

SLOVENSKI STANDARD
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Hladilne naprave in toplotne črpalke - Strokovna usposobljenost osebja (ISO/DIS 22712:2018)

Refrigerating systems and heat pumps - Competence of personnel (ISO/DIS 22712:2018)

Kälteanlagen und Wärmepumpen - Sachkunde von Personal (ISO/DIS 22712:2018)

Systèmes de réfrigération et pompes à chaleur - Compétence du personnel (ISO/DIS 22712:2018)

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Refrigerating systems and heat pumps — Competence of personnel

Systèmes de réfrigération et pompes à chaleur — Compétence du personnel

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

ISO 22712 was prepared by ISO Technical Committee TC 86, *Refrigeration and air-conditioning*, Subcommittee SC 1, *Safety and environmental requirements for refrigerating systems* and by Technical Committee CEN/TC 182, *Refrigerating systems, safety and environmental requirements* in collaboration in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Introduction

Refrigerating systems, if not properly constructed, installed, operated and maintained, can be of danger to the health and safety of persons, the safety property, be detrimental to the environment and increase the energy consumption.

It is therefore essential that personnel dealing with such systems are competent to carry out the activity, or activities, listed in this standard. These activities cover the particular sectors in which they may operate from original design to final dismantling and disposal. As job descriptions can vary from country to country and from company to company, this standard specifies the activities to be carried out. Job descriptions should specify these activities.

This standard defines the activities related to the refrigerating circuit.

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Refrigerating systems and heat pumps — Competence of personnel

1 Scope

This International Standard defines the activities related to refrigerating systems according to EN 378-1, EN 378-2, EN 378-3, EN 378-4 and ISO 5149-1, ISO 5149-2, ISO 5149-3 and ISO 5149-4 and the associated competence profiles and establishes procedures for assessing the competence of persons who carry out these activities. Activities with regard to electricity are excluded.

NOTE As a refrigerating circuit is considered not to incorporate electrical and electronic systems, activities in this area are not part of this standard. For competences on electrical and electronic systems, it is recommended to refer to national regulations or appropriate European or national standards. This European Standard does not apply to persons carrying out work on self-contained refrigerating systems as defined in EN 378-1 from the initial design of the product to the complete manufacture of the product, provided the process is controlled and the methods used are checked by an organisation or individual, responsible for the compliance with statutory requirements on health, safety and environment (e.g. energy efficiency).

NOTE The standard is not a training programme .

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

<https://standards.iteh.ai/catalog/standards/sist/4c709d8f-3f6e-4d00-88bc-365440000000/iso-22712-1>
EN 378-1:2016, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 1: Basic requirements, definitions, classification and selection criteria*

EN 378-2:., *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 2: Design, construction, testing, marking and documentation*

EN 378-3, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 3: Installation site and personal protection*

EN 378-4, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 4: Operation, maintenance, repair and recovery*

EN ISO/IEC 17024, *Conformity assessment — General requirements for bodies operating certification of persons (ISO/IEC 17024:2012)*

ISO 5149-1, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 1: Definitions, classification and selection criteria*

ISO 5149-2, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 2: Design, construction, testing, marking and documentation*

ISO 5149-3, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 3: Installation site*

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ISO 5149-4, *Refrigerating systems and heat pumps — Safety and environmental requirements — Part 4: Operation, maintenance, repair and recovery*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 378-1:2016 and the following apply.

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 assessment

process by which the evidence generated, gathered and provided about a person is judged to determine competence

3.2 assessment body evaluation body

organisation which is recognised to assess (evaluate) the competence of persons working on refrigerating circuits

3.3 certification body

organisation which issues/awards certificates proving the competence of persons working on refrigerating circuits

Note 1 to entry: Depending on national regulations, assessment bodies and certification bodies may be the same or different organisations.

Note 2 to entry: General criteria for certification bodies can be found in EN ISO/IEC 17024.

3.4 competence

ability to perform safely and satisfactorily the activities within an occupation

3.5 qualification

evidence of a certain level of professional competence

Note 1 to entry: See 4.2.

3.6 certification

procedure used to demonstrate the qualification of personnel at a specified level and leading to the issue of a certificate

3.7**certificate**

document issued under the rules of the assessment system defined in Annex A indicating that the named person is competent to deal with applicable health, safety, environmental protection and energy conservation requirements for refrigerating systems and heat pumps

3.8**designing**

collecting all data required for making an effective operating refrigerating circuit, or making the conceptual and detailed plan of the refrigerating circuit (e.g. dimensioning, calculation, component selection, refrigerant piping layout and sizing)

3.9**pre-assembling**

fabricating parts and sub-assemblies of a refrigerating circuit in a workshop or on site

Note 1 to entry: This excludes charging with refrigerant.

3.10**installation**

assembly of components of a refrigerating system and all the apparatus necessary for its operation

3.11**putting into operation**

integrity inspection of the refrigerating system and bringing it into work for the first time or after significant changes

Note 1 to entry: This may include charging with refrigerant.

3.12**commissioning**

ensuring that the system is performing according to the predefined conditions after putting the system into operation

Note 1 to entry: This may include charging with refrigerant.

3.13**operating**

running the refrigerating system in a routine manner ensuring that the system works within the conditions required in the user manual

3.14**in-service inspection**

all activities needed to check if the refrigerating system complies to predefined requirements (e.g. functionality, correlation of temperature and pressure, capacity checks, quality checks of joints for existence of corrosion)

3.15**leak checking**

identifying if there is a leak of refrigerant from the refrigerating system and if yes, identifying the exact location of the leak and reporting the results without breaking into the circuit

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3.16**general maintenance**

keeping or restoring a refrigerating system to a state from which the desired operation can be provided, without breaking into the refrigerating circuit

3.17**circuit maintenance**

keeping or restoring a refrigerating system to a state from which the desired operation can be provided, by breaking into the refrigerating circuit

3.18**decommissioning**

ensuring that the refrigerating system is in a safe and environmentally proper condition during the period that it is out of operation

3.19**removing of refrigerant**

recovering the refrigerant out of a refrigerating circuit

3.20**dismantling**

breaking the refrigerating circuit down into pieces

Note 1 to entry: This excludes removing of refrigerant

3.21**basic appreciation level****BA**

level of expertise required to discuss main elements of the skill with others

3.22**working knowledge level****WK**

level of expertise required for direct involvement in decisions and actions

3.23**fully operational level****FO**

level of expertise required to perform personally the majority of the activities

3.24**leading edge level****LE**

level of expertise required for significant development of the skill area

4 Requirements**4.1 General**

Persons shall be deemed competent if it can be demonstrated that they are capable of carrying out the activities listed in this standard.

4.2 Competence levels

4.2.1 General

Persons shall demonstrate a level of predefined competence as defined in 3.21, 3.22, 3.23, and 3.24, of their theoretical and/or practical ability as necessary for the activity in question, as set out in Annex A.

4.2.2 Requirements for evaluation and certification procedures

The evaluation and certification procedures dealing with the competence of persons related to the refrigerating circuit shall be done according to the procedures defined in EN ISO/IEC 17024.

4.2.3 Requirements for competence assessment methods

If competence assessment methods are defined by national regulations, they shall be used.

If competence assessment methods are not defined by national regulations, they shall be used according to Annex A.

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Annex A (normative)

Competence assessment methods as described in clause 4

A.1 General

The Annex A is a general overview of how this standard is structured.

This annex consists of six tables, each with an area where knowledge and skills necessary for "the circuit" these areas are:

- Basic thermodynamics;
- Components;
- Piping, joints and valves;
- Safety equipment;
- Fluids;
- Communication.

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A.2 Areas of assessment

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Horizontally described the various tasks performed on "the refrigerating system" during the life cycle of "the circuit". The numbers listed are referring to the job to the definition in clause 3 of the standard.

Vertical described the skills to assess whether the person is competent to perform task well during an assessment.

The cells of the table consist the level of the assessment

The definition as given in 3.21, 3.22, 3.23 and 3.24.

The assessment can be done by theoretical assessment this are the unshaded cells, and by a practical assessment the shaded cells. The black cells mean no assessment is necessary.

Table A.1 — Basic thermodynamics

Basic thermodynamics		Tasks												
Description of tasks, see Clause 3 Terms and definitions		Design	Pre-assembling	Installation	Putting into Operation	Commissioning	Operating	In-service Inspection	Leakage checking	General Maintenance	Circuit Maintenance	Decommissioning	Removing Refrigerant	Dismantling
		3.8	3.9	3.10	3.11	3.12	3.13	3.14	3.15	3.16	3.17	3.18	3.19	3.20
Skills to assess														
Know the basic SI units, for example: temperature, pressure, mass, density, energy	a	FO	BA	BA	WK	WK	WK	WK	FO	BA	WK	BA	WK	
Understand basic refrigeration terms, for example: Enthalpy and Entropy, Pressure, Temperature, Refrigerating Capacity, Power consumption, Energy reduction, Superheat, Sub-cooling, Liquid and Vapour properties	b	FO		BA	FO	FO	WK	WK	WK	BA	FO	BA	WK	
Know the layout as well as use of the log p-h-diagrams of refrigerants and understand triple point and supercritical area	c	FO		BA	WK	WK	WK	WK	BA	BA	BA	BA	BA	
Know and use of the saturated and superheated vapour tables of all refrigerants in correlation with the log p-h-diagrams as well	d	FO		BA	WK	WK	WK	WK	BA	BA	BA	BA	BA	
Draw a scheme of a compression refrigeration circuit	e	FO		BA	WK	WK	WK	WK	BA	BA	BA	BA	BA	
Understand the meaning of different kind of pressures (e.g. design pressure, absolute and gauge pressure, strength test pressure, test pressure for leak detection)	f	FO	BA	BA	WK	WK	WK	WK	FO	BA	FO	BA	BA	