



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



No. DGMS Tech. Circular (Electrical), (Approval) No. 12 Dhanbad, 25/05/15

To

All Owners/Agents/Managers of Coal Mines, Oil Mines & the Manufacturers

**Subject: Cables requiring DGMS approval for use in Coal and Oil Mines-
Replacement of approval by special order in writing with General approval.**

Cables are widely used in mines for the purpose of transmission and distribution of electric power, communication and for other applications. Cables in India are manufactured as per the relevant BIS standards depending on their type, voltage and application. The use of cables in mines for transfer of electrical energy or signals is associated with hazards like shock, fire, explosion etc., if the proper types of cables of adequate rating and strength are not installed, not used and not being maintained in proper manner based on their application.

Mining being a hazardous profession requires that the cables need to remain safe, robust and reliable under prolonged usage even in adverse conditions. Keeping this in view, the Chief Inspector of Mines (also designated as Director General of Mines Safety), approves cables by special orders to use in mines on case to case basis under Regulation 181(3) of Coal Mines Regulations, 1957 and Regulation 75(2) of the Oil Mines Regulations, 1984 based on the provisions therein and the same has been notified in Gazette notification of India vide G.S.R.1334 dated 3rd November, 1979.

In order to bring simplification, it is felt that the subject matter is required to be brought under the domain of general approval. However, in order to prevent any compromise on quality and safety aspects, certain conditions are specified for compliance. It is decided that following prescribed standards and parameters shall be adhered to during manufacturing process and use of cables in mines.

Testing of cables:

The tests on cables are broadly grouped as routine tests, type tests, acceptance tests and optional tests.

- 1.1 **Routine Tests** — Tests made by the manufacturer on all finished cable lengths to demonstrate the integrity of the cable.

- 1.2 **Type Tests** — Tests required to be made before supply on general commercial basis on a type of cable in order to demonstrate satisfactory performance characteristics to meet the intended application.
NOTE -These tests are of such a nature that after they have been made, they need not be repeated unless changes are made in the cable materials or design which might change the performance characteristics.
- 1.3 **Acceptance Tests** — Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.
- 1.4 **Optional Tests** — Special tests to be carried out, when required, by agreement between the purchaser and the supplier.
- 1.5 The type test report of the cable made at a laboratory as mentioned in the DGMS approval policy 2015 or its revised version for the parameters specified under the relevant standard shall be accepted.

2. Standards

The construction of cables for use in mines shall also comply with the relevant provisions of the Central Electricity Authority (Measures relating to Safety and Electric supply) Regulations, 2010 as amended from time to time.

The cables should conform to the prescribed standards. If the standard of a particular type of cable is not available in India, the relevant international standard with test reports from any laboratory as mentioned in the DGMS approval policy 2015 or its revised version may be accepted.

BIS standard	Type of cable
IS-1554 part-I	PVC insulated(heavy duty) electric cables for working voltages up to and including 1100V
IS-1554 part-II	PVC insulated(heavy duty) electric cables for working voltages from 3.3KV up to and including 11KV
IS-9968 part-I	Elastomer insulated cables for working voltages up to and including 1100V
IS-9968 part-II	Elastomer insulated cables for working voltages from 3.3KV up to and including 33KV
IS 14494	Elastomer insulated flexible cables for use in mines voltage grades covered are 1.1,3.3,3.8/6.6and6.35/11kV
IS-7098 part I	Cross-linked polyethylene insulated thermoplastic sheathed cables for working voltages up to and including 1100V
IS-7098 part II	Cross-linked polyethylene insulated thermoplastic sheathed cables for working voltages from 3.3KV up to and including 33KV
IS-2593	Flexible Cables for Miners' Cap-Lamps
While conforming to the relevant BIS or equivalent standards or any international relevant standards, the constituent conductors and protective armouring shall not be of aluminum for use in below ground coal mines and hazardous area locations of Oil mines. The conductors shall be of copper only.	

Flexible power cables for Oil Rigs shall comply with the provisions stipulated in line with IS-9968 read with the latest BHEL specifications (OR12003, OR12002 & OR12005) as the case may be.

3 Identification:

3.1 **Manufacturer's Identification:** The manufacturer shall be identified throughout the length of the cable by means of a tape bearing the manufacturer's name or trade-mark or by manufacturer's name or trade-mark being indented, printed or embossed on the cable. In case none of these methods can be employed or if the purchaser so desires, colour identification threads in accordance with a scheme approved by the Bureau of Indian Standards (BIS) / relevant international standard shall be employed. The indentation, printing or embossing shall be done only on the outer sheath.

3.2 **Cable Identification** — In order to distinguish these electric cables from telephone cables and other cables, the word 'electric' shall be indented, printed, or embossed throughout the length of the cable. In case of cables intended for use in mines, the word 'mining' also shall be indented, printed or embossed throughout the length of the cable. The indentation, printing or embossing shall be done only on the outer sheath.

The following special cables shall be identified by indenting, embossing or printing the appropriate legend on the outer sheath throughout the cable length, in addition to the existing marking requirements:

Type of cables	Legend
Improved fire performance for category C1	FR
Improved fire performance for category C2	FRLSH

3.3 **Cable Code** — The following codes shall be used for designating the cable:

Constituent	Code Letter
Aluminium conductor	A
XLPE insulation	2X
Steel round wire armour	W
Non-magnetic round wire armour	Wa
Steel strip armour	F
Non-magnetic strip armour	Fa
Double steel strip armour	FF
Double steel round wire armour	WW
PVC outer sheath	Y
Elastomer insulation/sheath	R
Braiding, compounding or varnishing	B
Earth continuity conductor	ECC

NOTE — No code letter for conductor is required when the conductor material is copper

- 3.4 **Voltage Identification:** The voltage grade of the cable shall be identified throughout the length of the cable by means of a tape bearing the voltage grade of the cable (for example 1.1kV, 3.3kV, 3.81/6.6kV and 6.35/11kV) or by the voltage grade being printed, embossed or indented on outer sheath.
- 3.5 **Type of Cable:** The cable type shall also be marked using the appropriate designation as given in the relevant standard (BIS) / relevant international standard throughout the length of cable by any of the means indicated above.

4 Marking and Packing

- 4.1 The cables shall be wound on a drum (as per IS 10418).
- 4.2 The cut ends of the cable shall be sealed by means of non-hygroscopic sealing material.
- 4.3 The cable shall carry the following information either stenciled on the drum or contained in a label attached to it:
- Reference to the relevant Standard;
 - Manufacturer's name, brand name or trademark;
 - Type of cable and voltage grade;
 - Number of cores;
 - Nominal cross-sectional area of the conductor;
 - Cable type;
 - Length of cable on the drum;
 - Number of lengths on drum (if more than one);
 - Direction of rotation of drum (by means of an arrow);
 - Approximate gross mass;
 - Country of manufacture; and
 - Year of manufacturer.

5 The manufacturer shall:

- 5.1 Have Reliable and adequate facility for manufacturing & testing of cables and fully responsible for its quality. The Indigenous cable manufacturers shall have valid BIS license.
- 5.2 Take a note of the relevant standards amended from time to time, provisions of the Central Electricity Authority (measures relating to safety and electric supply), Regulations, 2010 and any other instructions / circulars issued from this Directorate in respect of manufacturing of cables.
- 5.3 Furnish to the user all the type and routine test reports, cross sectional drawings of the cables, giving dimensional details for each size of cable. An illustrated literature on the cable, giving technical information on current ratings, cable constants, short circuit ratings, de-rating factors for different types of cables. The manufacturer shall also furnish other details like packing date, weights and other relevant information pertinent to their product(s) to the user(s), along with each consignment, and the users shall also have the responsibility to get such test reports/literature/documents from the manufacturer while purchasing and using the cable in the mines.



- 5.4 Shall seal the cable ends properly so that ingress of moisture is completely prevented.
- a. The individual core endings shall be sealed effectively with water resistant compound applied over the core and provided with a heat shrinkable cap of sufficient length with adequate cushion space so that the conductor does not puncture the cap in case of movement of the core during unwinding or laying. Before sealing, the semi-conducting layer on the cores may be removed for about 2mm at each end, to facilitate checking the insulation resistance from one end, without removing the sealing cap at the other end.
 - b. The multi cores should have an overall heat shrinkable cap with adequate end clearance and sufficient cushioning to prevent puncturing of the overall sealing cap due to stretching of the cores. The sealing cap shall have sufficient mechanical strength and shall prevent ingress of moisture into the cable. The ends of single core cables shall also be sealed on the same lines to prevent entry of moisture.
- 5.5 Any other precautions to preserve the quality of cables shall be duly taken by the manufacturer.

6 Users responsibilities:

- 6.1 Before using the cables in mines, the user shall ensure that all cables conform to the relevant standards.
- 6.2 The cables shall be installed used and maintained complying with the provisions of the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010 as amended from time to time.
- 6.3 Selection of mining cables shall be made as per the guidelines in Annexure-A.
- 6.4 Storage, transportation and use of cables shall be done as per the Manufacturer's Instruction manual.
- 6.5 The user may visit the Manufacturer's works as and when necessary to ensure the required manufacturing and testing facilities available and shall also ensure receipt of valid test reports/certificates from the manufacturer.
- 6.6 The user shall keep the test reports, cross sectional drawings of the cables with dimensional details for each size of cable. An illustrated literature on the cable, giving technical information on current ratings, cable constants, short circuit ratings, de-rating factors for different types of cables installed and other relevant information shall be maintained as history records.
- 6.7 The user shall conduct field observations from the date of Installation of the cable to assess the health and performance of the same. The records of the observation shall be maintained in a bound pagged book kept for the purpose duly signed by authorized and competent officials, countersigned by the Mine Manager.
- 6.8 In case, where the performance of a cable is not satisfactory/ where there is risk of causing hazard from such a particular type / lot of cables, the same shall be forthwith removed from use by the user and information in this regard shall be sent to the manufacturer, concerned electrical inspector of mines and to the DDG(Electrical) HQ, DGMS, Dhanbad.

- 6.9 The user shall be responsible for any violation to the provisions of the parameters and Guidelines laid in this order or violation of the provisions of the Central Electricity Authority (Measures relating to Safety and Electric Supply) Regulations, 2010 as amended from time to time.
- 6.10 The user shall maintain records of installation or reinstallation of power cables and lighting cables giving relevant information of such cables in a bound paged book kept for the purpose signed by authorized and competent officials, countersigned by the mine Manager.

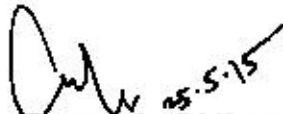
7 Power and functions of the Chief Inspector of Mines or an Electrical Inspector of Mines.

- 7.1 The Chief Inspector of Mines or an Electrical Inspector of mines may inspect, check and examine the manufacturing facilities at any time, may examine the type test report and may get samples tested during the course of inspection or send such samples for testing at any Govt. approved laboratories or a Test house accredited by NABL and not belonging to the concerned manufacturer, subject to confirmation of its ability to conduct such tests according to relevant standards. The cost of the test shall be borne by the manufacturer.
- 7.2 The Chief Inspector of Mines or an Electrical Inspector of mines may inspect, check and examine the cables at any time in the mine or/and may ask for the test reports of the cable. He may get the samples tested during the course of inspection or send such samples for testing in any Govt. approved/NABL accredited laboratory or a Test house at the cost of the user.

8 General Requirement

- 8.1 The above guidelines shall be adhered by the Manufacturers and the Users for safe use of cables in mines and avoiding any unwarranted conditions.
- 8.2 The cables conforming to the standards, parameters and testing as mentioned above in this circular, shall be considered as approved by the Chief Inspector of Mines by this general order as provided under regulation 181(3) of the Coal Mines Regulations, 1957 and regulation 75(2) of the Oil Mines Regulations, 1984.
- 8.3 The user shall consider at par those manufacturers having valid approvals under special order of DGMS and those who comply with the parameters and guidelines prescribed in the general order for use of cables in mines.

Yours Faithfully,


Director General of Mines Safety

General Guidance for Selection of mining cables as per IS 14494 : 1998

Cable type	type of application
FT1	Intrinsic safety cable in U/G production systems requiring infrequent movement - 3 phase.
FT2	Intrinsic safety cable in U/G production systems requiring infrequent movement - 3phase and earth.
FT3	Cable for mobile production machines in U/G applications.
FT4 (S)	Cable for production-cum-transportation machines in U/G application- Crawler mounted requiring medium degree of movement.
FT6(S)	Cable for mobile production machines in U/G applications.
FT7	Heavy duty trailing cable for mobile production machines in U/G applications with multipurpose built-in attachments like intermediate crusher, steel-tray conveyor, etc, for example road headers.
FT7(S)	Heavy duty trailing cable for mobile production machines in U/G applications with remote control/annunciation requirements, for example, sophisticated road headers, shearers in multipurpose packages, etc, suitable for use as interconnecting cables also.
FT8	Heavy duty trailing cable for mobile production machines in U/G application and surface use material handling application to satisfy space limitation, for example, Augar-ctmrdrill, Paddle feeders, Stacker/Reclaimer, etc.
FT10	Trailing cable for wheel mounted production support machines calling for heavy reeling duty requirement in U/G mines, for example, LHD's, Low height SDL's, etc.
FTD3	Cable for hand-held drills.
FTD3(S)	Cables for hand-held drills with intrinsic safety requirement.
P3	Power feeders to transportation/ ventilation system in U/G mines.
PLC2 to PLC5	Cable for lighting and auxiliary circuits in U/G application.
PA3	Cable for single phase/D.C. application.
PA1, 3PA1, 6PA1	Cable requiring infrequent movement in OCM Zone prew to cause external injury by thrust.
3PA1(S),	Cable with intrinsic safety system requiring protection against electrical

6PA1(S)	as well as mechanical adverse elements, for example, application area of Jumbo SH drills, Walking dragline, OCM Power feeders in new excavation areas, etc.
3FTS, 6 FTS	OCM trailing cable for machines requiring medium degree of movement, for example, Excavators.
3FTCS,6FTCS	OCM trailing cable for reeling duty, for example, BH drills, Excavators with CRD.
3FTINS, 6FTINS, 11FTINS	Trailing cable for heavy reeling duty OCM and material handling applications requiring high tensile strength.
3FTINS/3, 6FTINS/3, 11FTINS/3	Trailing cable with space limitation in CRD, for example, BWB's, Stacker/Reclaimers.
11LL , 11LL/3	Hazardous duty mine power feeder in OCM, for example, Landline.

NB: For any special applications where imported cables are proposed to be used in mines suitable recommendations may be considered based on the relevant standards on case to case basis.

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