

Standard Name:	Blasthole (DTH) Drills	Standard No.	3040-00000-04-5106-STD-060
Originator	Lead Engineer	Issue No.	01
Distribution	Mobile Equipment Sections	Effective Date	01 January 2018
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1. AIM

To eliminate or minimise the risk of fatalities, injuries and incidents arising from the use of Production or Blasthole (Down the hole) drill rigs.

2. APPLICATION

This Standard applies to production or Blasthole (Down the hole) drill rig activities where rotary, rotary percussion and / or dual-tube reverse circulation drilling methods are applied. Exploration drills are excluded from the standard.

In areas where requirements are not achievable or implemented, a risk-based approach shall be used to determine the level of compliance needed for each of the specific requirements.

This Standard applies to all Debswana operations, including contractors and visitors when involved in controlled activities.

This guideline can also be applied to production or blasthole drilling activities where rotary, rotary percussion and / or dual-tube reverse circulation drilling methods are applied.

The standard is limited to the open pit mining environment.

3. REASON FOR INCLUSION

Drill rigs has been involved in a significant proportion of our high potential incidents. Identified causes and contributing factors include:

- a. ineffective communications
- b. poor visibility
- c. moving machinery and drilling equipment
- d. equipment failure
- e. manual handling of items
- f. operator error
- g. Non-adherence to operating procedures.

4. APPLICABLE REGULATIONS AND STANDARDS

The equipment and the operation thereof shall conform to the following legislation and standards:

- a. The Botswana Mines, Quarries, Works and Machinery Act (MWQM Act) (Chapter 44:02)
- b. The Botswana Mines, Quarries, Works and Machinery Regulations
- c. The Botswana Mines and Minerals Act, 1999
- d. Debswana Fatal Risk Control Standards (FRCS) and Guidelines
- e. Debswana FRCS for Surface mobile equipment

Reference has also been made to relevant South African legislation where the requirements offer a greater degree of clarity or are more applicable to drilling operations than those contained in Botswana legislation. In particular reference has been made to The Mine Health and Safety Act 29 of 1996 and The Occupational Health and Safety Act 85 of 1993.

Compliance to the regulations and standards are mandatory.

5. REQUIREMENTS

Application of the Standard is mandatory at all Debswana operations. This mandatory nature is indicated by the use of the word “shall” within the Standard.

In some places, the word “should” is used. This means that the primary intent remains, but specific circumstances may mean that implementation of the requirement is not reasonably practicable.

Any deviation from the specifications set forth in these Standard shall be formally approved following an exemption procedure.

The exemption procedure comprises the following steps:

- a. Documented and detailed description of the implementation difficulties
- b. Documented and detailed risk assessment of the situation under proposed alternative control measures
- c. Documented formal approval from the Group Discipline Managers that the level of risk as a result of the alternative control measures is understood, tolerable for the organisation and in line with the Debswana vision of Zero Harm.

6. PLANT AND EQUIPMENT REQUIREMENTS

6.1 Drill rig

- a. Drill rigs shall be equipped with appropriate safety equipment for protection of people and equipment against injury or damage during the process of operation, maintenance, travelling and manoeuvring.
- b. All control levers shall be in a working condition and have means of isolating the levers in a safe position.
- c. Fleet and control consistency should be considered to minimise operator error when changing machines.
- d. Isolation points shall be installed to isolate all energy sources (including electrical, mechanical, gravitation) according to isolation procedures before any maintenance or repair work is executed. All isolation points shall be clearly indicated and labelled.
- e. Permanent safe access (Walkways, ladders, platforms) shall be provided to areas where routine work (maintenance and operations) is executed.
- f. Boarding steps and platforms shall be kept in good condition. Equipment shall not be operated where boarding steps and platforms are damaged to the extent that the operator is at risk when boarding.
- g. The drill rig shall have an alternative emergency escape route clearly indicated for the deck. Equipment shall not be used when the emergency escape route is jeopardised in any way.
- h. All walkways, ladders, platforms and handrails shall comply with Debswana standard.

- i. Effective guarding shall be provided on accessible moving parts (consistent with the Equipment Safeguarding Standard)
- j. Signage shall be installed on the equipment that allows clear and easy identification from a distance and reflective signage for night visibility.
- k. All controls, isolation devices, switches and instruments on the machine shall be clearly labelled to indicate the function of the control.
- l. Warning signs shall be fitted to the equipment to alert personnel and clearly identify dangerous areas.
- m. The working areas of the drill rig shall be adequately illuminated for the operator to have clear visibility of the critical functions of the machine.
- n. Flexible hoses shall be fitted with safety slings.
- o. Emergency stop buttons shall be easily accessible from within the operator's cab, machine house and ground level.
- p. Cable reel controllers shall be positioned not to put the operator at risk.
- q. Drill shall be fitted with an automated fire detection and suppression system, activated from the cabin or sides of the equipment.
- r. An equipped first aid box shall be available on the equipment. The first aid box shall be inspected by a competent person in intervals not exceeding 6 months.
- s. All special tools and equipment shall be designed and approved by a competent person. No "hand-made" tools are allowed on site.
- t. No drill rig shall be operated within 20 meters of an overhead power line.

6.2 Cabin

- a. Layout of cabins should take into consideration the ergonomics of seating, operator, controls and retrofitted devices.
- b. Cabin shall have roll-over protection (ROP) certification.
- c. Cabin shall have falling object protection (FOP) certification.
- d. The cabin shall be an enclosed and tightly-sealed air-conditioned cabin, with consideration of requirements for noise level exposure by the operator.
- e. The cabin layout and placement shall ensure good visibility for the operator to perform drilling and travelling tasks.

6.3 Mast

- a. Mast to be equipped with an access ladder which must be safely accessible and fitted with a fall arrestor.
- b. Access to mast to be controlled.
- c. Lock pins to be automatically operated.

6.4 Drill Deck

- a. Measures shall be in place to control access to the drill deck while the machine is operational. The equipment shall be isolated and de-energised before access to the drill deck is granted.
- b. Hazardous areas on the drill deck shall be clearly demarcated and hazards indicated through the use of suitable signage.
- c. The drill deck operation shall be fully mechanized allowing the operator to perform all functions from within the safety of the cabin.
- d. The drill rods and bits to be specifically designed to OEM specifications. Special attention to be given to thread design and quality control.
- e. Drill rod fallout protection must be provided as prescribed by the OEM.
- f. Drill rod handling process shall be automated.

7. SYSTEM AND PROCEDURAL REQUIREMENTS

- a. All new equipment shall be subjected to a documented risk-assessment conducted on the design, maintenance and operation of the drill rig.
- b. A Hazop study shall be conducted on all types of drill rigs used on the site, records of the study and improvements shall be kept in the maintenance management system.
- c. A technical specification shall be used for the selection and acceptance of new and modified equipment prior to commencement of work on site. The specification shall encompass the requirements of this standard and the operational environment.
- d. All modifications to equipment shall be approved by the OEM or a competent person. Changes shall be agreed in consultation with the OEM and Statutory governing body before implementation is done. Changes shall be documented and records kept in the maintenance management system as part of the change management process.
- e. Zero tolerance to be applied in the use of tools and rigging equipment, which must comply with OEM specifications.
- f. The responsible engineer shall conduct an annual inspection on the equipment to evaluate the condition, compliance to legislation and technical standards, records shall be kept in the maintenance management system.
- g. A procedure and checklist system shall be in place for pre-operation inspection by the operator. Logs shall be maintained on the machine.
- h. All safety devices shall be inspected and tested (tested only where practically possible) on a daily basis as a part of the pre-start inspection, safety devices shall be regarded as “NO GO” items.
- i. A system shall be in place to prevent unauthorised operation of the equipment.
- j. Systems shall be in place along highwalls and the edge of the bench to prevent equipment from being operated in dangerous areas as determined by risk assessment.
- k. A post-maintenance (scheduled or breakdown) machine test shall be conducted
- l. On-the-job risk assessments shall be conducted as part of the planning process for drill rig operations, including maintenance and other activities.
- m. An inspection and maintenance programme shall be in place for equipment, including critical equipment and components.
- n. Daily inspections by the operator shall include the evaluation of the equipment wearing components and drill rod conditions.
- o. Weekly and monthly inspections of the drill rig and its components shall be carried out by an authorised and competent person, records of all inspections shall be kept in the maintenance management system.

- p. Mobile telephones shall not be allowed on the equipment or used by the operator.
- q. The drill site shall be demarcated with sufficient warning signs indicating the hazards to persons entering the area.
- r. A communication system shall be in place and communication equipment tested on a daily basis as a part of the pre-start check.
- s. The operational and maintenance personnel shall lock out all energy sources when maintenance or repairs are required.
- t. Equipment specific isolation procedures shall be used for isolation of all energy sources.
- u. Seat belts shall be used in all cases by all occupants.
- v. Refueling, maintenance and repairs shall only be carried out by persons declared competent to execute the work according to a procedure.
- w. The drill rig and ancillary equipment shall be shut down during refuelling.

8. PEOPLE REQUIREMENTS

- a. Recruitment and induction processes for drill rig operators shall encompass past work history, site testing and comprehensive medical examinations that confirm fitness for work.
- b. All operating and maintenance personnel shall be trained on basic rigging for performing tasks on the equipment.
- c. Training programs shall be based on the OEM training requirements and supplemented by additional site specific training.
- d. Site and area induction of operators shall be performed prior to starting work in a new area.
- e. A permit or certification system shall be in place to ensure operators are competent to operate equipment on site, including the ability to respond under emergency conditions.
- f. A fit-for-work policy shall be in place, incorporating the clearly-defined maximum levels of drugs (including prescribed medication) and alcohol allowed in the system of operators.
- g. A system shall be in place to manage operator-fatigue.
- h. Documented behaviour-based observations shall include the evaluation of the specific tasks required for the operation of a drill rig. Any need for additional specific re-training shall incorporate the results of these observations.

9. AMENDMENT HISTORY

Issue no	Effective date	Date last revised	Amendment details
01	01 January 2018		First issue

10. RELATED DOCUMENTS

Document no.	Document name	Issue date	Date of next review