IGO GROUP SAFETY STANDARD 21 - VEHICLES, MOBILE PLANT AND EQUIPMENT

INDEPENDENCE GROUP NL

DOCUMENT APPROVAL FOR USE

Document owner: Head of Governance and Risk

Date first issued: 23/05/16

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Reviewed by	Changes	Approved by	Date Effective
Keith Ashby		Keith Ashby	20 May 2016
Exploration Team	Reference to UTVS	ExCo	1 June 2018

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1. INTENT

This standard details IGO's minimum requirements for the selection & maintenance of mobile plant and equipment used on IGO managed sites and for IGO business purposes.

2. APPLICATION

This standard applies to all mobile plant and equipment (including vehicles of any type) used on IGO managed sites and for IGO business purposes including that owned by IGO, contractors and other suppliers.

3. SELECTION REQUIREMENTS

3.1 Assessing mobile plant and equipment's fitness for purpose

All mobile plant and equipment used on IGO managed sites must be 'fit for purpose'.

This determination must be made by someone competent to make such an assessment. For guidance on designating 'competent persons', refer to Section 7 Responsibilities.

In assessing the fitness for purpose of any given piece of plant or equipment, the competent person must consider the following questions:

- What is the purpose for which the mobile plant and equipment will be used?
- What are environmental conditions and workplace circumstances in which the mobile plant and equipment is most likely to be used?
- Does the mobile plant and equipment meet statutory requirements?
- Does the mobile plant and equipment meet IGO's Mobile Plant and Equipment Specifications (where such specification exists)?

The competent person must consider consultation with the supplier and or the Original Equipment Manufacturer (OEM) as required to aid answering the above questions.

The mobile plant and equipment assessment must be documented prior to the equipment being used on site and a record of this assessment must be kept as per Section 5, Records. An assessment guideline is provided in ***IGO Group Safety Guideline 9 Assessing plant and equipment's fitness for purpose.***

3.2 Mobile Plant and Equipment Specifications

All plant used on IGO managed sites and for IGO business purposes must (in the absence of statutory requirements to the contrary) conform to Australian Standards and the Western Australian Mine Safety 7 Inspection Act and Regulations. For some mobile plant and equipment used on IGO managed sites, IGO prescribes specifications in addition to these requirements.

The following items of plant and equipment are subject to an IGO specification:

a) Underground vehicles (Appendix 1)

b) Surface mine site vehicles & mobile plant (Appendix 2)

c) Vehicles used in remote areas (IGO Group Safety Standard 40 – Remote Area Road Travel)

d) Utility Task Vehicles (Including All Terrain Vehicles [ATVs] and similar) (Appendix 3)

Detail on these mobile plant and equipment specifications are provided in appendices to this document.

4. MAINTENANCE & MANAGEMENT REQUIREMENTS

All mobile plant and equipment must be maintained to ensure it remains fit for purpose.

For some mobile plant and equipment used on IGO managed sites, IGO prescribes maintenance and management practices. The following items of plant and equipment are subject to such requirements:

a) Heavy Vehicle Tyre Selection

b) Heavy Vehicle Tyre and Rim maintenance

Detail on these mobile plant and equipment specifications are provided in appendices to this document. Site safe work procedures must incorporate the relevant elements of these requirements.

5. RECORDS

A documented electronic record of all ‘fitness for purpose’ assessments and maintenance records of Mobile Plant & Equipment must be kept.

Sites (and the person designated as responsible for exploration fleet management) must retain hard copies or have access to electronic copies of the following documents:

- Manufacturers Operating Manuals
- Manufacturers Maintenance Manuals
- Manufacturers Parts Books
- Specifications and data obtained from testing of the plant
- Statutory plant registration numbers

6. COMPETENT PERSONS

Given the significant risks posed by mobile plant and equipment, this standard requires that some activities are completed by Competent Persons. A Competent Person is defined as anyone who has the training, experience and demonstrated competency to make an informed decision. It is recommended that Competent Persons be formally appointed and that their responsibilities arising from this standard be captured in the Position Description.

7. RESPONSIBILITIES

It is the responsibility of the Registered Manager, or their delegate, to appoint Competent Persons.

It is the responsibility of the Competent Person to fulfill their duties with care and diligence.

8. PERFORMANCE MEASURES

Conformance with this standard will be assessed through regular audits and assessments.

9. RELATED DOCUMENTS

- IGO Group Safety Guideline 9 Assessing plant and equipment's fitness for purpose.
- IGO Group Safety Guideline 11 Heavy Vehicle Tyre & Maintenance Safe Work Procedures
- IGO Group Safety Standard 4 - EWPS, integrated tool carriers with mounted work platforms or similar devices, refer to

10. APPENDIX 1 - UNDERGROUND VEHICLES & MOBILE PLANT

Beyond conforming to Australian Standards and the Western Australian Mine Safety & Inspection Act and Regulations, all underground vehicles must conform to the following standards.

Note: For specific information on EWPS, integrated tool carriers with mounted work platforms or similar devices, refer to IGO Group Safety Standard 4.

10.1 General Requirements for underground vehicles & plant

Noise

The vehicle or plant operator's noise exposure must comply with IGO Buy Quiet Policy. Noise level should be assessed for a cycle of operating conditions in accordance with AS 1269. All measurements shall be taken with the doors and windows closed and the air conditioning system operating at maximum speed.

The operator's noise exposure ($L_{aeq.8h}$) should be assessed for a cycle of operating conditions in accordance with AS 1269. All measurements should be taken with the doors and windows closed and the air conditioning system operating at maximum speed.

The equipment supplier should provide a written record of all information related to noise testing on the completion of commissioning procedures.

Fire Control

All units of diesel engine mining equipment should be fitted with an AFFF or equivalently effective fire suppression system in the engine compartments and in other likely combustion compartments or surfaces.

The system should not allow the engine to start, or to keep running, if system pressure falls below the manufacturer's recommended minimum pressure.

When any in-built fire suppression system is actuated by any means, the engine should automatically shut down. A delay of about 6 seconds should be installed.

All units should be fitted with at least two manually operated fire suppression system actuators; one in the cabin and the other(s) at an external position(s) where it (they) can be readily reached from the ground level.

The AFFF system should include a detection tube for automatic activation of the AFFF system.

Equipment which is to be operated by remote control should be fitted with fire suppression systems which may be actuated by any one of three mechanisms all of which should be installed:

- Automatic actuation
- Remote control actuation
- Manual control actuation

Visible indication should be provided for the plant operator to show the operational readiness of the system. This indication should be visible to the operator from the normal operating position. (This does not apply to remote control panels).

Loss of electrical power should not prevent the operation of the system

Wiring systems should be capable of maintaining an adequate supply to the equipment when exposed to fire

Where a fire suppression system is installed the system should be interlocked so that:

- The equipment cannot be operated with the fire suppression system disabled or faulty.
- The interlock may be able to be over ridden by an override switch that requires constant hand operation. This applies to allow the plant to be moved to a safer location if required.

Adequate portable fire extinguishers should be fitted and maintained on each vehicle. Fire extinguishers should be thoroughly cleaned, inspected, serviced, and maintained on a regular basis not less than the OEM's recommendations.

Hand held Fire extinguishers appropriate to the fire risk for the vehicle are installed and easily accessible.

Testing and commissioning certificate is to be supplied for the above installation

Emission Control

A test record must be supplied of the exhaust gas emissions showing levels at idle and high idle for Carbon Monoxide and Nitrous fumes.

Carbon Monoxide levels must not exceed 1000 PPM and Nitrous fumes must not exceed 1500 PPM.

The test record must include results for Diesel Particulate Matter Emissions.

A Mammoth Diesel Particulate Filter is to be fitted to all Underground Heavy Diesel Equipment

Operator Cabin

The internal dimensions shall meet the requirements of ISO 10263-1 to ISO 10263-6 Earth-moving machinery – Operator Enclosure Environment. The operator's compartment shall be designed to prevent injury to the operator from:

- Accidental contact with sidewalls or backs, and
- As a minimum comply with AS 2294 Earth-moving machinery – Protective structures.

A suspension seat shall be installed to reduce vibration to the lowest practical level when measured in accordance with ISO 11112 Earth – moving machinery – Operator seat.

A retractable seat belt for all persons who may ride in the vehicle shall be installed in accordance with AS 2664 Earthmoving machinery – seat belts and seat belt anchorages. Equipment fitted with a training seat must comply with ISO 13459 Earth-moving machinery – Trainer seat.

The seat shall also allow the operator to be restrained by a seat belt and comfortably wear a self-rescuer and a cap lamp battery. The seat is to be adjustable (or self-compensating) for operator body weight and incorporate height and fore-aft adjustments.

The equipment shall be designed so that it cannot be operated unless the operator is in the control position.

The equipment shall BE designed to prevent uncontrolled movement when the engine is started.

The lay out of the controls shall follow sound ergonomic principals and minimise operator fatigue.

They shall as a minimum comply with the requirements of AS 2956.5 and identified in accordance with AS 2956.4.

The operator field of view shall meet the criteria specified in ISO 5006.

FOPS & ROPs

The manufacturer shall attach a plate to the protective structure confirming that it is the same as a prototype tested in accordance with AS2294.

A test report shall be supplied with each roll-over protective structure or falling-object protective structure tested in accordance with AS 2294.2 or AS 2294.3, as appropriate.

The test report shall provide the information required by AS 2294.2 or AS 2294.3 and, in addition, the qualification and status of the testing officer. A copy of each certificate shall be retained by the manufacturer.

Brakes- speed

The brake system shall comply with the design and performance requirements of AS 2958.1.

Service brakes shall be oil-cooled multiple wet discs.

Electrical Systems on Vehicles & Mobile Plant

Where cables pass through bulkheads they shall be either protected from wear by rubber grommets or have positive connection on either side of the bulkhead.

Where the cables are associated with electrical power generated by the engine system they shall be installed to AS 4242.

All other cable and electrical installations shall comply with the requirements of AS 3000.

All electrical circuits shall be protected against over current by circuit breakers.

Strapping of electrical harnesses to hydraulic and fuel lines is not permitted.

Isolation, four pole lockable isolators shall be used.

The circuitry is to be designed and installed so that the opening of the switch will stop the machine and isolate the electrical power.

There shall be provided a circuit breaker between the battery and the starter motor to protect against overcurrent.

The battery shall be housed in a compartment that provides adequate clearance between the battery terminals and any lid. An insulating cover shall be provided on the underside of any cover which is over battery terminals. The battery compartment shall be located so that it does not form part of an access pathway or platform during maintenance.

Jump-start provisions shall be provided in a location that encourages their use.

Electrical wiring to be run independent of all hosing;

Triple insulation of wiring where wiring runs through bulk heads

10.2 Explosive Carrying Vehicles

- 4 x White on Red Explosives stickers fitted (front, rear and each side). Including Hazchem decals.
- Approved Box's for packaged explosives (fitted on opposite side to exhaust) with Explosives sticker displayed on box.
- Blue Flashing Light

10.3 Build specification UG Heavy Mine Vehicles

All heavy mine vehicles (weighing more than 2 tonne) used underground must have:

- Power to run solenoid on fuel pump
- lockable battery isolators which will independently shutdown the engine and isolate all electrical power
- lockable starter motor isolator to prevent inadvertent engine start-up during live electrical testing and troubleshooting;
- AFFF isolators
- dry powder fire extinguishers for manual use
- Brake system to be fail safe, spring applied hydraulic release;
- A gauge that indicates residual braking pressure is to be fitted inside the operator's cabin.
- Park brake indicator light in cab;
- Brake lights on the rear;
- Brake system residual pressure indicators or gauges in Operator's cab;
- ABA Brakes
- When the park brake is applied, the rear brake lights will light up;
- Tail lights to be illuminated at all times when lockable battery isolator is on
- In addition to standard filler, Wiggins Fast Fill system;
- Decals to define all lights, gauges and controls;
- All hydraulic hosing in engine compartment are to be shrouded;
- Steel braided fuel lines to SAE 100R5 (Up to -12) AS 3791 – 1991;
- All fuel water separators to be made of a non-flammable material and no glass bowls;
- Standard Fuel Caps to be Non-ventilated fuel caps;

- Canvas seat covers or the equivalent;
- IGO logo and asset numbers, (High viss asset # black on green background);
- 50MM Scotch 3M yellow reflective striping fitted as per IGO specification;
- Reversing camera
- Batteries to be dry cell type;
- Transmission electronically locked to 3rd gear;
- Jump start system;
- Two-way radio;
- One amber strobe or flashing light on an independent light circuit such that the light can be left on when the machine is turn off;
- Interlock to prevent tramming whilst high voltage is activated;
- Guards or shields should be fitted to prevent damage to components and personnel and comply to all relevant standards. Guards, shields or protective coatings are to be fitted in the vicinity of the exhaust and turbocharger to prevent fuel or oil spraying on hot surfaces provided that they don't trap fuel or oil around the exhaust or turbocharger. Shielding, exhaust lagging or ceramic coating to cover all turbo charger and exhaust systems (LV's exempt).
- The engine compartment should be effectively fire shielded from the driver's compartment and from the means of egress from the driver's compartment.
- Any covers, shields or guards, if not constructed from steel, shall be constructed from fire resistant material if the failure of the material may place an operator at risk.
- Guards that are removal only with the use of tools. Wherever possible, movable guards should remain hinged to the vehicle when open.

11. APPENDIX 2 - SURFACE MINE VEHICLES & MOBILE PLANT

All surface mine vehicles and plant used on IGO mine sites must conform to the following requirements (unless otherwise approved by the Registered Manager);

- All LVs and HVs that are commonly used on public roads must meet a standard required to enable registration for use on a public road (even if it is not registered)
- lockable battery isolators which will independently shutdown the engine and isolate all electrical power
- dry powder fire extinguishers for manual use
- IGO logo and asset numbers;
- Reversing camera
- Two-way radio;
- One amber strobe or flashing light on an independent light circuit such that the light can be left on when the machine is turn off;

12. APPENDIX 3 – Utility Task Vehicles (UTVs)

Utility Task Vehicles are taken to include All Terrain Vehicles [ATVs] and similar.

The requirement for, selection and procurement of UTVs must be:

- subject to a formal documented risk assessment, and
- approved by the relevant Registered Manager.

All UTVs used on IGO sites and as used by IGO's exploration team (including contractors) must be fitted with:

- A battery isolator to enable positive isolation of the engine;
- A jump-starting system (eg with Anderson plug or similar);
- A dry powder fire extinguisher;
- Leg guards and foot plates that minimize the risk of 'staking-type' injuries; and
- (as of 1st September 2018) a suitable roll-over crush protection device.

13. APPENDIX 5 – HEAVY VEHICLE TYRE SELECTION

Heavy vehicle tyres pose a significant safety risk. The Australian Standards and many jurisdictions treat the assembled and inflated tyre and rim unit as a pressurised vessel.

Heavy vehicle tyres must be selected with care. Selection must be completed by a competent person.

The competent person must give consideration to the following matters:

- Site conditions
- Tyre duty
- Machine or plant OEM guidance and tyre OEM guidance

Although tyres are expected to operate under a variety of conditions, tyres should be selected to suit the worst conditions likely to be encountered. Factors affecting the life, reliability and serviceability of the tyre include:

- Where the vehicle will be operated (e.g. temperature, type of surface, condition of surface, road gradient, road camber or profile, turn radii, quarry or underground, type and condition of dumping and loading areas, climate, remote control use)
- How the vehicle will be operated (e.g. average and maximum speeds, maximum wheel load, average load, TKPH, weight distribution, length of cycles empty and laden, shift duration, number of cycles per shift)
- The type of machine (e.g. haul truck, make or model, OEM-recommended tyre size and rating).
- It is important to assess site conditions so the optimum tyre design parameters (e.g. tyre construction, tread design, rubber compound, TKPH rating) are selected. Such site

assessments are usually achieved by:

- Investigating site maintenance records for tyres, inspecting failed tyres on site to look for common failure modes, interviewing tyre maintenance workers with experience of the site
- Gathering data through monitoring and data logging technologies mounted on mobile plant — such technologies can monitor and record tyre pressure, temperature, TKPH, load, speed and other parameters, or
- A combination of the above, or
- A simulation of the proposed operations as used in mine planning.

Vehicles must not be operated beyond the limits of tyre load rating, speed and TKPH. Exceeding any of these parameters may create unsafe conditions such as overheating or physical damage. Optimising tyre selection and maximising the service of tyres can have significant consequences for safety.

14. APPENDIX 6 – HEAVY VEHICLE TYRE & RIM MAINTENANCE

14.1 Introduction

Tyres and rims pose a significant safety risk. The Australian Standards and many jurisdictions treat the assembled and inflated tyre and rim unit as a pressurised vessel.

14.2 Training and competency

Only competent personal who have completed ***The Goodyear Tyre and Rim Inspection and Fitting course (or equivalent certificate)*** and have demonstrated all the skills and knowledge required to meet that standard may carry out duties that include the fitting, inspecting, maintaining of tyres and rims. Training records must be maintained in InTuition.

14.3 Risk management

A JSEA must be completed prior to any work carried out on Tyres & Rims where the task is now specifically addressed in a Safe Work Procedure. In completing a JSEA, the following hazards should be considered:

- handling and working with tyres, wheels and rims
- tyre fires, bursts and explosions when tyres are in service
- Loss of control of vehicle due to tyre failure.
- sudden release of stored pressure energy — leading to projectiles (e.g. rim components, rocks) and percussive shock
- compressed air or other gases (e.g. nitrogen)
- noise
- handling heavy objects
- working with or operating heavy equipment
- heat and fire
- fuels and chemicals
- Pyrolysis or diffusion — leading to explosions.

14.4 Rim register

All site's must maintain a register of rim bases of 24" and over. The record shall contain as a minimum

- Serial Number
- Manufacturer
- Size
- Rim Type: 5 piece

- History of purchase “date” and disposal “date and hours”
- Inflation pressure
- Rim Tests, including test reports
- Scheduled hours
- Actual Life Hours
- Asset Number Fitted To
- Rim Serial Number

14.5 Heavy vehicle tyre & rim maintenance safe work procedures

Each IGO site must have a set of Safe Work Procedures that address the following:

- Removal and Deflation of Tyre and Rim Assemblies
- Chocking
- Jacking
- Deflation Prior to Loosening Attachment Bolts or Nuts
- Use of Hydraulic Bead Breaking Tools
- Inflation & Assembly
- Pressure Maintenance
- Inspection of In-service Tyres and Rims
- Tyre Matching, alignment and rotation
- Tyre handling & forklift use
- Tyre storage
- Rim Storage
- Tyre Re-use
- Tyre disposal
- Rim Identification
- Rim Integrity & Rim inspection periods

For additional information on the issue to be addressed in respect of the above matters, refer to ***IGO Group Safety Guideline 11 Heavy Vehicle Tyre & Maintenance Safe Work Procedures***

14.6 Tyre & rim repairs

Tyre & RIM repairs and regrooving shall only be completed by suitably qualified third party service providers. Where practicable, the warranties on repairs to all tyres and rims shall be unconditional and not to limit the service capability. Where this is not practicable, and a conditional repair is undertaken, the conditions of use shall be specified. Further tyres shall be marked with a permanent "X" symbol on both sidewalls as AS.4457.2 - 7.1. As per the standard, the symbol shall have the following meaning:

- X = Minor Repair
- XX = Intermediate Repair
- XXX = Major Repair

Note: Repairs with the symbols XX and XXX are to be fitted to the rear only as a Risk mitigation for the equipment operator. Sidewall repairs would be best positioned to face equipment chassis or the other tyre of a dual mounting.

14.7 Re-grooving

Re-grooving is only permitted when authorised by the tyre manufacturer or re-treader and is carried out by an authorised re-groover

Re-grooved tyres can be fitted to any position, except in the case of re-grooved retreads.

Retreads and Re-lug Retreads and re-lugs are not permitted on steering axles. This does not apply to graders.

The retreaders brand is to be marked on both sides of the tyre followed by X markings used to indicate the number of times the tyre has been retreaded.