

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE



**Mobile remotely controlled systems for nuclear and radiological applications –  
General requirements**

**Systèmes télécommandés mobiles pour applications nucléaires et  
radiologiques – Exigences générales**



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INTERNATIONAL  
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COMMISSION

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**MOBILE REMOTELY CONTROLLED SYSTEMS FOR NUCLEAR AND  
RADIOLOGICAL APPLICATIONS – GENERAL REQUIREMENTS**

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Draft	Report on voting
45/904/FDIS	45/907/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

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## INTRODUCTION

Mobile remotely controlled systems are used in areas that are difficult to access by human workers, such as high-radiation, high-temperature, high-pressure, and submerged environments.

International standards for applications other than nuclear applications, such as individual protective equipment and industrial, service-related, and medical applications, are developed within ISO TC 299.

There are a variety of mobile remotely controlled systems [14]<sup>1</sup> intended for application in various environmental conditions, namely: multifunctional mobile robot systems for the inspection and maintenance of the primary cooling water system of a nuclear power plant; shape-changing robots that serve as a remotely controlled inspection system in the primary containment vessel of a nuclear power plant; robots that inspect the reactor head and floor, underwater mobile robots that detect and remove loose parts within the reactor vessel; underwater crawling and swimming robots that serve as a remotely controlled system for feeder pipe inspection and maintenance of steam generators in an underwater environment; operation control systems for non-destructive inspections, mobile robots intended for radiation and chemicals reconnaissance and monitoring, as well as local distribution of gamma-radiation sources located in inaccessible areas; and double-arm or heavy duty robots that are used to dismantle nuclear power plants.

In this regard, it is necessary to develop technical standards that govern the design, manufacturing, interoperability, and use of mobile remotely controlled systems for nuclear applications that are suitable for various works such as the integrity inspection of nuclear components, repair of nuclear components, on-site monitoring when any abnormality or accident occurs in a nuclear facility, and nuclear decontamination and dismantling.

These technical standards concern the design, establishment, and performance of mobile remotely controlled systems and can be used to implement various important tasks and follow-up measures, such as monitoring nuclear-related activities.

To this end, general requirements for mobile remotely controlled systems have been provided for nuclear and radiological applications.

Detailed specifications of these general requirements need to be designated by manufacturers to provide support to the users of their products.

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<sup>1</sup> Numbers in square brackets refer to the Bibliography.

# MOBILE REMOTELY CONTROLLED SYSTEMS FOR NUCLEAR AND RADIOLOGICAL APPLICATIONS – GENERAL REQUIREMENTS

## 1 Scope

This document defines the general requirements for Mobile Remotely Controlled Systems (MRCSs) for nuclear and radiological applications such as integrity inspections, repair of components, handling of radioactive materials, and monitoring of physical conditions and radiation dose intensity in specific areas. (Refer to Annex A for more information regarding the main purposes of the MRCS.)

MRCS is used in the concerned area where human access is difficult or impossible during normal operation, transient and accidents, and recovery from an accident in nuclear facilities.

This document applies to MRCSs that are used to support nuclear and radiological facilities.

These general requirements encompass high-level performance requirements regarding sensors, monitoring devices, control devices, interfacing mechanisms, simulation methods, and verification methods thereof in a normal environment or extreme environmental conditions, such as high radiation, high temperature, and high humidity environments.

In this document, the term “MRCS” used hereinafter refers to a mobile remotely controlled system used for nuclear and radiological applications.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions are applied.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

### 3.1

#### **built-in control/diagnostics system**

##### **BCDS**

specialized circuit of the on-board control system intended to check the state of MRCS permanently

### 3.2

#### **hazard**

event having the potential to cause injury to plant personnel, damage to components, equipment, structures or MRCSs. Hazards are divided into internal hazards and external hazards

Note 1 to entry: Internal hazards are, for example, controller fail or power loss.

Note 2 to entry: External hazards are, for example, fire, flooding, earthquake and lightning.

Note 3 to entry: Damage to MRCSs is added to the source.

[SOURCE: IEC 61513:2011, 3.25, modified, – Note 3 to entry has been added.]