications include the following:

- RPM, the allowable speed of the disc must be equal to or greater than the maximum achievable speed of the grinder,
- Physical dimensions of the disc must meet grinder specification,
- The disc must be suitable for the material type to be cut/ground as indicated on the on the disk, and
- Cutting discs must never be used for grinding and vice versa.

It is critical that the correct disc mounting procedure is followed:

- Check that the machine is plugged out,
- Check the machine spindle, backup washer and thread,
- Check the condition of spindle nuts and ensure spanner drive holes are not elongated,
- Ensure spindle nut spanner is the tool recommended by machine manufacturers,
- Do not use a hammer, pipe, or chisel to tighten the nut, or apply additional mechanical force to nut torque. A firm "nip" is sufficient to retain the disc,
- Ensure the spindle diameter is suited to disc bore. Excessive clearance will cause the machine to vibrate due to eccentricity,
- Check to see that the nut and backup washer do not "bottom out". This will result in the disc not being correctly clamped on the spindle,
- Ensure the spindle speed is marked on the grinder and that it is less than the allowable disc speed, and
- Fit the disc with the metal ring.

35.3 Pneumatically Powered Tools and Equipment.

Pneumatic powered tools must only be driven by filtered compressed air with an in-line lubrication system or be lubricated prior to use if there is no in-line lubrication system. When using pneumatic powered tools, the designated tool pressure must be attained by the use of a regulator.

Pneumatic powered tools must be disconnected when not in use. They must not be disconnected from the air supply until all the residual pressure has been released or contained by a shut-off device. Hoses must not be kinked as a means of containment.

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Employees operating pneumatic powered tools, and any potentially affected employee in the vicinity of use, must wear suitable personal protective equipment. All rotary compressed air tools (e.g. drills) must have the RPM permanently marked on the casing. Only attachments of compatible RPM must be used with these machines.

The actual RPM of the tool must be checked every three months to ensure that the speed is as rated to manufacture specifications.

Pneumatic powered tools must be secured to the air supply hose by an approved positive means to prevent the tool from becoming accidentally disconnected. Safety clips or retainers must be securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.

All pneumatically driven nails, staplers, and other similar equipment provided with automatic fastener feed, which operate at more than 100 kPa pressure at the tool, must have a safety device on the muzzle to prevent the tool from ejecting fasteners unless the muzzle is in contact with the work surface.

Compressed air must not be used for cleaning purposes except when reduced to less than 30 kPa, and then only with effective chip guarding and personal protective equipment in place. The 30 kPa requirement does not apply to formwork, mill scale and similar cleaning purposes. The use of compressed air for cleaning purposes must be approved by project management. Compressed air must not be pointed at any part of the body or used for cleaning clothing.

Airless spray guns of the type which atomize paints and fluids at high pressures must be equipped with automatic or visible manual safety devices which will prevent pulling of the trigger to prevent release of the paint or fluid until the safety device is manually released. A diffuser nut which will prevent high pressure, high velocity release while the nozzle tip is removed, plus a nozzle tip guard which will prevent the tip from coming into contact with the operator, or other equivalent protection must be provided in lieu of the above.

Abrasive cleaning nozzles must be equipped with an operating valve, which must be held open manually to enable operation. Support must be provided on which the nozzle may be mounted when it is not in use.

35.4 Fuel Powered Tools and Equipment.

Fuel powered tools must be shut down and allowed to cool before being refueled, serviced, or maintained. Fuel must be transported, handled, and stored in approved fuel containers. Where possible, diesel driven engines must be used in preference to

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petrol driven engines. All fuel powered tools must be included on the contractor's equipment register and the register.

When fuel powered tools are used in enclosed spaces, the space must be ventilated, and the atmosphere monitored to measure toxic gas concentrations. Persons in space must wear the necessary personal protective equipment. This type of activity must only be undertaken in exceptional circumstances and requires the approval of project management. Drip trays and containment of spillages must be adhered to.

35.5 Hydraulically Powered Tools and Equipment.

Hydraulic powered tools must use only approved fluid that retains its operating characteristic at the most extreme temperature to which it will be exposed. The manufacturers stated safe operating pressure for hoses valves pipes filters must not be exceeded. Only manufacture approved hoses pipes filters and fittings must be used.

35.6 Hand Tools.

Employees required to use hand tools must receive training relevant to the tool and have their competency assessed in the operation, inspection, and maintenance of the tool. Where necessary, additional applicable personal protective equipment must be worn when using hand tools.

Wrenches, including adjustable pipe end, and socket wrenches must not be used when the jaws are sprung to a point where slippage occurs. Impact tools such as drift pins, wedges and chisels must be kept free of mushroomed heads. The wooden handles of tools must be kept free of splinters or cracks. The tools are purpose designed and must be used as designed.

Adjustable wrenches must not be used in lieu of ring or open-end type spanners, unless a Risk Assessment has been conducted and the use of the adjustable wrench is approved by project management. Wherever possible, ring spanners must be used in preference to open end spanners. Correct hand tools for the job must be used, e.g. screwdrivers must not be used as chisels and pliers must not be used as hammers.

All wedges and drifts that may spring, fly or fall to lower levels upon impact must be fitted with an attachment which attaches a safety "lanyard" to a solid structure to restrain the impact tool from becoming a projectile.

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All hand tools used in elevated areas, that may be dropped or fall to lower levels must be fitted with safety lanyards and attached to solid structures or in the case of podges, scaffold keys etc., attached by wrist lanyard to the user. Purpose-built tools and equipment may not be used unless a Risk Assessment has been conducted and authorised by project management.

35.7 Stanley Knives/Utility Knives.

A utility knife must be used as a last resort when it is the safest tool to use. Always consider alternatives that pose less of a risk to the operator. Whenever a utility knife is used, ensure that a complete Risk Assessment is done and that all possible hazards have been addressed. Only utility knives with retractable blades are to be used. The blade is always to be retracted when the knife is not in use or is being stored.

Before using the utility knife, ensure that the tool is in good condition and the blade is secure in the holder (seated correctly and that there is no play). Ensure that the blade is always sharp and in good condition. This will prevent the use of excessive force.

Always wear cut-resistant gloves and safety glasses when using a utility knife. There is always a risk of the blade breaking under tension and becoming a projectile. Always ensure that you cut away from your body and that no part of your body is in the firing line. Always ensure cleanliness of all equipment in use during the cutting operations.

35.8 Inspection of Tools and Equipment.

All tools must be inspected by the user before, during and after use. If any faults are identified, the tool must be taken out of service and not used until repaired. Faulty tools that are not able to be repaired must be tagged "out of service" and removed from site.

36. Manual Handling and Vibration.

Any handling or lifting task that can only be done manually must be planned properly before the task is done. If more than one person is involved in a task a communication procedure must be agreed in advance. Lowering the load must be done in a controlled manner. Dropping a load is dangerous and must be avoided.

As a guideline 25kg is considered to be the limit of what a person can safely handle. Where there are loads exceeding 25kg the risk of handling the load must be mitigated to

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assure minimal potential for any injury. When mechanical lifting aids are provided, they should be used. Extra care should be taken when lifting awkwardly shaped objects.

Position the feet correctly, the feet should be placed hip-width apart to provide a large base. One foot should be put forward and to the side of the object which gives better balance. Bend or 'unlock' the knees and crouch to the load. The weight will then be safely taken down by the spine and the strong leg muscles will do the work. Get a firm grip. The roots of the fingers and the palm of the hand should grip the load. This keeps the load under control and permits it to be distributed more evenly.

The following should be considered with conducting the Risk Assessment with regards Manual Handling and also taking into consideration the task factors, physical demands and tools involved in the task:

- Load weight/frequency,
- Hand distance from lower back,
- Asymmetrical trunk/load,
- Postural constraints,
- Grip on the load,
- Floor surface,
- Environmental factors,
- Carry distance, and
- Obstacles en route.

Team Manual Handling:

- Load weight,
- Hand distance from lower back,
- Vertical lift region,
- Trunk twisting/sideways bending,
- Postural constraints,
- Grip on the load,
- Floor surface,
- Environmental factors,
- Communication, co-ordination, and control.

In order to reduce exposure to vibration:

- Consider buying equipment that operates effectively at lower speeds,
- Buy equipment with built-in damping materials,
- Buy lighter tools if they are available – they require less of a grip,
- Maintain the equipment,

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- Make sure equipment is balanced and there are no worn parts,
- Use remote controls when they are available,
- Reduce your grip on the equipment when it is safe. The less time you actually have your hands on the equipment the better. Relax your hands during these brief breaks. Ensure better effective padded gloves are supplied.
- Take scheduled breaks, and
- Do other tasks that allow you to move away from vibrating tools and equipment.

The workplace must be assessed by a competent person for compliance with good design, layout, and practice, to avoid or minimize adverse health consequences due to manual handling and vibration issues.

Quantitative evaluations of vibration produced by specific equipment must include the following measurement parameters: direction of movement, frequency, intensity, and variation with time and duration, as per documented methods.

Employees and contractors must be informed of the results of assessments and instructed in appropriate manual handling techniques, where the Risk Assessment indicates a need. Workplace vibration sources that could contribute to the exceedance of an Occupational Exposure Limit (hence potential for impact on worker Musculo-skeletal fitness) must be identified and adequately characterized. The contractor must show that the Approved Inspection Authority was approached for advice and monitoring and that an Occupational Medical Practitioner was consulted for the medical examination fitness as well as the regular medical surveillance program to reduce fatigue.

Manual handling tasks assessed as having the potential to cause a Lost Time Injury (i.e. with potential for impact on worker Musculo-skeletal fitness) must be identified and adequately characterized. Workplace manual/materials handling tasks risk rated as "significant" must be assessed and recorded to include biomechanical factors (e.g. posture, bending, twisting, repetitive motions, working overhead, and exerting force away from the body).

37. Personal Protective Equipment.

GSR 2 and other applicable legislation concerning PPE must always be complied with. The contractor shall draft an issue PPE matrix per job category.

As a minimum, the following PPE must always be worn by all persons (including visitors) whilst on the project site:

- Safety footwear with steel toe protection,

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- Safety glasses (individuals who wear prescription spectacles must be provided with either over-spec safety glasses or prescription safety glasses),
- Safety helmet (hard hat) and with a chin strap for working at heights,
- High visibility protective clothing with reflective taping (long trousers and long-sleeved shirts with collars and cuffs),
- Additional PPE requirements must be determined through Hazard Identification and Risk Assessment. This hazard-specific PPE (such as hand protection, hearing protection and respiratory protection) must be worn as required (e.g. when in a certain area, when performing a certain task, or when working with a certain substance),
- The correct PPE must always be worn:
 - ✓ In accordance with site requirements (as indicated at the entrances to a project site and at the entrances to buildings and/or designated areas on the premises).
 - ✓ In zoned areas (e.g. noise zones and respirator zones), or
 - ✓ As required by a Safe Work Procedure, a Risk Assessment, or an SDS.

Each contractor must provide each employee with all required PPE (at no cost to the employee). The specific PPE that is provided to a particular employee must be based on the nature of that employee's work and the location in which the work is performed (i.e. must be based on the hazards to which the employee is exposed). PPE requirements for a particular job or for a particular area must be determined through a Risk Assessment for that job or area.

Any employee who does not have all of the PPE that is required for him to perform his duties safely will not be permitted to work. Each employee must care for his PPE, maintain it in good condition, and inspect it on a daily basis. If an item of PPE has worn out, has become damaged, or is found to be defective in any way, it must be replaced by the contractor. PPE must be stored in accordance with the manufacturer's requirements and/or recommendations.

Each employee must receive training in the use, maintenance and limitations of the PPE that is provided to him and must be made aware of why the PPE is necessary as well as the consequences of not wearing it as instructed (i.e. the potential for injury and/or disciplinary action). Training records must be retained.

Any person who refuses to wear PPE as required must be removed from the site. Symbolic signs indicating mandatory PPE requirements must be prominently displayed at the entrances to a project site and at the entrances to buildings and/or designated areas on the premises where additional PPE is required. These signs must comply with SANS 1186-1.

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Each contractor must appoint an employee to:

- Control the issuing and replacement of PPE,
- Keep an up-to-date register as proof that items of PPE have been issued to individuals (an employee must sign for the items that he receives),
- Ensure that there is an adequate supply of all required PPE (i.e. maintain PPE stock levels on site), and
- Carry out regular inspections to ensure that PPE is being used correctly, is being maintained in a good, serviceable, and hygienic state and is not being shared between employees. Monitor the effectiveness of the PPE to ensure protection is provided so the returning of used and/or broken PPE should be managed.

37.1 Head Protection.

Safety helmet (or hard hat) worn correctly will help protect the head in the event of:

- An employee being struck on the head by a falling or flying object.
- An employee striking his head against a fixed or protruding object, or
- Accidental head contact being made with an electrical hazard.

A safety helmet must always be worn on a project site, with the following exceptions:

- Vehicle and equipment operators inside enclosed cabs.
- In offices and in office or administration buildings, and
- At designated lunch and break areas (provided that no work is in progress in the immediate break area).

A safety helmet must be worn in accordance with the manufacturer's requirements. A safety helmet must be worn directly on the head. The wearing of a cap or other headgear beneath a safety helmet is prohibited unless the items have been specifically designed to be used in combination (i.e. the arrangement is approved by the safety helmet manufacturer).

The suspension system inside a safety helmet (that acts as a shock absorber) may not be removed. The religious long hair under the helmets is contained with hair net and the helmet is adjusted to fit with a chin strap. The painting of safety helmets is prohibited. Safety helmets may only be cleaned using mild detergent and water. No solvents may be used.

37.2 Eye Protection.

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If an employee is carrying out, assisting with, or working adjacent to any activity where sparks or projectile particles are being generated, where chemical mists or fumes are being generated, where liquids may splash or spray, where harmful electromagnetic radiation (heat or light) is being generated, or where there is a risk of wind-blown particles entering the eyes, then suitable protective eyewear must be worn at all times (i.e. safety glasses, safety goggles, a face shield, a welding helmet, or a combination of these). Double eye protection as well as the dark and light conditions must be managed.

Such activities include:

- Working with rotating equipment (e.g. grinders, drills, mills, lathes, and saws),
- Welding and cutting,
- Chipping, chiseling or caulking,
- Using explosive powered tools,
- Abrasive blasting,
- Sanding, and
- Working with hazardous chemical agents (e.g. drilling fluids, acids, solvents, paints, pesticides, etc.).

Double eye protection is required for activities such as:

- Grinding, cutting, chipping, chasing, and reaming (employees must wear both a full-face shield and safety glasses or goggles), and
- Arc welding (welders must wear both safety glasses and a welding helmet).

Screens must be erected to protect passers-by, where practical.

Safety glasses must always be worn on a project site, with the following exceptions:

- Vehicle and equipment operators inside enclosed cabs with the windows fully closed,
- In offices and in office or administration buildings,
- At designated lunch and break areas (provided that no work is in progress in the immediate break area), and
- When another form of eye protection is required (e.g. safety goggles).

All safety glasses used on site must have suitable permanent side protection. When the person is required to wear or use their prescription glasses and or if permission can be given then proof of hardened and tinted lenses side protection must be given in writing.

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In strong sunlight, dark safety glasses should be worn to reduce eyestrain and fatigue. However, caution must be exercised when employees are required to frequently move between outdoor and indoor environments. Dark safety glasses may not be worn indoors or in poor daylight conditions. Prescription spectacles with tinted lenses are prohibited inside buildings or other structures with limited illumination unless the lenses are light-sensing and adjust to changing illumination levels.

Employees who wear prescription spectacles (i.e. require corrective lenses) must make use of either:

- Prescription safety glasses (with permanent fixed side shields) that conform to the requirements of a recognized national or international standard (e.g. CSA, ANSI, or equivalent), or
- Over-spec safety glasses or goggles.

The use of contact lenses in certain areas may not be suitable because of increased risk to the eye due to dust or heat as well as radiation from the welding process.

37.3 Hearing Protection.

Noise Exposure Regulations (NER) concerning occupational exposure to noise and the use of hearing protection must be complied with as a minimum.

"Low noise" tools and machinery must be used wherever possible to reduce noise levels. Where noise cannot be reduced to an acceptable level through engineering and work practice controls, measures must be put in place to minimize the exposure of employees to noise (i.e. administrative controls and personal hearing protection).

Areas where it is likely that the 95% upper confidence limit of an eight-hour shift mean exceeds 85dB(A), or areas where impulse noise exceeds 140dB(C), must be designated as noise zones. These noise zones must be clearly demarcated and mapped, signs must be posted, and all employees must be made aware of the requirements for working in such an area.

Suitable hearing protection must be worn in all designated noise zones and when carrying out (or working in the vicinity of) any activity where the noise level exceeds 85dB(A).

Where hearing protection is required, a hearing conservation programme (applicable to all personnel and visitors) must be implemented. The programme must include training in the correct use and proper storage of hearing protection devices as well as replacement requirements.

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Training must be provided when hearing protection is first issued to an employee and refresher training must be carried out at least annually thereafter. Training records must be retained.

At least two types of personal hearing protection must be made available to employees. The hearing protection devices provided must have adequate noise reduction ratings (i.e. must be able to attenuate the noise level to below 85dB(A)).

Personal hearing protection must be issued on an individual basis and must not be shared. In addition to personally issued hearing protection, suitable disposable hearing protection must be made available at the entrances to all noise zones. All hearing protection devices (except for disposable hearing protection) must be thoroughly inspected and cleaned on a regular basis. Regular monitoring of the noise levels is to be done by the Approved Inspection Authority.

37.4 Respiratory Protection.

Designated areas (respirator zones) must be established where:

- It is likely that the 95% upper confidence limit of a Similar Exposure Group's mean exposure concentration exceeds the relevant Occupational Exposure Limit (OEL) for agents resulting in chronic effects, such as total inhalable dust, respirable dust, respirable crystalline silica, PAH, fluorides, lead, mercury, asbestos or non-asbestos fibrous materials, or
- The concentration of an agent (particulate, vapor or gas) with an acute effect exceeds 50% of the relevant OEL.

Note: For a particular hazardous agent, the OEL to be adopted must be the OEL specified in the Regulations for Hazardous Chemical Agents.

These areas must be clearly demarcated and mapped, signs must be posted, and all employees must be made aware of the requirements for working in such an area.

Suitable Respiratory Protection Devices (RPDs) must be worn in all designated respirator zones and when carrying out (or working in the vicinity of) any activity where the risk assessment has identified the need for respiratory protection.

RPD's must be selected based on:

- The type(s) of airborne contaminants that are present (gases, vapors, particulates, aerosols including dusts, fumes, sprays, mists, and smoke),

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- The potential particulate size distribution,
- Substance toxicity, and
- The likely concentrations.

Compatibility with the work tasks and other PPE, comfort (as it affects wear-time), and the ability to communicate adequately must also be considered.

The Risk Assessment for the work to be performed, the information contained in the relevant SDS, and the results of any air monitoring associated with the substances to be worked with or activities to be carried out, must be used to ensure that the most suitable RPD is selected. Only RPDs certified to a recognized standard may be used.

Where respiratory protection is required, a respiratory protection programme (applicable to all personnel and visitors) must be implemented. This applies mainly for grit blasting, painting and hazardous chemical work. The respiratory protection programme must include:

- Periodic inspection of RPDs, including before each use,
- Periodic evaluation (by competent persons) of cleaning, sanitizing, maintenance and storage practices,
- Performance of positive pressure and negative pressure fit checks by RPD wearers before each use to ensure that the respirator is functioning properly, and
- Training in the first issue of a RPD and regular refresher training thereafter in accordance with regulatory requirements or at least once every two years (the training must cover fit testing, use, cleaning, maintenance, filter cartridge replacement, and storage). Training records must be retained.

RPDs must be used, maintained, and stored in compliance with the manufacturer's requirements as well as the respiratory protection programme. Suitable facilities must be provided for the cleaning and sanitary storage of RPD's.

As a minimum, qualitative and documented fit testing must be carried out (although quantitative fit testing is preferred) to ensure that the use of negative pressure RPDs (including disposable RPDs) is effective. Fit testing must be performed by a competent person when an RPD is first issued and must be repeated periodically in accordance with legal requirements or every two years as a minimum. A policy must be in place requiring a cleanshaven face when using a negative or neutral pressure RPD for routine tasks (otherwise a positive pressure RPD must be used). A medical evaluation including a pulmonary function test may be required to determine whether or not an individual is medically fit to wear a respirator.

For air supplied RPDs, breathing air must be effectively filtered and/or isolated from plant and instrument air and isolated from sources of potential contaminants. The

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supplied air must be tested to determine if the air quality complies with the requirements of applicable standards for breathing air.

For nuisance dust, dust masks with a protection level of at least FFP2 must be worn.

37.5 Hand and Arm Protection.

Gloves must be worn when handling or working with equipment, materials, or substances with the potential to cause injury or illness. Suitable gloves must be selected based on the task to be performed and the specific hazard against which the employee requires protection, such as:

- Sharp edges,
- Sharp points and splinters,
- Abrasive surfaces,
- Hazardous chemical agents (toxic, corrosive, sensitizing, etc.),
- Extreme temperatures,
- Viruses, bacteria, and parasites.

37.6 Foot Protection.

Safety boots must always be worn whilst on a project site, with the exception of offices and office or administration buildings in which closed athletic, business, or similar shoes may be worn.

Sandals, slaps, slippers, open-toed and high-heeled shoes are not permitted on any project premises.

Safety boots must provide the following protection:

- Steel toe cap to protect against crushing (impact and compression forces).
- Leather uppers that provide resistance against water penetration and water absorption.
- Slip resistant soles. Check that the soles of the shoes are water resistant antistatic and as the Risk Assessment mitigation requires.

And where a Risk Assessment identifies the need:

- Puncture resistant soles (i.e. steel midsoles) for protection against sharp objects.
- Chemical resistant soles for protection against spilt chemical substances (such as solvents, hydrocarbons, acids, and alkalis).
- Heat resistant soles for protection against hot surfaces or molten metal.

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- Electrical shock resistant soles for protection (insulation) against live electrical conductors.
- Gumboots with steel toe caps must be worn when working in water or in very wet conditions.

37.7 Clothing.

All employees working on a project site must wear high visibility protective clothing with reflective taping. Trousers must be long, and shirts must be long-sleeved. Shirts must be buttoned at the neck and wrists.

Minimum specification shall be Dromex DW – D59 FA, 100% cotton, flame retardant and acid-resistant SABS approved conti-suit with long sleeves. Materials meeting the requirements of SANS 434, antistatic properties EN 1149 with silver reflective strip (50mm in width) on each sleeve around upper arm and each leg, meeting the requirements for EN471.

Protective clothing must preferably be made of natural fibres. Short pants, short-sleeved shirts, sleeveless shirts, and vests are prohibited as outer garments (with the exception of a high visibility vest worn over a long-sleeved shirt).

Loose clothing may not be worn where it may become caught in moving machinery or equipment. For hot work (e.g. welding, cutting, etc.) and any work carried out in the vicinity of an open flame, the protective clothing worn (shirt and trousers) must be made of a suitable fire-retardant fabric. Underwear and socks must be made of natural fibres (preferably wool) or fire-retardant fabric.

37.8 Body Protection.

Suitable body protection must be provided as required to protect employees against specific hazards. A range of work activities require body protection in one form or another, including but not limited to:

- Working in extremes of temperature,
- Hot work (e.g. welding, burning, cutting, and grinding).
- Working with hazardous chemical agents (e.g. acids, solvents, pesticides, etc.), and
- Clean up and disposal of hazardous materials and wastes (e.g. asbestos, hydrocarbons, etc.).

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A wide variety of protective garments are available, such as firefighting, freezer jackets, leather aprons, leather spats, laboratory coats, chemical resistant aprons, chemical resistant (or hazmat) suits, and disposable coveralls. Suitable items must be selected to provide protection against the specific hazard(s) to which an employee is exposed. Hazards must be carefully identified and characterized to ensure that the correct protection is used.

Body protection must be sized properly to prevent tearing, the parting of seams, tripping, or restriction of movement. Do the daily inspections and prevent persons entering site with holes in their clothing.

37.9 Electrical Protective Equipment.

To reduce the risk of electric shock, electrical insulating equipment appropriate for the voltage that may be encountered must be worn when working on energized electrical installations and when working within two meters of exposed energized conductors.

All rubber electrical insulating equipment (including gloves, sleeves, matting, covers, blankets, and line hoses) must be inspected for damage prior to and after each use and immediately following any incident that can reasonably be suspected of having caused damage.

Rubber insulating equipment with any of the following defects and/or damage may not be used:

- A cut, rip, tear, hole, or puncture.
- Ozone cutting or ozone checking (i.e. the cutting action of ozone on rubber under mechanical stress causing a series of interlacing cracks).
- An embedded foreign object.
- Chemical deterioration (texture changes) such as swelling, softening, hardening, or becoming sticky or inelastic, or
- Any other defect that damages the insulation properties.

Rubber insulating gloves must be electrically tested before first issue and every 12 months thereafter as a minimum. Insulating gloves must also be given an air test along with the daily inspection. Essentially, this involves filling a glove with air and checking for any holes or leakage.

Insulating equipment that fails an inspection, or electrical test may be repaired only as follows:

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- Rubber insulating line hose may be used in shorter lengths with the defective portion(s) cut off.
- A rubber insulating blanket may be repaired using a compatible patch that results in the patched area having electrical and physical properties equal to those of the blanket.
- A rubber-insulating blanket may be salvaged by cutting the defective area off the undamaged portion of the blanket.
- Rubber insulating gloves and sleeves with minor physical defects, such as small cuts, tears, or punctures, may be repaired by applying compatible patches. The patched areas must have electrical and physical properties equal to those of the surrounding material.

Repairs to gloves are permitted only in the area between the wrist and the reinforced edge of the opening.

Repaired insulation equipment must be retested before it is put back into use.

Insulation equipment must be cleaned as required to remove foreign substances (using a mild detergent).

Insulating equipment must be stored in such a location and in such a manner so as to protect it from light, temperature extremes, excessive humidity, ozone, and other damaging substances and conditions. Leather protective gloves must be worn over rubber insulating gloves to provide mechanical protection against cuts, abrasions, and punctures.

Suitable arc flash PPE (e.g. voltage rated gloves, fire retardant clothing, arc rated face shield, arc flash hood, arc flash suit, etc.) must be worn whenever an employee is potentially exposed to an arc flash hazard. The appropriate level of PPE must be worn depending on the task and the potential energy exposure. These PPE requirements must be clearly specified as part of a project specific arc flash protection programme. Neoprene type rubber gloves or equivalent to be worn in accordance with the employer requirements.

38. Fuel/Flammable Liquid Storage and Refueling.

No fuel (diesel, petrol, etc.) or any other flammable liquid (paints, solvents, etc.) may be stored on site unless approved in writing by project management.

If the on-site storage of a fuel or a flammable liquid is approved, the contractor must ensure the following:

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- The quantity of fuel/flammable liquid to be stored on site must be kept to the minimum that is required,
- The storage area must be located in a well-ventilated area at least 10 meters away from any building, drain, boundary or any combustible material,
- If more than 200 liters of fuel/flammable liquid is to be stored, the tank must be installed/the containers must be positioned within a bund,
- If the fuel/flammable liquid is to be stored in bulk tanks/vessels, then the minimum capacity of the bund must be 110% of the volume of the largest tank/vessel. If many small containers (e.g. 210-liter drums) are to be stored, the bund must be able to contain 25% of the total volume of the stored products,
- The bund must be impermeable. It must have a solid concrete floor, and the walls must be constructed out of brick and must be plastered on the inside,
- The bund must be fitted with a lockable drain valve (for draining away rainwater), which must remain locked in the closed position. The valve may only be opened under supervision and in accordance with a written procedure,
- The fuel/flammable liquid storage area may not be used for the storage of any other materials/equipment and must be kept completely free of all combustible materials (including rubbish, brush, and long grass) at all times,
- Access to the storage area must be controlled (wire mesh fencing and gate).
- Appropriate warning signage (i.e. "Flammable Liquid", "No Smoking" and "No Naked Flames") must be prominently displayed at the storage area. The contents and volume of each tank must be indicated,
- In order to contain spillages, the offloading/refueling bay at the fuel/flammable liquid storage area must have a solid concrete base surrounded by bund walls, ramps or humps and/or spill trenches (covered with steel grating) that lead into a sump,
- Fuel dispensing pumps must be protected against impact damage,
- All fuel/ flammable liquid storage tanks and dispensing equipment must be electrically bonded and properly earthed,
- All electrical installations and fittings must be of an approved intrinsically safe type,
- 2 x 9kg dry chemical powder fire extinguishers must be mounted in an easily accessible position near the entrance gate to the fuel/flammable liquid storage area. Depending on the size of the storage area, additional fire extinguishers may be required to ensure that an extinguisher is no further than 15 meters away from any point on the perimeter of the storage area,
- A fire extinguisher must be at hand wherever refueling is carried out,
- Smoking or open flames within 10 meters of a fuel/flammable liquid storage/refueling area is strictly prohibited,
- No petrol/diesel-powered vehicle or equipment may be refueled while the engine/motor is running,

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- Cellular phones must be switched off in fuel/flammable liquid storage/refueling areas,
- Spill clean-up kits (containing a suitable absorbent fibre product) must be provided,
- Any spillages must be cleaned up immediately and all contaminated cleaning materials must be disposed of in accordance with the applicable legislation,
- If a flammable liquid is spilt or is leaking from a container/vessel, the area must be cordoned off and appropriate warning signage must be displayed to keep unauthorized personnel away from the affected area. Every effort must be made to contain the spillage. All hot work in the vicinity must be stopped immediately. If the spilt product is volatile and the possibility exists that a vapor cloud may form, or if the leak or spillage cannot be contained or stopped, then appropriate emergency response procedures must be activated including the evacuation of all persons in the vicinity. Suitable firefighting equipment must be positioned ready for use should the spilt product ignite,
- The manual decanting of fuel or a flammable liquid from a large container should only be done using a stirrup pump (or similar) or a purpose-made frame which allows the container/drum to tilt for decanting and then return to the upright position,
- Drip trays must be used wherever required,
- All tanks, drums, cans, etc. containing flammable liquids must be tightly closed and properly sealed except for when a container is being filled or when a product is being decanted,
- The transport or storage of corrosive or flammable liquids in open containers is strictly prohibited,
- Daily-use quantities of fuel (up to a maximum of 20 liters) must be handled in an approved safety can with a flash arresting screen, spring closing lid and spout cover that will safely relieve internal pressure if the can is exposed to fire,
- Where safety cans may be impracticable, only approved metal containers with screw caps may be used. Each container must be clearly labelled to indicate its contents,
- Only small quantities of flammable liquids (paints, solvents, etc.) may be stored within a building. Each product must be kept either in its original container or in an approved container which must be properly sealed. Each container must be clearly labelled to indicate its contents. When not in use, all such containers must be stored in a well-ventilated steel cabinet which must be kept locked to prevent unauthorised access,
- Not even small quantities of flammable liquids may be stored or dispensed in buildings or places of public assembly, in general warehouses, or in buildings containing sources of ignition such as space heaters, cooking devices, open electric motors, motor vehicles, or where welding, cutting, or grinding activities are being carried out,

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- Safe Work Procedures must be compiled for the transportation (including delivery), offloading, storage, handling and use of any fuel/flammable liquid on site,
- All personnel that will be required to work with or may come into contact with a flammable liquid must be made aware of the hazards associated with the product and must be thoroughly trained in safe transportation, use, handling and storage thereof.

39. Fire Protection and Prevention.

The contractor performing hot work or other activities that could give rise to a fire must compile a Fire Protection and Prevention Plan for the work that will be carried out on site.

The contractor must assess/survey his area of responsibility and identify locations where the risk of fire is high. Cognizance must be taken of the fact that certain locations may need to be designated as high risk due to the presence of large quantities of flammable or combustible materials/substances. For all high-risk areas, the contractor must ensure that additional precautions are taken to prevent fires, and strict control is exercised over any hot work (i.e. welding, cutting, grinding, etc.) that is carried out.

The contractor must supply and maintain all required firefighting equipment. The type, capacity, positioning and number of firefighting appliances must be to the satisfaction of project management and must meet the requirements of the applicable legislation. Fire mains, hydrants and hose reels will rarely be available on site, so use must primarily be made of portable fire extinguishers.

Firefighting equipment, fixed and portable, must be strategically located with a view to being able to rapidly deploy the equipment in order to bring potentially dangerous and destructive fires under control while still in their infancy. All fire extinguishers (and any other firefighting equipment) placed on site must be:

- Conspicuously numbered,
- Recorded in a register,
- Visually inspected by a competent person on a monthly basis (the results of each inspection must be recorded in the register and the competent person must sign off on the entries made), and
- Inspected and serviced by an accredited service provider every six months (Project management may require that this frequency be increased depending on the environmental conditions (e.g. high dust levels, water, heat, etc.) to which the fire extinguishers are exposed).

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Any fire extinguisher that has a broken seal, has depressurized, or shows any sign of damage must be sent to an accredited service provider for repair and/or recharging. Details must be recorded in the register. There are to be additional units spare for use in the event one is used so as to prevent higher risk during refilling etc.

Firefighting equipment may not be used for any purpose other than fighting fires. Disciplinary action must be taken against any person who misuses or willfully damages any firefighting equipment.

Access to firefighting equipment, fixed or portable, must always be kept unobstructed. Approved signage must be in place to clearly indicate the location of each permanently mounted fire extinguisher, fire hose reel, etc.

The contractor must ensure that all persons working in/entering his area of responsibility are made aware of where all firefighting equipment and alarm points are located. The contractor must ensure that his or her employees are trained in firefighting procedures and the use of firefighting equipment.

The contractor must compile an Emergency Response Procedure detailing the actions that must be taken in the event of a fire or a fire/evacuation alarm. All personnel working within the contractor's area of responsibility must be trained, and all visitors must be instructed in this procedure. Copies of the procedure must be prominently displayed in the workplace in all languages commonly used on the site.

A person discovering a fire must extinguish the fire if he can do so safely, and then immediately report the incident to the supervisor. If the person cannot extinguish the fire, he must raise the nearest alarm and then report the fire as quickly as possible to the supervisor, the person responsible for the area, and/or Security.

On hearing a fire/evacuation alarm, all persons must make any operational plant or equipment safe and then proceed to the nearest emergency assembly point and await instructions. All incidents of fire (including the use or misuse of any firefighting equipment) must be reported to project management immediately. Used fire extinguishers must be replaced by the contractor without delay.

No hot work (i.e. welding, cutting, grinding, etc.) or any other activity that could give rise to a fire may be performed outside of a designated workshop without a Permit to Work having been issued.

Wherever hot work is being carried out, a fire extinguisher must be at hand. Where the Risk Assessment determines that it is necessary, a fire watch must be stationed.

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Supervisors must carry out workplace inspections regularly to ensure adherence to fire prevention measures and procedures.

At the end of every working period (i.e. before each tea/lunch break and at the end of every shift/day), the workplace must be thoroughly inspected to ensure that no material is left smoldering, and no condition/situation exists that could give rise to a fire.

The contractor must ensure that all supervisors and all employees carrying out or assisting with any hot work or any other activity that could give rise to a fire have been trained in firefighting procedures and the use of firefighting equipment. The training must be conducted by an accredited training provider.

When using electrical equipment, all cables must be in good condition and the nearest convenient socket must be used.

No power socket may be loaded beyond its rated capacity through the use of adaptors, etc.

Makeshift electrical connections are not permitted under any circumstances.

Water-based firefighting equipment must not be used on electrical equipment or burning liquids.

Each vehicle used on site for work purposes and each item of mobile equipment with a diesel or petrol engine must be fitted with a permanently mounted fire extinguisher. Smoking is only permitted in designated smoking areas. Cigarette ends/butts must be properly stubbed out in the ashtrays provided and never thrown into waste bins.

The contractor must ensure that good housekeeping practices are enforced, as this is crucial to the prevention of fires. All combustible waste materials must be removed from the workplace on a daily basis (at the end of each shift) and placed in waste receptacles located at least 5 meters away from any structure. The accumulation of waste materials in out-of-the-way places is prohibited.

Offices, desks, cabinets, etc. must always be kept tidy and uncluttered. Wastepaper bins must be emptied regularly. The storage of combustible materials under stairways or in attics is prohibited.

All walkways, passages and stairways must be kept clear (i.e. must always be unobstructed), as they may need to be used as a means of escape. The areas around and the routes to all exits, fire escape doors, fire hydrants, fire hose reels and fire extinguishers must be kept clear (i.e. must always be unobstructed). "No Smoking" signs must be conspicuously displayed in and around all storage areas/rooms. Waste may not be burned under any circumstances.

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No flammable liquid (such as petrol, acetone, alcohol, benzene, etc.) may be used for starting fires or as a solvent for cleaning clothes, tools, equipment, etc. Only approved solvents may be used for cleaning purposes. All storage areas and offices to be built to the SANS code and where required doors etc. must be fire rated.

Whenever any work is carried out involving the use of a flammable substance/material, the area must be cordoned off and appropriate warning signage (i.e. "No Unauthorised Entry", "No Smoking" and "No Naked Flames") must be displayed.

39.1 Fire Protection Systems in a Highly Flammable Area.

Part of the project activities will be performed in close proximity to bulk highly flammable liquids (JMP and APT). Firefighting controls and procedures have been developed and are maintained by the respective terminal/depot within their respective areas. The contractor is to ensure that their activities do not compromise any of the systems and controls as implemented by the respective terminal/depot.

TPL respective terminal/depot are equipped with suitable and adequate firefighting equipment for their respective areas and includes, foam pourers, bund pourers, hydrants, storage tank fire systems, sirens, detection equipment, etc. Routine testing of the systems forms part of the controls, and the contractor needs to align to the testing of the fire systems as it may impact on the construction works.

39.2 Smoking.

The contractor must not permit smoking on site except within designated smoking areas selected in accordance with the applicable legislation. Such an area must be clearly demarcated, and the required signage must be displayed.

Any person found smoking or discarding a cigarette butt outside of a designated smoking area may be removed (temporarily or permanently) from the site. In all designated smoking areas, adequate non-combustible commercial ashtrays and/or cigarette butt receptacles (butt cans) must be provided.

Ashtrays and other receptacles provided for the disposal of smoking materials must not be emptied into rubbish bins or any other container holding combustible materials.

"No Smoking" signs must be strictly observed.

40. Housekeeping.

The contractor must maintain all work areas in a tidy state, free of debris and rubbish. Unless directed otherwise, the contractor must dispose of all debris, rubbish, spoil, and hazardous waste off site in a designated and authorised area or facility. The contractor must familiarize himself with the Waste Management Plan for the site, including collection and disposal arrangements, and must align his waste management activities accordingly. The contractor must ensure that all protruding ends of the rebar steel are guarded with a bright orange rebar cap for visibility.

In cases where an inadequate standard of housekeeping has developed and compromised safety and cleanliness, project management may instruct the contractor to cease work until the area has been tidied up and made safe. All electrical cables are to be neatly routed to ensure that there are always no tripping hazards on site at all times. Neither additional costs nor contract deadline extensions will be allowed as a result of such a stoppage. Failure to comply will result in a clean-up being arranged through another service provider at the cost of the non-complying contractor.

The contractor must carry out housekeeping inspections on a weekly basis to ensure maintenance of satisfactory standards. The contractor must document the results of each inspection. These records must be maintained and must be made available to interested parties on request.

The contractor must implement a housekeeping plan for the duration of the contract ensuring that the site housekeeping is maintained. Furthermore, at the end of every shift, the contractor must ensure that all work areas are cleaned, all tools and equipment are safely stored, and construction rubble is removed. Housekeeping goes hand in hand with the environmental requirements of spillage and waste management.

Where the contractor fails to maintain housekeeping standards, project management may instruct the contractor to appoint a dedicated housekeeping team for the duration of the project at the contractor's expense. Littering is prohibited.

41. Waste Management.

Waste may not be disposed of unless the disposal of that waste is authorised by legislation. The contractor must therefore ensure that all waste that is generated is handled, stored, transported, and disposed of in accordance with the requirements of the applicable legislation/local authority.

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No waste may be removed from the project site to a waste storage or disposal facility unless that facility has been approved for use by project management. An adequate number of waste bins and skips must be provided by the contractor, and suitable arrangements must be made to ensure that these bins and skips are emptied regularly. Hazardous wastes must be kept separate from general waste.

Waste disposal service providers must be approved by project management before any waste is removed from site. These service providers must be audited on a two-yearly basis (or more frequently if deemed necessary based on risk) in order to ensure compliance with legislation and to help ensure that no liabilities accrue to the project.

42. Stacking and Storage.

All irregular shaped items shall be stacked at floor/ground level in designated stacking areas on a level, firm base capable of withstanding the weight of the commodities being stacked and stacked in such a manner that the items do not topple over or change position due to subsidence or weight transfer when being moved.

Where these commodities are stacked on shelves or racks, the shelves or racks must be designed to carry the weight of the commodity being stacked. All racks or shelves where heavy material or commodities are stacked will have a weight carrying limitation clearly marked on the structure and have a safety factor of at least +10% of maximum total carrying capacity.

All materials, commodities, or articles, which could be damaged due to inclement weather, must be stored under cover. Waste material that is combustible must not be allowed to accumulate in sufficient quantities to create a hazard. No commodities or equipment may be stacked or stored within 500mm of rolling stock tracks or where mobile equipment travels.

The storage of material, small equipment, tools, files, and general items in cupboards and on shelves must always be neat and controlled. Incompatible substances must not be stored in or on the same cupboard or shelf.

No equipment, tools, files, or documents may be stored or stacked on top of cupboards which are higher than 1.5 meters in height.

43. Facilities.

Sanitary conveniences must be provided and maintained at a rate of at least 1 shower facility for every 20 workers, at least 1 toilet facility for every 20 workers, separate male and female changing facilities and sheltered eating areas.

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Where chemical toilets are provided, 1 toilet for every 20 employees must be allocated. All toilets must be cleaned daily, disinfected, and provided with toilet paper. All employees making use of these facilities have the responsibility to help keep the facilities neat, clean, and hygienic.

Washing facilities, including soap and towels, must be made available for use by all personnel on site.

Drainage from all washing/toilet facilities must be properly designed and constructed to prevent employee exposure to wastewater (and the associated biological hazards). Wastewater may not accumulate or stand in pools at any location on the project site. Change rooms must be provided and must always be kept clean and free from odors.

No chemicals, except those normally used for domestic cleaning of these facilities, may be stored in the facilities. No equipment or items (other than those normally associated with hygiene facilities) may be stored in the facilities. All entrances must be constructed in a way to afford privacy to users. Drinking water must be provided.

A sheltered (covered) area must be set aside on site to be used as a dining facility (eating area). Adequate seating must be provided for the maximum number of employees. The facility must be kept clean and tidy. Food may only be consumed in authorised sheltered areas.

A suitably sized, impervious receptacle (bin) must be provided for the disposal of waste food and other refuse generated at the dining facility. This bin must be emptied and cleaned regularly (i.e. promptly after mealtimes).

44. Occupational Hygiene.

Occupational Hygiene is the discipline of anticipating, recognizing, evaluating and controlling health hazards in the working environment with the objective of protecting worker health and well-being and safeguarding the community at large.

The contractor must ensure that the exposure or potential exposure of his employees to any of the following stressors is assessed and managed:

- Noise,
- Hazardous chemical agents,
- Hazardous biological agents,
- Thermal stress (heat or cold),
- Particulates (dust),

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- Silica (free crystalline silica),
- Asbestos,
- Ionizing radiation,
- Non-ionizing radiation,
- Vibration (hand/arm vibration and whole-body vibration),
- Ergonomics, and
- Illumination.

Baseline surveys shall be carried out by an Approved Inspection Authority and if it is determined that exposure levels for a particular stressor are unacceptable, then a monitoring and control plan must be implemented to manage any risk of overexposure.

Note: Where hazardous chemical agents are to be used as part of the construction process, the contractor must ensure that the chemical composition of each agent is known.

Carcinogenic (cancer-causing) ingredients must be specifically identified with due understanding that no chemical known to cause cancer will be permitted for use on site (an alternative will need to be sourced).

Note: Environmental conditions that are not associated with any activity may include:

- Heat stroke with symptoms such as hot dry skin, confusion, convulsions, and eventual loss of consciousness. This is the most severe disorder and can result in death if not detected at an early stage, the constructor shall ensure that all employees are trained/aware of the above conditions and make necessary arrangements/measures for the control of excessive heat, dust, cold and dehydration on site if required/needs arises proper or specific PPE will be purchased by the contractor to avoid stresses associated with the above stressors. The intake of water must be enforced and ensure good clean water at least 600 milliliters per hour.
- Snake bites may be avoided by making employees aware of the possibility of snakes on site and be trained on how to deal with the situation. There must be a trained person to deal with snake bites at the first Aid level and the contact details for the snake catchers must be always displayed on site.

44.1 Lighting.

For all work areas and access ways, if the natural lighting available is inadequate it must be supplemented by artificial lighting to meet the minimum levels required. A lighting survey to determine luminance must be conducted for all work areas, at least once every 2 years. Emergency lighting must be provided in all indoor workplaces that do not have adequate natural lighting or in which persons work at night. The

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emergency sources of lighting that are provided must be such that, when activated, an illuminance of not less than 0.3 lux is obtained at floor level to enable employees to evacuate safely.

Where it is necessary to stop machinery or shut down plant or processes before evacuating the workplace, or where dangerous materials are present or dangerous processes are carried out, the illuminance must be not less than 20 lux.

Windows and translucent sheeting must be kept adequately clean and clear of obstructions as far as reasonably practicable. Light fittings i.e. lenses and reflectors must be kept clean. If a light intensity meter is used, a valid calibration certificate must be available.

Neon lights must not be installed in areas where moving parts of machinery or equipment cannot be fully guarded, i.e. lathes, bench grinders, etc. in order to eliminate the stroboscopic effect. No person may use a portable electrical light where the operating voltage exceeds 50 volts, unless:

- It is fitted with a non-hydroscopic, non-conducting handle,
- All metal parts which may become live are protected against accidental contact,
- The lamp is protected by means of a guard firmly attached to the handle, and
- The cable can withstand rough use.

No person may use a portable electric light in damp or wet conditions or in closely confined spaces, inside metal vessels or when in contact with large masses of metal, unless:

- The lamp is connected to a source incorporating an earth leakage, and
- The operating voltage of the lamp does not exceed 50 volts.

44.2 Hearing Conservation.

A hearing conservation program must be implemented and protection against the effects of noise exposure must be provided when the noise exposures equal or exceed an 8-hour time-weighted average sound level of 85 decibels measured on the (A) weighted scale of a standard sound level meter at slow response.

1) For the hearing conservation program to be effective it must include as a minimum:

- Monitoring of the workplace to determine the representative exposure of employees to excessive noise levels.

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- An audiometric testing program for employees, which must include:
 - ✓ A baseline audiogram for all employees exposed to noise levels equal to or in excess of the standard.
 - ✓ Annual audiograms for each overexposed employee.
 - ✓ Analysis of audiogram results with retesting and/or referral to an otolaryngologist or qualified physician when a significant threshold shift (STS) occurs, and
 - ✓ Written employee notification of the STS.
- A training program for all employees exposed to noise.
- Provision of personal protective equipment to all affected employees when administrative or engineering controls fail to reduce sound levels to within the levels of the standards.

Monitoring employee exposures to noise shall be conducted by an Approved Inspection Authority.

The monitoring requirement may be met by either area monitoring or personal monitoring that is representative of employee exposures. Personal monitoring is preferred and may be required based on the type(s) of noise sources.

For purposes of the hearing conservation program, employee noise exposures shall be computed in accordance with the NER. A person-task specification shall be available for every job category and shall be submitted with an employee for audiometric testing.

Audiometric testing and an annual audiogram shall be provided as part of the regular medical examinations. Audiometric test results obtained from the pre-employment medical examination for a new employee shall be used as the baseline audiogram. Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace noise.

Hearing protectors shall not be used as a substitute for the requirement that baseline audiograms be preceded by 14 hours without exposure to workplace noise. Employees shall be notified of the need to avoid high levels of non-occupational noise exposure during this 14-hour period.

Record-keeping for the audiogram shall include:

- Name and job classification of the employee.
- Date of the audiogram.
- The examiner's name.
- Date of the last acoustic or exhaustive calibration of the audiometer.
- Employee's most recent noise exposure assessment.

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Audiometric test results shall be maintained in the employee's medical file. Remember that when there is a deterioration found and is reportable under OHS Act Section 25, the Occupational Medical Practitioner has to do the reporting.

To control noise exposure, its three basic elements shall be examined, i.e. source of the sound, travel path and effect on receiver or listener. Solution of a given noise problem might require alteration or modification of any or all of these three basic elements.

2) Controlling noise at the noise source can be achieved by the following:

- Select quiet equipment initially,
- In selecting quiet equipment, the following features shall be considered:
 - ✓ Low noise certification,
 - ✓ Advertisement of "quiet" operation, evidence of noise control design,
 - ✓ Evidence of "lower" and "slower" operating characteristics,
 - ✓ Side-by-side noise testing of equipment, and
 - ✓ "On-site" or "in operation" inspection of mechanical equipment before purchase.
- Reduce operating noise by considering the following control measures:
 - ✓ Reduce impact or impulse noise by reducing weight, size, or height of fall of impacting mass,
 - ✓ Reduce speed in machines and flow velocities and pressure in fluid systems,
 - ✓ Balance rotating parts to control machinery noise and vibration of fans, fly wheels, pulleys, cams, etc.,
 - ✓ Reduce frictional resistance between rotating, sliding or moving parts in mechanical systems: frequent lubrication, proper alignment of moving parts, static and dynamic balancing of rotating parts, correction of eccentricity or "out-of-roundness" of wheels, gears, rollers, pulley, etc.,
 - ✓ Reduce resistance in air or fluid systems: use of low flow velocities, smooth boundary surfaces of duct or pipe systems, and long-radius turns and flared sections in pipes, etc., to reduce turbulence noise,
 - ✓ Isolate vibration elements in machinery, install motors, pumps, etc. on most massive parts of machine, use belt or roller drives in place of gear trains, use flexible hoses and wiring instead of rigid piping and stiff wiring, etc.,
 - ✓ Apply vibration damping materials such as liquid mastic, pads of rubber, felt, foam or fibrous blankets; or sheet metal viscos-elastic laminates or composites to vibrating machine surfaces, and
 - ✓ Reduce noise leakage from the interior of machines such as compressors by sealing or covering all openings or applying acoustical materials to machine interiors. The design team needs to review this for the final operational

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requirements as well as the contractor to ensure their design and work is carried out with as little noise as possible.

3) Controlling noise in the transmission path can be achieved by the following:

- Separate the noise source and receiver as much as possible,
- Use sound-absorbing materials on ceiling, floor or wall surfaces as close to the machine as possible,
- Use sound barriers and deflectors in the noise path,
- Use acoustical lining on inside surfaces of such passageways as ducts, pipe chases, or electrical channels,
- Use mufflers, silencers or snubbers on all gasoline or diesel engines, regardless of size and particularly on equipment when large quantities of high-pressure, high-velocity gases, liquids, steam, or air are discharged into the open air, and
- Use vibration isolators and flexible couplers where the noise transmission path is structure borne in character.

4) Protection for the receiver - when engineering controls fail to reduce the levels to within the levels specified in NER, the following measures shall be implemented:

- Personal protective equipment shall be provided and replaced as necessary at no cost to employees, and
- Supervisors shall ensure that hearing protective devices are worn by all employees who are exposed to a time-weighted average of 85 decibels or greater and who have experienced a significant threshold shift.

Noise zones shall be indicated by means of signs at every entrance to such zones. When noise levels exceed 100 dB(A), a combination of earplug and earmuff may be required to achieve protection of the worker. It is important to note that using double protection will add only 5 to 10 dB of extra attenuation above that of a single Hearing Protection Device. Hearing protection devices should be worn for the full noise exposure period.

Where an audiometry programme is required, it must meet the following standards:

- All testing must be by pure tone audiometry in an audiometry booth or quiet room, with measured noise levels less than 40 dB(A),
- The initial audiogram must be taken prior (minimum of 24 hours) to exposure to significant noise. Further audiograms must be taken periodically, annually where exposures are over 85 dB(A) or where continued deterioration of hearing is occurring.
- Testing must be performed by trained and competent personnel.

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- Audiometers must be calibrated according to the manufacturer's guidelines. As a minimum these will be a weekly biological calibration using an employee unexposed to noise, or a bio-acoustic simulator, and an annual quantitative check. All results must be documented, and
- Audiograms must be read by trained persons who will identify any increasing hearing loss and then determine if this is noise induced. Any employee with a significant downward shift in one or both ears (measured as an average non-age-adjusted loss from baseline of 10 dB at 2, 3 or 4 kHz) must be retested following removal from noise for a minimum of 24 hours, usually after a days-off period. If the downward shift persists the employee must be reviewed by a physician and improved hearing protection considered.

44.3 Particulate and Gas/Vapor Exposures.

Designated areas must be created where:

- It is likely that the 95% upper confidence limit of a Specific Exposure Group's (SEGs) mean exposure concentration for agents resulting in chronic effects (such as total inhalable dust, respirable dust, respirable crystalline silica, PAH, fluorides, lead, mercury, asbestos or non-asbestos fibrous materials) exceeds the relevant OEL, and
- Agents with acute effect, such as particulate hazards or gases (e.g. CO, SO₂, NH₃, HF, etc.), or vapors exceed 50% of the relevant OEL.

Designated areas must:

- Be identified and mapped, signposted or otherwise clearly communicated to employees working in the area. Signposting, where necessary, must use appropriate wording or symbols on signs to identify the hazard,
- Have a documented respiratory protection programme based on suitable Risk Assessment and standards which is applied to all personnel,
- Have regular monitoring of Specific Exposure Group's (SEGs) working in the area, and
- Have a formal review of the practicality of engineering controls at least every two years, or less where it is critical control for a significant risk.

Particulate and gas/vapor monitoring must be appropriate to the exposure conditions and toxicants and based on the use of equipment approved by regulatory authorities. Where Risk Assessment indicates the possible presence of levels of gas/vapor sufficient to cause health effects in less than one shift, continuous monitoring is required as long as the potential for harm exists.

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Personnel must be covered by a medical surveillance programme when:

- Their Specific Exposure Group (SEG) time-weighted average mean exposure to respirable crystalline silica, total inhalable dust, respirable dust, lead, or asbestos is greater than 50% of the relevant OEL,
- The medical adviser considers that it is advisable, or
- There is a legal requirement for medical monitoring.

Where Risk Assessment indicates a risk of respiratory condition, assessment programmes must include chest x-rays and/or lung function tests. The test or tests chosen must enable the earliest detection of adverse effects from the exposure of concern. Where indicated, they must meet the following standards:

- High quality chest x-rays will be taken at intervals required by relevant legislations,
- All chest x-rays for pneumoconiosis surveillance will be read to International Labour Organisation (ILO) standards by an ILO B reader, wherever possible, and if not, by a competent radiologist using verifiable quality criteria,
- Any progression of more than one step on the ILO extended scheme to a reading above 1/0 will be reviewed by a physician,
- Any reading suggesting active lung disease will be reviewed by a physician, and
- All spirometry will be performed by trained staff following the American Thoracic Society guidelines or equivalent and be offered at a frequency determined by the likely rate of detectable change in lung function.

Controls must be of an adequate standard such that surfaces are adequately cleaned to avoid:

- Dust generation due to material dislodgment (e.g. windblown), where practicable, or
- Fume generation from accumulated dust during welding/ heating or cutting operations.

Where Risk Assessment indicates the need to reduce exposures to toxic substances for employees or their families, good personal hygiene must be enforced. The programme must include:

- No smoking, eating, or drinking in designated hazard areas,
- Washing hands and face prior to drinking, eating, or smoking,
- Showering at work post shift or after exposure to 'dirty' conditions, and
- Laundering of contaminated clothing by the contractor.

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Abrasive blast cleaning must be conducted so as to protect worker health and minimize dust emissions. Substitutes must be used whenever practicable for abrasives containing crystalline silica. However, if such abrasives are used, workers must be aware of the hazards and exposure monitoring conducted. The hazardous properties of alternative materials must be considered before use.

Where required, training in the recognition of signs and symptoms of hazardous particulate and gas/vapor exposure, emergency procedures and preventative measures must be provided.

44.4 Respiratory Protection Devices.

The selection of Respiratory Protection Devices (RPD's) must be based on:

- The potential particulate size distribution, gas/vapor types, substance toxicity and likely concentrations,
- Compatibility with the work tasks and other PPE, and
- Comfort (as it affects wear-time) and allowance for adequate communication.

Only RPD's approved by project management may be used. Suitable facilities must be available for cleaning and sanitary storage of RPD's. Half-mask and full-face air-purifying respirators must NOT be used where:

- The atmosphere is oxygen deficient ($< 19.5\%$),
- The atmosphere is immediately dangerous to life or health (e.g. in areas where CO concentrations are $>1500\text{ppm}$, HF $>30\text{ppm}$, or $\text{NH}_4 >300\text{ppm}$),
- Gases and vapors are more than 10 times their OEL or greater than 1000 ppm for half mask respirators, or more than 100 times their OEL for full-face respirators, or
- Particulates are more than 5 times their OEL for half-mask respirators, or more than 50 times their OEL for full-faced respirators.

For atmospheres that are oxygen deficient, or contain unknown hazards, or have concentrations of gases and vapors that are unknown or could potentially exceed levels that are immediately dangerous to life or health, an air-supplied type respirator must be worn.

For effective use of negative pressure RPD's (including disposable RPD's), fit testing must be qualitative and documented as a minimum, although quantitative fit testing is preferred. Fit testing must be performed by a competent person when RPD's are first issued and must be repeated periodically according to legal requirements or two-yearly as a minimum frequency. There must be a policy requiring a clean-shaven face when using a negative or neutral pressure RPD for routine tasks, or the use of a positive pressure RPD will be required. A

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pulmonary function test and medical evaluation may be required to determine whether or not an individual is medically fit to wear a respirator.

For air supplied RPD's, breathing air must be effectively filtered and/or isolated from plant and instrument air and isolated from sources of potential contaminants. The quality of the breathing air must be checked for conformance with applicable standards.

The respiratory protection programme must include:

- Periodic inspection of RPD's, including before each use,
- Periodic evaluation of cleaning, sanitizing, maintenance and storage practices by competent persons,
- Performance of positive and negative fit checks before each use by RPD wearers to ensure that the respirator is functioning properly, and
- Training at first issue of an RPD and regular refresher training thereafter in accordance with regulatory requirements or at least once every two years.

44.5 Hazardous Chemical Agents (HCA).

No HCA may be brought onto site unless it has been approved for use by the project management and it appears on the approved HCA register which shall contain the following information.

- Trade name/Product name of the HCA,
- Manufacturer/Supplier of the HCA,
- Maximum inventory,
- Storage requirements and precautions,
- Inventory of special emergency items held for handling spillages, fires, etc. (e.g. reagents to neutralize spillages, firefighting foam, etc.), and
- Approved disposal methods.

If the contractor wishes to make use of an HCA that does not appear on the register, then the contractor must provide the following information to project management for review PRIOR to bringing it onto site:

- Safety Data Sheet (SDS) that aligns with the Globally Harmonized System (GHS) issued by the manufacturer/supplier of the HCA.
- The reason for wanting to bring the HCA onto site (i.e. the intended use of the substance).
- The proposed method of transportation.
- The proposed arrangements for the safe storage of the HCA.
- The quantity to be stored on site.

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- The proposed methods for handling/using the substance (including PPE).
- The proposed method of disposal of the waste.
- Proof that the contractor is able to readily provide the necessary first aid measures as specified on the SDS, and
- Risk Assessment covering the transportation, use, handling, storage, and disposal of the substance with specific reference to the substance's compatibility with other chemicals.

This information must be provided at least 5 working days prior to the date on which the contractor intends to bring the HCA onto site for use. Any chemical substance brought onto site without adherence to the requirements stipulated above shall be removed from site immediately.

If project management approves the substance for use, the contractor must ensure that all necessary precautions are taken concerning the transportation, use, handling, storage and disposal of the substance, and that all required PPE and first aid materials/equipment (as stipulated on the SDS) are readily available on site.

The contractor must ensure that an SDS is obtained for each HCA brought onto site. A file or files containing all of the SDS's must be maintained and must be readily available to all personnel on site (particularly first aiders) as well as other potentially affected parties (e.g. emergency services personnel, etc.). Current revision of each SDS shall not be older than 5 years.

The contractor must appoint a trained and competent Hazardous Chemical Agents Coordinator who understands and is able to evaluate the risks associated with a wide variety of HCA's who shall also be responsible for:

- Assessing the hazardous properties and risks associated with HCA's brought onto site by the contractor (using SDS's),
- Determining precautions and safe practices for transportation, use, handling, storage, and disposal (including PPE requirements) (using SDS's),
- Determining first aid and emergency response requirements/procedures (using SDS's),
- Maintaining the SDS file,
- Managing and monitoring the consumption of inventory, and
- Providing an "as needed" service to site personnel and suppliers.

The risks associated with the transportation, use, handling, storage and disposal of all HCA's brought onto site must be assessed and managed by the contractor through a process that incorporates risk reduction using the hierarchy of controls. The contractor must provide Safe Work Procedures for the transportation, use, handling, storage, and disposal of all HCA's to be used on site.

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The contractor must provide his employees with PPE that is necessary to prevent exposure/injury while handling/using the HCA that they will be required to work with. Appropriate PPE must be selected with consideration given to the potential hazards, permeability, penetration, resistance to damage and compatibility with the work tasks.

The contractor's employees must be trained in the safe transportation, use, handling, storage, and disposal of the HCA that they will be required to work with or may come into contact with. The training must specifically address PPE requirements (including the correct selection, fitment and use thereof).

All personnel must be trained to understand the potential health effects associated with exposure to HCA and therefore the importance of Safe Work Procedures and PPE. All personnel must be trained in emergency response procedures and first aid measures. Behaviour-based observations and coaching must include the use/handling of HCA.

An appropriate occupational exposure monitoring and medical surveillance programme must be in place for all personnel potentially exposed to HCA's which have the potential to cause immediate or long-term harm.

Emergency showers and eyewash stations must be provided where required by legislation, or where a Risk Assessment indicates a need. The emergency showers and eyewash stations must be appropriately located, signposted, and regularly tested and maintained. Employees must receive training on the location and use of the showers/eyewash stations. An emergency response plan for incidents involving HCA must be in place. Regular and appropriately staged emergency drills (possibly involving external spill response and ambulance support services) must be held and lessons learnt must be incorporated into the emergency response plan.

The contractor must provide appropriate storage facilities for all HCA's to be used on site. The storage facilities must be secure and protected from damage. They must also be designed for easy access for firefighting purposes. Where applicable, the storage facility must protect HCA containers from physical damage due to temperature extremes, moisture, corrosive mists or vapors, and vehicles.

The inventory of HCA's stored on site must be kept to a minimum. The quantity of each chemical stored must be justifiable. Storage and segregation requirements for all HCA's to be used on site must be based on:

- The quantities of the HCA's stored,
- The physical state of the HCA (solid, liquid or gas).
- The degree of incompatibility, and
- The known behaviour of the substances.

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Access to areas where HCA's are stored and handled must be limited and controlled.

HCA containers must be adequately and clearly labelled to identify their contents, to indicate precautionary requirements, and to indicate the date of expiry (if applicable). Pipes used to transfer/convey/distribute the HCA must be clearly identified (e.g. colour coding). Directional flow must be indicated where practical. Before any item, equipment or empty container containing HCA residue is disposed of as general waste, it must be properly decontaminated (where applicable). Before being disposed of, empty HCA containers must also be rendered unusable for carrying water (by puncturing, cutting or crushing them).

HCA waste (i.e. redundant/expired HCA, containers containing residues, contaminated items/materials, etc.) must be disposed of in accordance with the applicable legislation.

Maintenance, inspection and testing schedules and procedures must be in place for critical equipment associated with HCA's. A system must be in place to ensure that the risks are assessed before any changes are made to equipment and/or processes for the transportation, storage, handling, use or disposal of HCA. A programme must be in place to continually investigate possibilities/opportunities for replacing HCA's with safer alternatives.

44.6 Radiation.

The risks associated with ionizing (from naturally occurring radioactive minerals (NORM), radon, and man-made sources), ultraviolet (UV) and electromagnetic field (EMF) radiation exposure must be assessed by a competent person.

There must be an inventory of all radiation sources that have the potential to cause adverse health effects. For each radiation source, the type of radiation (e.g. radioisotope, radon, x-ray, EMF, laser, etc.), the strength of the radiation, and the location must be recorded.

Where Risk Assessment indicates the need, a documented radiation management programme must be developed such that:

- All types of radiation sources are adequately characterized and described,
- Exposures are eliminated or reduced to as low as reasonably practicable (ALARP),
- A clearly defined chain of responsibility (with duties) is provided, and
- Education is provided for employees regarding radiation safety, including the radiation management programme elements.

The ionizing radiation management programme must meet all applicable regulatory requirements, and as a minimum must include the following elements (as applicable):

- Surveyed radiation areas and quantification of exposure sources/levels,

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- Exposure and medical monitoring programmes based on established investigation levels,
- Transport of radioactive materials in compliance with international radiation transport regulations when no local regulations are in place,
- Waste monitoring and disposal programmes,
- Feedstock and equipment check for naturally occurring ionizing radiation,
- Clearance and control procedures for all contaminated materials and equipment leaving or arriving at site (including scrap),
- Leak (wipe) tests on sealed radioactive containment equipment,
- Lock-out procedures for vessels and equipment containing radioactive sources and radon decay product measurement prior to entry,
- Emergency procedures,
- Environmental impact Risk Assessment (air, water, waste, foods, etc.),
- Product/waste life cycle control, and
- Dose assessment for employees and critical exposure groups, according to documented methods and by a competent person. The timing of the operation should be when no other activity or persons are on site e.g. lunch or at night.

Areas with ionizing radiation with annual doses greater than 5 milli sieverts (mSv) must be designated as restricted access or controlled areas. These areas must be identified and mapped, signposted or otherwise clearly communicated to employees working in the area.

Each person whose potential exposure exceeds 5 mSv per annum or who is a designated radiation worker must undergo periodic personal radiation monitoring and medical surveillance designed to show continued fitness for radiation work.

All sources of ionizing radiation must be managed in use and when they are either disposed of or securely stored in accordance with applicable legislation. Each operation where individual worker's exposures could exceed 5 mSv per annum must have a trained radiation protection adviser or ready access to a trained protection consultant.

There must be documented procedures for the inspection, assessment and maintenance of the controls, and emergency procedures to deal with incidents involving ionizing radiation sources (including fire and explosions). All controls must be reassessed annually to ensure their continued effectiveness and that operating practices are in accordance with written procedures.

44.7 Thermal Stress.

Hot areas or activities where employees have experienced or could experience excessive fatigue, muscle cramps, dehydration, dizziness, and other symptoms of heat stress must be identified and described.

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Where the risk of thermal stress is determined, a competent person must conduct monitoring surveys on site, in consultation with workers.

For defined extreme thermal conditions and job activities, medical examinations must include information about the operator's physiological and biomedical aspects, and an assessment of fitness for the working conditions.

Cold areas or activities where employees have experienced or could experience pain or loss of feeling in extremities, frostbite, severe shivering, excessive fatigue, and other symptoms of cold stress must be identified and described.

Workplace thermal stress levels (temperature, air movement, humidity, etc.), activities (work level, etc.) and conditions (clothing, health, etc.) that have the potential to exacerbate thermal stress effects must be adequately characterized and described.

Detailed heat stress assessment of identified tasks or jobs must be tiered to commence with the use of a simple heat stress index as a screening tool, then if necessary:

- Use rational heat stress indices in an iterative manner to determine the 'best' control methods for alleviating potential heat stress, and
- Undertake physiological monitoring when exposure times are calculated to be less than 30 minutes, or where high-level PPE that limits heat loss must be worn. By wearing special types of clothing one can also become too hot and therefore one needs to have a time weighted exposure program.

Detailed cold stress assessment of identified tasks or jobs must be conducted according to current appropriate guidelines that incorporate a cold stress index to determine the 'best' control methods for alleviating potential cold stress.

When a risk of thermal stress is identified, the following exposure controls must be implemented:

- An acclimatization period for new workers and those returning from extended leave or sickness,
- Training in the recognition of signs and symptoms of heat or cold stress, emergency procedures and preventative measures,
- Protective observation (buddy system or supervision), and
- A requirement for self-paced working.

The following exposure controls must be considered by a competent person:

- Work/rest regimes and job rotation based on measurements conducted,

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- Suitable rest areas with a provision of cool drinking water and cool conditions for high temperatures, or provision of warm drinks and warm conditions for cold temperatures,
- Selection of appropriate clothing or other PPE for extreme temperature conditions,
- The use of engineering controls, and
- Undertake hot/cold tasks during a cooler/warmer time of the day.

Where thermal stress is assessed to be a risk, a suitable emergency response plan must be developed in this regard.

45. Fitness for Work.

The contractor must develop and implement a programme to manage employee fitness for work. All employees working on site for whom the contractor is responsible (i.e. direct employees of the contractor as well as the employees of any appointed contractors) must be subject to this programme.

All safety critical jobs (i.e. roles where fatigue or other causes of reduced fitness for work could lead to serious injury, illness or death to employees, significant equipment/plant damage, or significant environmental impact) must be identified and the risks associated with reduced fitness for work in these roles must be assessed.

A programme to manage these risks must be implemented and it must include:

- Mechanisms for managing fatigue, stress, and lack of fitness,
- An alcohol and other (including prescription, pharmaceutical or illicit) drugs policy that includes testing,
- An Employee Assistance Programme providing confidential access to resources and counsellors, and
- Training and awareness programmes.

Each employee has an obligation to present himself fit for work at the start of the day/shift, and to remain fit for work throughout the work period. Reporting for work under the influence of alcohol or any other intoxicating substance will not be tolerated. Any transgression concerning the alcohol and other drugs policy applicable to the project may result in the offending employee's access to the project premises being temporarily or permanently withdrawn.

Alcohol and drug testing on the project premises will be carried out randomly (as employees report for duty and during the course of the day/shift), following significant incidents (all persons involved), and whenever there is reasonable suspicion. Alcohol and drug testing may also be carried out as part of a Pre-Employment Medical Examination.

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Sleep deprivation during shift work or from excessive working hours is a known cause of fatigue. Fatigued employees are at increased risk of accidents. Shift system design must consider:

- The effect on worker fatigue,
- The effects of activities carried out during scheduled and overtime hours,
- The impact on sleep cycles of activities such as commuting to and from site, and
- The monitoring and control of working hours.

The contractor is responsible for the administration of the working hours of his employees as well as the employees of any appointed contractors. The maximum working hours per day and the minimum rest times between shifts must be specified in the contractor's Health and Safety Management Plan and must comply with all applicable legislation. The contractor has to provide the proof that the Department of Employment and Labour has given permission to work the required man-hours.

All employees engaged in safety critical jobs must undergo fitness assessments (medical examinations) which must be carried out prior to the commencement of employment on the project, prior to a change in role, periodically based on an employee's individual risk profile, and on termination of employment on the project:

- Pre-Employment Medical Examination to assess the physical suitability of the person for the role and environment in which he will work (carried out prior to the commencement of employment on the project and prior to induction),
- Periodic (Surveillance) Medical Examination to assess the ongoing physical condition of an employee to determine if his role is impacting on his health and whether the employee's fitness level is still adequate for the role he holds (these medical examinations are "risk driven" the specific protocol followed and the frequency of the examinations will depend on the applicable legal requirements and the employee's individual risk profile as determined by his personal fitness, the nature of his role/duties, and the environment in which he works/occupational health hazards to which he is exposed). The periodic medical assessment programme must include:
 - ✓ The identification of modifiable risk factors that may impact fitness for work.
 - ✓ Education and support to maintain health or address identified risk factors, and
 - ✓ Education and support to help employees regain their fitness for work.
- Role Change Medical Examination to assess an employee's physical suitability for a different role and work environment (carried out prior to a change in role/duties), and

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- Exit (Post-Employment) Medical Examination to determine the total physical impact of the work the employee performed (carried out on termination of employment on the project if the employee worked on the project site for more than six months).

Note: The results of an Exit Medical Examination from previous employment will not be accepted as a Pre-Employment Medical Examination.

Note: The medical examinations described above may only be carried out by an occupational medical practitioner (i.e. a medical doctor who holds a qualification in occupational medicine).

A detailed job (role) description and an exposure profile (noise, dust, heat, fumes, vapors, etc.) must be provided for each employee or group of employees. The medical examinations that an employee undergoes must be based on (i.e. the employee's fitness must be assessed against) the information contained in these documents as well as the Risk Assessment for the work. This information must be made available to the occupational medical practitioner performing the medical examination.

For each role, the medical criteria for fitness must be documented and these must be based on an evaluation of the physical and medical requirements for the role. Depending on the circumstances, certain vaccinations may need to be provided to employees. The medical examinations carried out for all drivers and operators must include testing/assessment for medical conditions that could affect the safe operation of vehicles or equipment.

Specific testing/questioning must be carried out to determine if an individual:

- Suffers from epilepsy or any other medical condition deemed to be a risk by the occupational medical practitioner,
- Makes use of chronic medication that could affect performance,
- Is colour-blind, or
- Has poor day or night vision.

The medical examinations carried out for employees that are required to work at height must include testing/questioning to determine if an individual suffers from epilepsy, hypertension (high blood pressure) or any other medical condition deemed to be a risk (with regard to working at height) by the occupational medical practitioner. Electricians must be tested for colour-blindness.

With regard to the placement of new employees:

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- Prospective employees must be referred to a suitable occupational medical practitioner (doctor) for a "Pre-Employment Medical Examination".
- If an individual is found to be medically "unfit for placement", the doctor will indicate which work activities cannot be performed by the person.
- The individual may still be employed on the project if his medical restrictions can be accommodated and provided that no legislation is transgressed.

A process must be established to manage medical restrictions that may be placed on an employee. For every employee with a medical restriction, regular follow-up visits with the occupational medical practitioner must be arranged to ensure that each case is proactively managed.

An employee in a safety critical job must report (to his supervisor) any condition that might impair his ability to safely perform the duties associated with his role. A mechanism must be in place for such reports to be referred to an occupational medical practitioner to determine if the employee is fit to continue with his work.

Proof of all medical examinations (i.e. certificates of fitness signed by an occupational medical practitioner) must be kept on site and these records must be readily available for inspection by interested parties.

An employees' certificates of fitness must be included in his Personal Profile (dossier). If an Employee Personal Profile (dossier) has not already been compiled for a particular employee, then this must be done without delay following the employee's Pre-Employment Medical Examination. No employee in a safety critical role may commence work on site without proof that he has undergone a Pre-Employment Medical Examination.

Occupational medical examinations and data interpretation may only be carried out by medical practitioners that are appropriately qualified and certified to do so. Occupational medical data contained in reports to management must be grouped and summarized to ensure that the confidentiality rights of each individual employee are maintained. All occupational medical data and records must be retained for at least 40 years.

46. Measuring and Monitoring.

The workplace exposure (or potential exposure) of persons to occupational health stressors must be measured and monitored to determine the effectiveness of control measures as well as compliance with legal and other requirements, particularly Occupational Exposure Limits.

All such measuring and monitoring must be carried out by a competent person and/or an Approved Inspection Authority (i.e. a specialist service provider that is appropriately

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registered with a governing authority) as prescribed by the OHS Act and applicable Regulations.

A plan for measuring and monitoring occupational exposure must be developed and it must include:

- Detail of what must be measured and monitored, based on a Risk Assessment and/or identified legal or other requirements,
- The frequency of measurement and monitoring,
- A description of the necessary equipment,
- Data quality requirements and controls (including details on the sample size for statistical validation and any rejection criteria),
- The sampling and analysis method(s) including any laboratory certification requirements, and
- The competency requirements for persons carrying out workplace monitoring.

Each instrument and item of equipment used for occupational exposure measurement and/or monitoring must be:

- Properly maintained to ensure compliance with legislative requirements,
- Controlled and safeguarded from unintentional adjustments,
- Suitably stored and protected from damage, and
- Calibrated or verified against a traceable standard at specific intervals (calibration records must be retained).

Each analytical laboratory service that is used must have implemented a credible quality assurance or quality control programme. All monitoring results obtained must be analyzed on a regular basis to:

- Identify trends and potential exceedances of legal or other requirements (such as Occupational Exposure Limits),
- Identify inconsistent or unusual results,
- Evaluate the effectiveness of existing control measures,
- Measure performance against stated objectives, and
- Identify continual improvement opportunities.

Each exceedance of a specified requirement or limit must be recorded, investigated, and reported. Appropriate corrective actions must be identified and implemented.

47. Working at Night.

That contractor must ensure the following is in place prior to initiating night shift:

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- Conduct lighting survey before initiating night work,
- Ensure the site is adequately illuminated and safe at night as workers should not be allowed to work in the dark or in an unsafe site,
- A comprehensive Risk Assessment must be conducted prior to the commencement of work and approved by project management before commencement of work, and
- Fatigue management program must be presented for approval prior to the approval of working at night.

48. Temporary works.

A contractor must appoint a temporary works designer in writing to design, inspect and approve the erected temporary works on site before use, ensure that all temporary works operations are carried out under the supervision of a competent person who has been appointed in writing for that purpose, ensure that all temporary works structures are adequately erected, supported, braced, and ensure that all temporary works structures are adequately erected, supported, braced and maintained by a competent person so that they are capable of supporting all anticipated vertical and lateral loads that may be applied to them, and that no loads are imposed onto the structure that the structure is not designed to withstand.

All temporary works structures are done with close reference to the structural design drawings, and where any uncertainty exists, the structural designer should be consulted, detailed activity specific drawings pertaining to the design of temporary works structures are kept on the site and are available on request to interested parties.

All persons required to erect, move, or dismantle temporary works structures are provided with adequate training and instruction to perform those operations safely. All equipment used in temporary works structure are carefully examined and checked for suitability by a competent person, before being used. All temporary works structures are inspected by a competent person immediately before, during and after the placement of concrete, after inclement weather or any other imposed load and at least on a daily basis until the temporary works structure has been removed and the results have been recorded in a register and made available on site.

No person may cast concrete, until authorization in writing has been given by the competent person. If, after erection, any temporary works structure is found to be damaged or weakened to such a degree that its integrity is affected, it is safely removed or reinforced immediately. Adequate precautionary measures are taken in order to:

- Secure any deck panels against displacement,

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- Prevent any person from slipping on temporary works due to the application of release agents,
- The health of any person is not affected through the use of solvents or oils or any other similar substances,
- Upon casting concrete, the temporary works structure is left in place until the concrete has acquired sufficient strength to safely support its own weight and any imposed load and is not removed until authorization in writing has been given by the competent person,
- The foundation conditions are suitable to withstand the loads caused by the temporary works structure and any imposed load in accordance with the temporary works design,
- Provision is made for safe access by means of secured ladders or staircases for a temporary works drawing, or any other relevant document includes construction sequences and methods statements,
- The temporary works designer has been issued with the latest revision of any relevant structural design drawing,
- A temporary works design and drawing is used only for its intended purpose and for a specific portion of a construction site, and
- The temporary works drawings are approved by the temporary works designer before the erection of any temporary works.

No contractor may use a temporary works design and drawing for any work other than its intended purpose. The temporary works plan with the Risk Assessment has to be approved by the appointed team before the work can commence.

49. Structures.

The contractor must ensure that:

- All reasonably practicable steps are taken to prevent the uncontrolled collapse of any new or existing structure or any part thereof which may become unstable or is in a temporary state of weakness or instability due to the carrying out of construction work,
- No structure or part of a structure is loaded in a manner which would render it unsafe, and
- All drawings pertaining to the design of the relevant structure are kept on site and are available on request to interested parties.

The owner of a structure must ensure that:

- Inspections of that structure are carried out periodically by competent persons in order to render the structure safe for continued use,

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- The inspections are carried out at least once every six months for the first two years and thereafter yearly,
- Structure is maintained in such a manner that it remains safe for continued use, and
- Records of inspections and maintenance are kept and made available on request to interested parties.

50. Emergency Preparedness and Response.

The contractor must develop, implement, test, and maintain an Emergency Response Plan (incorporating emergency evacuation procedures) that focuses specifically on the contractor's team and work activities. The plan must be risk-based and must detail the procedures that must be followed when responding to all potential emergency scenarios such as a medical emergency (including first aid response), a fire, an explosion, a hazardous chemical agent (HCA) spill, flooding, rescue from height, rescue from a confined space, etc.

Potential off-site emergency scenarios must be included (e.g. emergency scenarios related to the transport of personnel, the transport of hazardous materials, and personnel performing work in remote locations).

Availability and capability of local emergency services shall be considered when developing Emergency Response Plan. Details of any arrangements with external emergency response service providers must be included in the plan.

The Emergency Response Plan must satisfy and comply with all applicable legal requirements. The plan must be adequately resourced to ensure effective implementation. These resources must include appropriate personnel, external emergency response service providers, emergency response equipment, and warning devices. All equipment and warning devices must be identified, maintained, and always tested to ensure availability.

Accountability for the Emergency Response Plan must be clearly defined. An Emergency Response Team (ERT) responsible for the implementation, management and execution of the Emergency Response Plan must be established. The roles and responsibilities of each team member must be clearly defined in the plan. Each team member must receive appropriate training to ensure that each role is performed competently.

The process for managing incident communication, notification, and reporting must be incorporated into the Emergency Response Plan. The responsible person(s) must be clearly identified, and the protocols for communicating with internal and external stakeholders must be defined.

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The Emergency Response Plan must be formally reviewed (and amended if necessary) on at least an annual basis, and following any emergency situation, to ensure that it remains appropriate and effective.

At each project work site:

- A suitable evacuation alarm (siren) must be provided. If work is to be carried out in proximity to an existing operational plant, the alarm provided by the contractor must be distinctly different (in terms of the sound that it generates) to any alarm installed in the operational plant. All persons working in an area where an evacuation alarm is sounded must respond to it immediately,
- Suitable fire-fighting equipment must be provided and maintained, and personnel must be trained in fire-fighting procedures and the use of fire-fighting equipment.
- Suitable first aid equipment and supplies must be provided and maintained, and an adequate number of appropriately trained First Aiders must be in place,
- Emergency assembly points positioned in safe locations away from buildings, plant and equipment must be designated (and conspicuously signposted). In the event of an evacuation, all persons (i.e. personnel and visitors) must assemble and be accounted for at these emergency assembly points,
- All personnel must receive awareness training on the applicable emergency response procedures, and all visitors entering the site must be properly instructed in these procedures,
- The emergency response procedures must be displayed on each notice board,
- A diagram (site plan) indicating evacuation routes, emergency assembly point locations, and the positioning of emergency equipment (fire extinguishers, first aid boxes, etc.) must be prominently displayed in all buildings and plants, in all offices, on all notice boards, and in other locations on the site as may be required,
- An up-to-date list of emergency telephone numbers must be compiled and maintained. A copy of this list must be posted at each site entrance, in each office, near each telephone, and on every notice board, and
- Emergency response drills must be conducted to test the effectiveness of the emergency procedures and equipment, as well as the knowledge and proficiency of the response personnel. Where appropriate, drills must include liaison with and the involvement of external emergency response service providers. A variety of emergency scenarios must be tested including, but not limited to, medical emergencies, fires, rescues, and hazardous chemical agent spills. A drill must be carried out one month after site establishment and six-monthly thereafter.

Each drill must be monitored, and the outcomes (highlights and shortcomings) must be documented. Corrective actions must be identified and implemented to address the

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shortcomings, and the Emergency Response Plan and associated procedures must be amended as required.

The Emergency Response Plan requirements as articulated above need to be developed by the contractor. The requirements are compiled having considered the TPL Health and Safety Site Specific Emergency Response Plans and its associated business recovery plans.

51. Incident Reporting and Investigation.

All incidents referred to in GAR 8 and 9 involving the contractor on the project site or TPL premises, shall be reported to project management and DoEL OHS Inspectorate as prescribed by the OHS Act.

The contractor must establish a procedure for the management of all health and safety incidents. This procedure must define the responsibilities, methodologies and processes that must be followed for:

- Reporting an incident,
- Investigating an incident,
- Analyzing an incident to determine the root cause,
- Identifying and implementing corrective actions to prevent a recurrence, and
- Communicating information concerning an incident to relevant persons and/or groups.

Please Note: Arrangements must be made to ensure that proper medical care is provided to any contractor employee that suffers an occupational injury or illness. These arrangements must be described in the contractor's Health and Safety Management Plan.

An incident may have multiple impacts. For each impact, the Actual Consequence and the Maximum Reasonable Outcome must be evaluated. Each impact must be evaluated independently with the most significant classification forming the primary rating of the incident. A Near Miss is an incident. All Near Misses must be reported.

An incident must be reported as soon as practicable but not later than the end of the same workday or shift on which it occurs, and preliminary details must be recorded and a TPL Incident Flash Report must be completed within 24 hours. Depending on the Actual Consequence and Maximum Reasonable Potential Outcome of the impact(s), the relevant internal and external parties must be notified in accordance with specified protocols and timeframes, and legislative requirements.

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In the event of a significant incident (i.e. an incident with an Actual Consequence of Moderate, Major or Catastrophic, or a Maximum Reasonable Potential Outcome of High or Extreme, work must cease and must only resume once the necessary actions (including the re-evaluation of any relevant Risk Assessments) have been taken to eliminate or reduce the risk of recurrence. Work must only be permitted to recommence once formal authorisation has been granted by the Construction Manager. In the case of incidents with an Actual Consequence of Major or Catastrophic, work must not be permitted to recommence until authorisation has been granted by the relevant government authorities (i.e. DoEL or SAPS).

The Construction Manager must ensure that an investigation is completed for each incident that occurs, and that appropriately senior personnel participate in, and authorize the outcomes of each investigation. Incident investigations must be facilitated by competent and experienced persons who have been trained in the appropriate methodology.

All significant incidents (i.e. incidents with an Actual Consequence of Moderate, Major or Catastrophic, or a Maximum Reasonable Outcome of High or Extreme) must be investigated using methodology approved by project management.

For all other incidents (i.e. incidents with an Actual Consequence of Insignificant or Minor, or a Maximum Reasonable Outcome of Low or Moderate), other methodologies may be used.

Each incident (including Near Miss) must be investigated to a level of detail that is appropriate for the Maximum Reasonable Potential Outcome of the incident.

Each incident must be analyzed to determine the root cause, and corrective actions must be identified and prioritized for implementation to eliminate or reduce the risk(s) in order to prevent recurrence of the incident.

For each corrective action, a responsible person must be designated and an appropriate timeframe (target date) for completion of the corrective action must be specified. Progress in implementing corrective actions (i.e. closing incidents) must be monitored and reported on. The implementation of corrective actions must be verified during monthly audits by the SHEQ Specialist or designated personnel but also no later than 30 calendar days after the conclusion of the incident investigation.

The contractor must document the results of each investigation, and a report must be submitted to project management within 7 days of the incident occurrence.

As a minimum, each incident report must include:

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- The date, time, and location of the incident,
- A detailed description of the incident, including photographs,
- The names of any injured persons,
- Injury details (if applicable),
- A summary of the first aid and/or medical treatment provided (if applicable),
- The current status of any injured persons.,
- The root causes of the incident, and
- Detailed corrective actions, including responsible persons and target dates for implementation.

Each significant incident must be summarized for its lessons learnt following the investigation. This information must be reviewed by the Construction Manager to assure completeness, accuracy, and relevance before it is shared with (communicated to) all project personnel.

51.1 First Aid Arrangements.

The contractor must ensure that adequate number of First Aiders are trained and appointed in ratios and requirements as described in GSR 3. Suitable first aid kits (i.e. appropriate to the level of training) must be readily available to each First Aider. All kits must be provided and maintained by the contractor. Considering the type of injuries that are likely to occur in the workplace, each first aid kit must contain suitable equipment and supplies. First-aid equipment and supplies required by GSR Annexure must be provided as a minimum. Monthly inspections must be conducted by appointed First Aiders, including monitoring of expiring contents.

The contents of each first aid kit must be kept clean and dry. Each kit must be contained in either a portable weatherproof case/bag or a steel box mounted to a fixed structure. Access to first aid equipment/supplies must be limited to trained First Aiders only. Access to portable kit bags must be controlled and steel first aid boxes mounted in the workplace must be kept locked. Approved signage must be in place to indicate the locations of the first aid boxes/bags. A record of each treatment administered must be kept in a suitable register.

52. Performance Assessment and Auditing.

The contractor must establish and maintain programmes for measuring and monitoring health and safety performance on a regular basis. Metrics must include leading and lagging indicators and be based on qualitative and quantitative data.

52.1 Reporting on Performance.

Reports summarizing the contractor's health and safety performance on the project must be compiled on a weekly and a monthly basis. The contractor must be prepared to discuss the content of these reports at scheduled health and safety meetings. The reports must contain the following information:

- Number of employees including appointed contractors on site,
- Total hours worked on site by contractor and appointed contractors' employees (by company),
- Number of incidents by category (i.e., Near miss, First Aid Incident (FA), Medical Treatment case (MTC) and Lost Time Incident (LTI),
- Lost Time Injury Frequency Rate (LTIFR) (project to date and 12-month rolling),
- Details of all new incidents for the reporting period and the corrective actions taken or to be taken,
- Feedback (progress updates) on all open incidents and outstanding corrective actions,
- Status and feedback on any employee that may have been injured and has not yet returned to work,
- Details of all health and safety training carried out during the reporting period,
- Number of SOC's (Safety Observations and Coaching) carried out during the reporting period,
- SOC trends identified and proposed action for the coming week or month to maintain positive trends and/or address negative trends,
- Details of all audits, inspections and site visits carried out during the reporting period, and the corrective actions taken (or to be taken) to address all nonconformances,
- Feedback (progress updates) on all open non-conformances and outstanding corrective actions,
- Number of Toolbox Talks conducted during the reporting period (monthly),
- Number of Planned Task Observations (PTO's) carried out during the reporting period (monthly),
- Details of all active Risk Assessments and Safe Work Procedures highlighting those that are due for review in the coming month (monthly),
- A look ahead (to the coming week, month, or quarter) to ensure that appropriate health and safety planning and preparation is done for upcoming work,
- Challenges faced with regard to health and safety, and
- Any other health and safety related information specific to the project that may be required.

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Leading indicators (e.g. audit findings, observations, etc.) must be analyzed, and any negative trends identified with regard to unsafe behavior or conditions must be appropriately addressed to prevent incidents.

Lagging indicators (e.g. injuries, illnesses, near hits, etc.) must be investigated in detail to determine the root causes. Corrective actions must be identified, implemented, and integrated into Safe Work Procedures to prevent recurrences.

52.2 Audits and Inspections.

On a monthly basis, the health and safety management system and workplace activities of the contractor will be audited by the SHEQ Speci or designated personnel to assess compliance with the project health and safety requirements. Any deviation from these requirements (i.e. non-conformance) that places the health or safety of any person in immediate danger will result in the specific activity being stopped until the non-conformance is corrected.

For each non-conformance determined during any audit, the contractor must identify and implement appropriate corrective actions.

For each corrective action, a responsible person must be designated and an appropriate timeframe (target date) for completion of the corrective action must be specified. Progress on implementing corrective actions (i.e. closing non-conformances) must be monitored and reported on. The implementation of corrective actions will be verified during the monthly audits.

Should it be determined that the contractor's level of compliance is unsatisfactory, all work being performed by the contractor on the project site may be stopped (at the contractor's expense) until an investigation into the reasons for the poor performance has been carried out, a corrective action plan has been developed, and corrective actions have been implemented.

The contractor must carry out an internal audit on a monthly basis to assess compliance with the project health and safety requirements (including the requirements of this specification and the contractor's Health and Safety Management Plan). Furthermore, the contractor must ensure that each appointed contractor is audited and measured to the same standard. Copies of these audit reports must be submitted to the SHEQ Specialist or designated personnel monthly.

The contractor must carry out internal health and safety inspections as follows:

- General site health and safety inspections on a daily basis,

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- Inspections of plant, tools and equipment prior to establishment or use on site, and at least monthly thereafter, and
- Legislated tools and equipment (i.e. lifting, electrical, mobile plants, etc.) must be inspected as prescribed by applicable legislation.

All audits and inspections must be carried out by competent persons who have been authorised and/or appointed in writing. A schedule of planned audits and inspections must be compiled and maintained ensuring that:

- All work areas and all activities are covered at regular intervals,
- All applicable legal requirements are complied with, and
- Areas or activities with significant associated hazards or risks receive greater attention.

53. Management Review.

A review of the contractor's Health and Safety Management System must be completed annually to ensure that the system continues to be effective in managing health and safety performance and meeting project requirements. The review must evaluate if there is any need for change and must identify actions to improve the system. The review must be led by senior management and the following must be considered:

- The suitability of the policy adopted for the project,
- The impact of changing legislation,
- The management of risk,
- Health and safety objectives and performance indicators,
- Changing expectations and requirements of relevant stakeholders,
- Changes to the contractor's scope, schedule, designs, etc.,
- Changes to the contractor's organizational structure,
- Communication and feedback (particularly from employees, Project representatives, and client representatives),
- The effectiveness of the management of change process,
- Workplace exposure monitoring and medical surveillance,
- The status of corrective actions,
- Performance statistics, including an annual summary of safety statistics and occupational hygiene monitoring and medical surveillance results,
- Non-conformances (findings) from completed audits,
- Follow up on actions from previous management reviews, and
- Recommendations and opportunities for improving the effectiveness of the management

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A record of each completed management review must be retained, and it must include all decisions and identified actions concerning alterations, modifications or improvements to the management system that demonstrate a commitment to continual improvement. The contractor must keep records of the above requirements as it is required for the project close out report.

54. Management of Change.

To ensure that proposed changes do not give rise to unacceptable health or safety risk, the contractor must develop and implement a process for identifying and managing change in the workplace (e.g. changes to scope, schedule, procedures, work methods, site conditions, designs, plans, plant and equipment, materials, processes, etc.) that may impact on health or safety performance. The management of change process must take into consideration that changes may be planned or unplanned, sudden, or gradual, temporary, or permanent. The process must aim to ensure that:

- Changes are identified and assessed before they are implemented,
- Careful consideration is given to managing the risks associated with any change,
- Due diligence can be shown to have taken place,
- The number of unsatisfactory or unnecessary changes is minimized,
- The right people are involved in the change process, and
- All statutory requirements are met.

All risks associated with a proposed change must be evaluated and ranked. The risks that are ranked as moderate or higher must be managed to prevent serious injury or illness.

It must not simply be assumed that a change will not result in significant risks. All proposed changes must be formally evaluated. The evaluation or review must include:

- An appropriate level of technical expertise,
- The involvement of the workforce potentially affected by the proposed change, and
- Approval of the change by a person with at least the same level of authority as those who control the existing process or item being changed.

55. Non-conformance and Action Management.

The contractor must establish a process for identifying and recording corrective actions arising from:

- Incident investigations,
- Hazard identification and risk assessment,

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- Measurement and monitoring,
- Improvement plans and suggestions,
- Managing change,
- Audits and inspections, and
- Safety observations and coaching (safety interactions).

The contractor must establish a procedure for managing actions that addresses:

- Identification, categorization and prioritization of actions,
- Formal evaluation and approval of actions (management of change process),
- Assignment of responsibilities, resources, and schedules for implementation,
- Implementation of actions,
- Tracking and reporting on implementation status, and
- Monitoring and verifying the effectiveness of the actions.