

The Lighting for Underground Coal Mine Faces

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Abstract: In Present study an effort has been made to carry out the uses of lightning equipment in u/g coal mines and their preventive measures. The major problem of uses electric apparatus in u/g coal mines is firedamp. In earlier naked open flame is used in u/g coal mines for lighting due to naked lamp firedamp explosion is happened in u/g coal mines. For lighting and firedamp explosion intrinsically safe and flame proof equipment are used in u/g coal mines because electric bulb, LED bulb, tube light produce heat and electric spark and cause of firedamp explosion.

Keywords: Flame Safety Lamp, Caplamp, Safety Torch, Firedamp, illumination.

1. Introduction

DGMS give order in all the underground coal mines Owner, Agent/Manager to used Intrinsically safe and flame proof apparatus for lighting purpose and the order is published in the Gazzate of India.

In Underground Coal Mines, DGMS Permissible Lighting Equipment's are used Like Flame Safety lamp, Caplamp, Flameproof Safety Torch because they are intrinsically safe and flame proof.

Intrinsically safe apparatus means an electric equipment their circuit is designed by that type which is unable to produce sufficient spark or heat under the condition of firedamp explosion.

Flame proof apparatus means an equipment is designed in such a way that an internal ignition of a flammable area will not be transmitted outside of the enclosure and thereby preventing the ignition of surrounding flammables [3].

In Underground Coal mines DGMS permitted lighting apparatus reduce the chance of firedamp explosion because firedamp is present in mine environment and its explode in the temperature of 650°C and these equipment is unable to produce this temperature.

Table 1
Candle power of permitted lighting equipment's [1]

S. No.	Apparatus	Candle Power	Colour rendition
01.	Flame Safety Lamp	1.2	Average
02.	Cap lamp	6	Excellent
03.	Flameproof Safety Torch	4.8	Excellent

A. Permitted Lighting Equipment's for working face.

1) Flame safety lamp [4]-[9]

In 1815 Sir Humphry Davy invent Flame Safety Lamp. Flame safety is an instrument which is used in mines for inspection of gases and illumination purpose. It is a flameproof apparatus and a Permitted lighting instrument. The Candle power of FSL is 1.2.

In u/g coal mines DGMS permitted FSL are used for illumination and detection of gas purpose. Due to its heat absorbing capacity it can't produce the sufficient heat for explosion of methane gas that's why this lamp is used in mines.

But only Gas Testing examination passed person handled/Operate this lamp in underground coal mines.



Fig. 1. Flame safety lamp [10]

Application and Safety feature of FSL. [1][2][6][9]

- Due to heat absorbing capacity no chance of firedamp explosion.
- Used in mines for illumination and detection of gases.
- Flame never betrays whereas Electrical or Electronic apparatus may betray [5].
- Instant reaction during gas inspection [5].
- No Chance of heating and sparks.
- Permitted by DGMS.

2) Flameproof safety torch [2]

In Early time flameproof safety torch are used in u/g coal mines by senior Supervisory Staff. It is Intrinsically safe equipment and its illumination power is excellent. The Candle Power of this torch is 4.8. when in trend in Electric Caplamp, the used of this torch is day by day decreased. But in some collieries this torch is presently used by Senior Supervisory Staff.

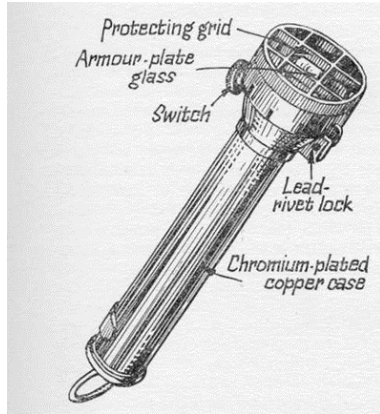


Fig. 2. Flameproof Safety Torch [10]

Application and Safety feature of Flameproof Safety Torch.
 [1][2][6][9]

- The Flameproof safety torch body is made up of chromium Plated Copper, Iron or Steel and torch is operated with battery.
- Approved by DGMS and The chief controller of explosive.
- The torch is locked in the lamp cabin and a special tool is used for opening.
- Due to Unique safety locking device Unlocking and opening of torch in u/g mines is impossible.
- Under the unbreakable glass a small bulb is placed and a spring is placed over for protection of bulb.

3) **Electric caplamp** [4]-[9]



Fig. 3. Electric Caplamp [10]

In U/g Coal Mines Electric cap lamp is provided the miners for clear vision. IN 1955 Cap lamp was first introduced in India

and presently used in every u/g mines in India. A caplamp is a lamp which is worn on the helmet. It is an Intrinsically safe equipment Permitted by DGMS with the BIS License. The modern cap uses Lithium Ion battery as its power supply, Light in weight and very good illumination power.

Application and Safety feature of Electric Caplamp. [4]-[9]

- Illumination Power is very good and Crystal clear vision.
- Intrinsically Safe Equipment and Approved by DGMS with the BIS License.
- No chance of Fire and Firedamp explosion.
- Longer life and Extra power.
- Tough Polycarbonate Container.
- Integral belt loop.

Table 2
Result

S. No	Equipment	Chance of Firedamp explosion	Permissible	Illumination
01.	Flame safety lamp	No	Yes	Average
02.	Caplamp	No	Yes	Average
03.	Safety Torch	No	Yes	Average

2. Conclusion

The overall conclusion is that firedamp is the major problem of u/g coal mines for uses of electrical lighting equipment's that's why intrinsically safe and flame proof equipment's are used in u/g coal mines.

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