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Assessment of inadvertent initiation of bridge wire electro-explosive devices by radio-frequency radiation – Guide

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Svenska Elektriska Kommissionen, SEK.
Postadress: SEK, Box 1284, 164 29 KISTA
Telefon: 08 - 444 14 00. *Telefax*: 08 - 444 14 30
E-post: sek@sekom.se. *Internet*: www.sekom.se

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SEK
Box 1284
164 29 Kista
Tel 08-444 14 00
www.sekom.se

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Assessment of inadvertent initiation of bridge wire electro-explosive devices by radio-frequency radiation – Guide

Evaluation de la création par inadvertance de dispositifs électro-explosifs par pont métallique, par rayonnement de radiofréquence – Guide

Leitfaden zur Verhinderung des unbeabsichtigten Auslösens einer Zündeinrichtung mit Brückendraht durch hochfrequente Strahlung

This Technical Report was approved by CENELEC on 2004-08-28.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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Foreword

This Technical Report was prepared by the Technical Committee CENELEC TC 31, Electrical apparatus for explosive atmospheres - General requirements.

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Introduction

Electromagnetic waves produced by radio-frequency (RF) transmitters (e.g. radio, television and radar) will induce electric currents and voltages in any firing circuit including leading wires of the electro-explosive device (EED) on which they impinge. The magnitude of the induced current and voltages depends upon the configuration of the firing circuit and leading wires relative to the wavelength of the transmitted signal and on the strength of the electromagnetic field. If the induced current which is transferred to the EED is in excess of the no fire current then the EED could initiate. This European Technical Report provides a systematic approach to assist transmitter operators, quarry managers and all others concerned with a logical method for the assessment and elimination of the initiation of EED by RF. The assessment procedures contained in this European Technical Report are based on measurements of the powers and current that can be extracted from typical firing circuits and leading wires and on the physical electrical parameters of various types of EED.

1 Scope

This European Technical Report provides guidance on assessing the possibility of inadvertent extraction of energy from an electromagnetic field propagated from radio frequency (RF), radar or other transmitter antennas and the coupling of this energy to an electro-explosive device (EED) in a manner capable of causing initiation. The frequency range covered by this European Technical Report is 9 kHz to 60 GHz. This European Technical Report only applies to bridge-wire devices which are directly initiated by radio frequency current and does not apply to special detonators, for example, electronic detonators. It does not cover the similar hazard arising from electromagnetic fields generated by other means, for example electric storms, electricity generating plant or power transmission lines.

This European Technical Report does not apply to the following equipment:

- air bag igniters for automotive applications (including the igniters before they are fitted);
- special pyrotechnic devices;
- pyromechanisms;
- igniters for fireworks;
- special military devices;
- special safety equipment.

NOTE The methods of assessment from 9 GHz to 60 GHz are based on extrapolation of data for frequencies below 9 GHz.

2 Normative references

No normative references are made in this standard.