

# **Studies and Effects on the Propagation of Electro-magnetic Waves in Explosive Zone and Exposure to Human Body**

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Rapid development in electronic communication and information technology leading to uses of transceivers right from Low Frequency L.F. to H.F. to VHF to UHF that propagate Electro-magnetic waves (e.m) of different frequencies and powers. Most cause of concern is cell phone users who are increasing day by day and consequently safety aspects of its uses in inflammable areas e.g. near inflammable gas filling station, Explosive and Chemical industries etc. Second one is health hazard's effect on body due to emission of e.m waves.

There are two important constraints to be studied to make the transmission and receiving of transceivers and mobile phones eco-friendly, hazards free and safe to operate at hazardous locations. Firstly the radiating energy as well as receiving energy of transceivers and cell phones must be intrinsically safe and abide to safety regulation IS 5780-2002. The regulation defines the Intrinsically safety "The fault (short-circuit) occurs in any electrical or electronic circuitry due to any cause should be insufficient to ignite the explosive mixtures".

On medical front there are limits for exposure to radio frequency (RF) recommended by International Guidelines (ICNIRP). These limits are part of comprehensive guidelines and established permitted levels of RF energy for general population. The exposure standard for cell phones employs a unit of measurement known as the Specific Absorption Rate (SAR). The SAR limit states in the international guidelines is 2.0 W/Kg averaged over 10 gm of body tissue.

Contrary to exercises made by different R & D institutions all over the world on effect of Electro-magnetic waves (e.m. waves) on human body, trifle attempts and experimentation have been made to find the danger of propagated e.m waves radiating from cell phone in the vicinity of explosive zone and gas filling station (Petrol pumps, Gas bottling Domestic fuel plant etc). Although the radiating power of 2 Watt has been limited for transceivers for hazardous and explosive areas by safety departments all over the world based on the field experiences of their transceivers/ Mobiles operation in inflammable zones but in the era of fast technology development, the necessary for intensive R & D is the need of hour.

Authors in this paper brief the Intrinsically safe limit for different category of explosive areas imposed by statutory regulation body of all countries in the world for the use of cell phone, transceivers etc. on or in inflammable and other likewise hazardous zones. Break flash apparatus is employed to measure the intrinsically safe Instruments /Gadgets to be used in explosive and inflammable areas. However, for high frequency instruments such as HF, VHF, UHF transceivers set and cell phone which operates mostly on 900 MHz & 1800 MHz, authors suggests a modified testing instrument to ascertain the intrinsically safety of high frequency instruments.

Attempts are going on to determine the field intensity of R.F. waves radiated from cell phones and transceivers of different frequencies approximately 1 meter away from oil-filling station.

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