

# SVENSK STANDARD

## SS-ISO 17874-5:2010

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### **Fjärrstyrda anordningar för radioaktivt material – Del 5: Fjärrstyrda tänger (ISO 17874-5:2007, IDT)**

### **Remote handling devices for radioactive materials – Part 5: Remote handling tongs (ISO 17874-5:2007, IDT)**

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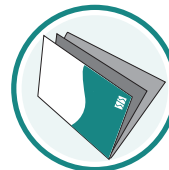
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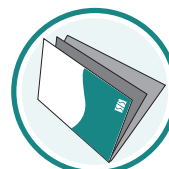
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Den internationella standarden ISO 17874-5:2007 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av ISO 17874-5:2007.

The International Standard ISO 17874-5:2007 has the status of a Swedish Standard. This document contains the official English version of ISO 17874-5:2007.

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 17874-5 was prepared by Technical Committee ISO/TC 85, *Nuclear energy*, Subcommittee SC 2, *Radiation protection*.

ISO 17874 consists of the following parts, under the general title *Remote handling devices for radioactive materials*:

- *Part 1: General requirements*
- *Part 2: Mechanical master-slave manipulators*
- *Part 4: Power manipulators*
- *Part 5: Remote handling tongs*

The following part is under preparation:

- *Part 3: Electrical master-slave manipulators*

## Introduction

This part of ISO 17874 concerns multi-purpose remote handling tongs for nuclear applications.

These remote handling tongs replace some functions of human hands and arms in inaccessible areas (generally, behind shielding or containment walls). In general, remote handling tongs provide limited functionality compared to master-slave manipulators, such as those described in ISO 17874-2.

Remote handling tongs are typically used in hot cells for the following applications: fuel element examination, radio-isotope manipulation, reprocessing and waste treatment, radio-chemical analysis.

Vertically mounted remote handling tongs are typically applied in pools for work on radioactive sources and irradiated fuel elements.

End-effectors other than tongs, e.g. special-purpose tools, can be mounted on similar actuators, but these are not included within the normative part of this part of ISO 17874.

This part of ISO 17874 addresses only manually-actuated remote handling tongs and does not address any powered versions.





# Remote handling devices for radioactive materials —

## Part 5: Remote handling tongs

### 1 Scope

The purpose of this part of ISO 17874 is to provide guidance for the selection, installation and use of manually-operated remote handling tongs within nuclear installations.

This part of ISO 17874 covers only the specific engineering aspects of manually-operated remote handling tongs and their interfaces with the nuclear facilities in which these devices are to be installed.

Specifically, it does not address design options concerning aspects such as the process and general maintenance arrangements that lead to the selection of any particular type of remote handling device.

### 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7212 *Enclosures for protection against ionizing radiation (Lead shielding units for 50 mm and 100 mm thick walls)*

ISO 9404-1, *Enclosures for protection against ionizing radiation (Lead shielding units for 150 mm, 200 mm and 250 mm thick walls) — Part 1: Chevron units of 150 mm and 200 mm thickness*

ISO 11933-1, *Components for containment enclosures — Part 1: Glove/bag ports, bungs for glove/bag ports, enclosure rings and interchangeable units*

ISO 11933-2, *Components for containment enclosures — Part 2: Gloves, welded bags, gaiters for remote handling tongs and for manipulators*

ISO 10648-2, *Containment enclosures — Part 2: Classification according to leak tightness and associated checking methods*

ISO 17874-1, *Remote handling devices for radioactive materials — Part 1: General requirements*

ISO 17874-2, *Remote handling devices for radioactive materials — Part 2: Mechanical master-slave manipulators*

### 3 Terms and definitions

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

#### 3.1

##### **axis**

direction of a Cartesian coordinate system defined from the operator standing point, considered as the origin of this system

NOTE The following axes are considered:

- X axis, from right to left along the shielding wall;
- Y axis, forward into the shielded cell;
- Z axis, up towards the ceiling of the shielded cell.

#### 3.2

##### **containment enclosure**

enclosure designed to prevent leakage of products contained in the internal environment under consideration into the external environment, or the penetration of substances of the external environment into the internal environment, or both simultaneously

NOTE This is a generic term to designate all kinds of enclosures, including glove boxes, or cells of different geometries used for handling or to store radioactive materials, with handling devices.

#### 3.3

##### **shielded containment enclosure**

##### **hot cell**

containment enclosed by a shielding wall intended to provide complementary shielding against penetrating radiation

NOTE This shielding wall can be integral with, mounted on or independent of the containment enclosure wall. The choice and thickness of the protection material are determined according to the type of radiation (beta, gamma or neutron) and the type of handling required.

#### 3.4

##### **disconnection**

mechanical operation allowing the separation of two assembled elements, such as the disconnection of the tongs from the leak-tight coupling

#### 3.5

##### **disconnection device**

mechanical device located inside a hot cell and used to connect or disconnect the end-effectors of a remote handling device, e.g. tongs, jaws, special tool, etc.

NOTE Such a device can also be used to store these elements.

#### 3.6

##### **enclosure ring**

plastic or metallic ring mounted on containment enclosure or glove box walls, using threaded components or by welding or bonding

NOTE The ring is used to allow fitting of interchangeable leak-tight units mounted on a support ring (e.g. gloves, rigid plugs, gaiters for remote handling tongs, etc.).

#### 3.7

##### **ejection device**

device used to release an interchangeable element, e.g. a gaiter or a seal, and to replace it with another element without compromising the integrity of the containment

**3.8****handle**

component gripped by the operator, fixed to the end of the rod and enabling control of the movement of the remote-handling device

**3.9****jaws (of tongs)**

components fixed to the actuator assembly of the tongs which enable the handling of an object

NOTE The jaws can be disconnectable.

**3.10****joint**

assembly of several moveable components allowing at least one rotational motion about one axis

**3.11****operating volume**

space in which the operation of tongs is possible, considering all the positions reached by any end-effector

**3.12****tongs**

gripping device fixed at the active end of the rod and consisting of an actuator assembly and jaws

NOTE The actuator assembly is also referred to as the tongs unit.

**3.13****sphere unit**

component inserted in the shielding or containment wall used to support a spherical or cylindrical moving part and forming the pivot for the remote handling tongs

NOTE Swivel joints, or systems using pins but having the same properties of two parts swivelling at right angles to one another (as in universal joints or gimbals), can also be referred to as sphere units.

**3.14****gaiter****booting US**

specialty profiled flexible sleeve designed to protect the mechanical parts of the remote handling tongs from contamination or to provide the continuity of the leak-tightness of the hot cell

**3.15****gaiter assembly**

gaiter equipped at one side with a leak-tight coupling and at the other side with a support ring or an expandable ring

**3.16****rod**

rigid tube which connects the handle and the tongs and contains the transmission elements for the gripping motions

NOTE The length of the rod defines the working range of the tongs.

**3.17****leak-tight coupling**

intermediate device mounted between the tongs unit and the rod, ensuring the continuity of the leak-tightness of the gaiter and the transmission of the gripping motion in a leak-tight way

**3.18****motion**

term defining the possibility to execute a movement, which may be linear or rotation about a defined axis