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Road vehicles — Technical personnel dealing with natural gas vehicles (NGVs) —
Training and qualification

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ISO/~~PWI~~ 23684-1:2023(E)

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ISO copyright office

CP 401 • Ch. de Blandonnet 8

CH-1214 Vernier, Geneva

Phone: +41 22 749 01 11

Email: copyright@iso.org

Website: www.iso.org

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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 of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html the following URL.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 41, *Specific aspects of gaseous fuels*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Since the effectiveness of any application on [natural gas vehicles \(NGVs\)](#) depends upon the capabilities of the persons who perform or are responsible, a procedure has been developed to provide a means of evaluating and documenting the competence of personnel whose duties require the appropriate theoretical and practical knowledge of the work they perform, specify, supervise, monitor or evaluate.

When certification of personnel working on NGVs is required in product standards, regulations, codes or specifications, it is important to certify the personnel in accordance with this [International Standard document](#). When latitude is provided in the criteria within this [International Standard document](#), the certification body has the final decision in determining specific requirements.

When there is no mandatory requirement in national legislation, or in case a member State does not adopt this [international standard document](#) concerning certification of ~~NGV's~~ [NGV's](#) personnel, the employers of such personnel ~~shall~~ take the steps to decide how to ensure themselves that employees are competent to do the work assignment. Thus, they may employ people who are already certified or they may apply their own expertise and under their responsibility ensure themselves that their employee has the necessary competence.

This document gives particular emphasis on:

- the way in which qualifications are expressed,
- application of the principle that “learning outcomes” are crucial instead of the path to allow transferability between formal, informal and non-formal areas.

This document is mainly directed to:

- [Workshop Personnel](#)
- [Vehicle Park Owner / Personnel](#)
- [workshop personnel](#),
- [vehicle park owner/personnel](#),
- [NGV Dealer / Owner](#) ~~dealer/owner~~,
- [CNG, LNG and L-CNG fuelling station Owner / Personnel](#) ~~owner/personnel~~,
- [First](#) ~~first~~ responders,
- [Inspectors](#) ~~inspectors~~,
- [Training](#) ~~training~~ course providers,
- [Certification Bodies](#)
- [Original Equipment Manufacturer \(OEM\)](#)
- [System Manufacturer](#)
- [certification bodies](#),
- [original equipment manufacturer \(OEM\)](#).

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— system manufacturer.

— workshop owner/operator.

~~Workshop Owner/Operator~~

— CNG and L-CNG fuelling station ~~Owner/Operator~~owner/operator.

— ~~Parking~~parking and garages ~~Owner/Operator~~owner/operator.

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Road vehicles — Technical personnel dealing with natural gas vehicles (NGVs) — Training and qualification

1 Scope

This document specifies the requirements for the provisions of personnel dealing with the operation on natural gases (NG) fuelled vehicles in order to demonstrate their competence.

This document specifies the minimum requirements for training and qualification of personnel according to the level of safety required by the activity.

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 apply.

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

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

3.1

ability

capacity and human attribute to perform an activity

[SOURCE: ISO/IEC TS 17027:2014, 2.1, modified — The phrase "and human attribute" was added.]

3.2

authorized qualification body

body, independent of the *NGV workshop* (3.20), authorized by the *certification body* (3.4) to prepare and administer *qualification* (3.24) examinations

Note 1 to entry ~~qualification~~: *Qualification* examination is an activity administered by the *certification body* (3.4) or the authorized qualification body, which assesses the general, specific and practical knowledge and the *skill* (3.34) of the candidate.

[SOURCE: ISO 9712:2021, 3.2, modified — "employer" = "employer" has been changed to "NGV workshop/workshop", the word "qualifications" and the Note 1 to entry were added.]

3.3

certification

third party attestation related to products, processes, systems, or persons

[SOURCE: ISO 1700:2004, 5.5; ISO 7240-1:2014(en), 2.1.16]

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**3.4
certification body**

third-party conformity assessment body operating *certification* (3.3) schemes

Note 1 to entry: A certification body can be non-governmental or governmental (with or without regulatory authority).

Note 2 to entry: A conformity assessment body is a body that performs conformity assessment activities and that can be the object of [accreditation](#).

Note 3 to entry: A third-party conformity assessment is the conformity assessment activity that is performed by a person or body that is independent of the person or organization that provides the object, and of user interests in that object

[SOURCE: ISO/IEC 17065:2012(en), 3.12, 3.12, modified — Notes 2 and 3 to entry were added.]

**3.5
competence**

ability (3.1) to apply knowledge and *skills* (3.3128) to achieve intended results

[SOURCE: ISO/IEC 17024:2012, 3.6]

**3.6
competence assessment**

formal outcome of an evaluation process (e.g. examination) and validation by means of objective elements, obtained when a *competent body* (3.7) states that the learning outcomes of a person meet given standards and safety regulations

**3.7
competent body**

person or corporate body, defined by the national or relevant authority, which by combination of appropriate *qualification*, (3.24), *training*, (3.32), experience and resources is able to make objective judgments on a subject

[SOURCE: EN 13423 SOURCE: ISO 10691:2004, 3.2]

**3.8
competent person**

person who has acquired, through *training*, (3.32), *qualification*, (3.24), experience or a combination of these, the knowledge and *skill* (3.3128) enabling that person to correctly perform the required tasks

[SOURCE: ISO 11525-1:2020(en), 3.4]

**3.9
CNG**

compressed natural gas

~~CNG~~

natural gas (3.18) which has been compressed and stored for use as a vehicle fuel

[SOURCE: ISO 16923:2018 terminology alignment 15500-1:2015, 3.2]

**3.10
CNG cylinder**

any container used for the storage of *compressed natural gas* (CNG) (3.9) according to the following classifications:

- CNG-1: an all metal cylinder
- CNG-2: a hoop wrapped cylinder with a load-sharing metal liner and composite reinforcement on the cylindrical part only
- CNG-3: a fully wrapped cylinder with a load-sharing metal liner and composite reinforcement on both the cylindrical part and dome ends
- CNG-4: a fully wrapped cylinder with a non-load sharing non-metallic liner and composite reinforcement on both the cylindrical part and dome ends

3.11

garage

building used for the storage and servicing of NGVs

3.12

formal training

organized and documented program of learning activities designed to impart the knowledge and *skills* (3.31-28) necessary to be qualified to this document

3.13

fuelling station

facility at which vehicle fuels are dispensed

3.14

learning outcome

what a person is expected to know, understand or be able to do at the end of a training programme, course or module

[SOURCE: ~~EN 13423 SOURCE~~ ISO/IEC TS 17027:2014, 2.57]

3.15

Liquefied LNG

liquefied natural gas

LNG

natural gas (3.18) which has been liquefied, after processing, for storage or transportation purposes

[SOURCE: EN ISO and 16924:2019 terminology alignment 2016.3.38]

3.16

L-CNG fuelling station

facility at which compressed natural gas (CNG) (3.9) derived from liquefied natural gas (LNG) (3.15) is dispensed to vehicles

3.17

LNG fuelling station

facility at which liquefied natural gas (3.15) is dispensed to vehicles

3.18

natural gas

NG complex gaseous mixture of hydrocarbons primarily methane, but which generally includes ethane, propane and higher hydrocarbons, and some non-combustible gases such as nitrogen and carbon dioxide

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Note 1 to entry: ~~the~~The definition includes renewable natural gas (biogas, biomethane, etc.).

[SOURCE: ISO 14532:2014, 2.1.1.1, ~~modified~~ — Note 1 to entry was replaced.]

3.19

Natural natural gas vehicle

NGV

road vehicle that is powered, either fully or partially, by *natural gas* (3.18) stored on board vehicle in liquid or/and gaseous form

3.20

NGV workshop

competent ~~Organization~~organization, appropriately equipped, that assumes technical responsibility for correct and safe service, inspection, repair and retrofit on *compressed natural gas (CNG)* (3.9) or *liquefied natural gas (LNG)* (3.15) vehicles

3.21

**Notified Body
notified body**

independent, accredited body which is entitled by an authorized accrediting body

Note 1 to entry: Upon definition of standards and regulations, the accrediting body may allow a notified body to provide verification and *certification* (3.3) services. These services are meant to ensure and assess compliance to the previously defined standards and regulations, but also to provide an official *certification* (3.3) mark or a declaration of conformity.

3.22

operator

person working in ~~an~~ NGV workshop (3.20) or in a *compressed natural gas (CNG)* (3.9) /LNG/L-CNG fuelling station (3.16) under the supervision of the *competent person* (3.98)

3.23

practical examination

assessment of practical *skills* (3.3428), in which the candidate demonstrates familiarity with, and the *ability* (3.1) to perform, the test

3.24

qualification

demonstrated education, *training*, (3.32), and work experience, where applicable, required to properly perform the assigned task as awarded or conferred as described in the document.

[SOURCE: ~~adapted~~Note 1 to entry: Adapted from ISO/IEC 17024:2012, 3.7; ~~ISO 29992:2018, 3.1, and ISO/IEC 19479:2019~~].

3.25

qualification level

~~Level 1: The learning outcomes relevant to Level 1 are basic general knowledge~~

~~Level 2: The learning outcomes relevant to Level 2 are • basic factual knowledge of a field of work or study~~

~~Level 3: The learning outcomes relevant to Level 3 are • knowledge of facts, principles, processes and general concepts, in a field of work or study~~

~~Level 4: The learning outcomes relevant to Level 4 are • factual and theoretical knowledge in broad contexts within a field of work or study~~

~~Level 5: The learning outcomes relevant to Level 5 are comprehensive, specialized, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge~~

~~Level 1: the learning outcomes relevant to Level 1 are basic general knowledge~~

~~Level 2: the learning outcomes relevant to Level 2 are basic factual knowledge of a field of work or study~~

~~Level 3: the learning outcomes relevant to Level 3 are knowledge of facts, principles, processes and general concepts in a field of work or study~~

~~Level 4: the learning outcomes relevant to Level 4 are factual and theoretical knowledge in broad contexts within a field of work or study~~

~~Level 5: the learning outcomes relevant to Level 5 are comprehensive, specialized, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge~~

3.26

qualified person

~~EN 13423~~ individual subjected to qualification process which has passed the *qualification* (3.24)

3.27

Recognized training course

training course which contents (for instance: *qualification* (3.24) of teachers, training procedures, documents, examination program and procedures) are assessed against applicable standards and approved by a *certification body* (3.4)

3.28

skill

ability (3.1) to perform a task or activity with a specific intended outcome acquired through education, *training*, (3.32), experience or other means

[SOURCE: ISO/IEC/TS 17027:2014, 2.74]; ~~ISO 29992:2019(en), 3.11]~~

3.29

skilled organization

entity comprising multiple people, such as an institution or an association, that has a collective goal and is linked to an external environment and shall be recognized by National Authorities for the specific field of application

3.30

system manufacturer

company which can assume technical responsibility for the manufacturing or retrofitting of NGV fuel system and can demonstrate that it possesses the features required and the necessary means to provide quality assessment and conformity of production of the NGV fuel system

[SOURCE: R. 115]

[SOURCE: Reference [14], 2.3, modified — "LPG and CNG" have been replaced by "NGV fuel system".]

3.31

technical manager

qualified person ~~which~~ (3.26) that takes responsibility for decisions relating to parking, fuelling, installation, maintenance and repair of an NGV system

Note 1 to entry: See also EN 13423.