



Government of India
भारत सरकार
Ministry of Labour and Employment
श्रम एवं रोजगार मंत्रालय
Directorate General of Mines Safety
खान सुरक्षा महानिदेशालय



DGMS (Tech) Circular / 02 / 2019 Dhanbad dated 29.11.2019

To,

Owner, Agent and Manager of All Metalliferous Mines and OEMs of Diamond Wire Saw Machines.

Subject: Safety Provisions for Diamond Wire Saw Machines and its Operations.

1. A fatal accident occurred in an Open Cast Marble mine during cutting of Marble block by Diamond Wire Saw Machine, in which a worker working in the vicinity was hit by high speed flying off Diamond beads which emanated from snapped Diamond wire of the Machine, causing serious injuries, to which the worker succumbed latter. After the Fatal Accident, a study was conducted in various Marble and Granite mines where Diamond Wire Saw Machines were in use so as to recommend safety measures to avoid similar accidents and injuries to persons working in the vicinity of Diamond Wire Saw Machine operations in Mines.
2. Major mechanical aspects associated with risks involved in Diamond Wire Saw machining operations are moving/rotating elements of the machinery, whiplash of wire rope and high velocity projection of Diamond beads, springs and/or spacers etc due to sudden rope breakage during cutting operation of the machine.
3. Safety requirements such as Guards and Fences for moving and rotating elements of the machinery had adequately been covered under Regulation 174(2) of The Metalliferous Mines Regulations 1961. Failure of any rope under tension results in release of energy stored in it which usually leads to broken rope and ends of the rope to whiplash violently posing danger to persons in the immediate vicinity of the breakage. The greatest risk to persons from Diamond Wire Saw machine operation arises from high-velocity projection of the beads at the time of rope breakage. The whiplash normally occurs in the plane of cutting of the rock unless interrupted by other structures.
4. To address the risks associated with Diamond wire saw cutting operations in Mines, following safety provisions shall be strictly adhered with:

4.1. Design of Diamond Wire Saw Machines & Diamond Wire Ropes:

(a) In addition to requirements covered under Regulation 172 of The Metalliferous Mines Regulations 1961, the procedures described for identifying hazards and estimating & evaluating risks during relevant phases of the Machine Life Cycle and for the elimination of hazards or for the provision of risk reduction mentioned in Indian Standard-IS:16819 (*Safety of Machinery-General Principles for Design-Risk Assessment and Risk reduction*) shall be strictly followed during design and manufacture of Diamond Wire Saw cutting Machines. The remaining hazards and risks, if any, shall clearly be stated along with protective measures to be adopted and danger areas involved in Equipment Manual supplied with machine by OEM.

(b) Suitable Guard behind the drive pulley to stop the wire motion towards the rear of machine and to intercept flying off elements in case of wire breakage shall be provided in the machine.

(c) Plastic coated Diamond Wire Rope shall be used in the machine. Plastic coating on the wire keeps a constant separation between the beads and reduces the likelihood of the flying off of elements (Diamond beads springs and/or spacers) in case of wire breakage. Further, the plastic coating protects the steel cable from abrasive action of cuttings. Adequate numbers of Guide pulleys for rope shall be provided in the machine.

(d) The rope cutting speed and rope tension during operation of the machine greatly contribute to life of the rope. Improper cutting speed and rope tension aggravate fatigue failure of the rope. The manufacturer shall prescribe details of optimum cutting speed and rope tension in the Equipment Manual.

4.2. Operation and Maintenance:

(a) Diamond Wire Saw Machine Operators/Technicians shall be adequately trained in safe operation/proper maintenance of Machine and the rope.

(b) When cutting is performed, tracks on which the machine operates shall be placed on properly levelled ground.

(c) Machine Control Panel shall be mounted inside a substantially built and easily transportable operator cabin with adequate seating facility so as to protect the operator from Whiplash of wire rope & flying off elements during rope breakage and also to provide protection from heat, dust and rain etc.

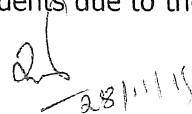
(d) The Operator's cabin with machine's control panel shall be placed by the side of the cut plane and at an adequate distance, depending on the height of the cut. If several cutting operations are carried out on the same bench or quarry floor, or Horizontal cutting operation is carried out, the cabin shall be so positioned that the Operator is not endangered by rope failure and dangers arising thereof.

(e) Proper wedges and/or support(s) shall be provided to prevent uncontrolled movement of block being cut so as to avoid injury to persons in the vicinity and to prevent snapping of Diamond wire rope due to trapping or jamming during the cutting operations.

(f) The Manager, in consultation with Engineer of the Mine, shall specify adequate danger areas for protection from the flying off elements and shall ensure that persons are not deployed within the danger zone/area during operation of the machine.

(g) Detailed Codes of Practice for operation and Maintenance of Diamond Wire Saw Machine shall be framed by Manager of the Mine in consultation with Engineer of the mine and the same shall be enforced.

In the interest of Safety, all the Owners, Agents and Managers of the Mine in which Diamond Wire Saw Machines are being used and OEM of such machines are advised to comply with the aforesaid safety requirements so that accidents due to these causes are mitigated.


(R. Subramanian)
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