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للسلامة الأساسية والأداء الأساسي -- الجزء 5: أجهزة
الإنعاش للطوارئ التي تعمل بالغاز

Gulf Standard

Lung ventilators for medical use -- Particular
requirements for basic safety and essential
performance -- Part 5: Gas-powered emergency
resuscitators

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هيئة التقييس لدول مجلس التعاون لدول الخليج العربية هيئة إقليمية تضم في عضويتها أجهزة التقييس الوطنية في الدول الأعضاء ، ومن مهام الهيئة إعداد المواصفات القياسية واللوائح الفنية الخليجية بواسطة لجان فنية متخصصة.

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Gulf Foreword

GCC Standardization Organization (GSO) is a regional organization which consists of the national standardization bodies of GCC member states. One of GSO main functions is to issue gulf standards and technical regulations through specialized technical committees.

GSO Technical Council in its meeting number (37) held on 03/09/1437 H , which corresponds to 21/12/2015 has approved gulf standard No GSO ISO 10651-5:2015 titled "Lung ventilators for medical use -- Particular requirements for basic safety and essential performance -- Part 5: Gas-powered emergency resuscitators" in English language which was studied and adopted by endorsement from International Organization for Standardization Standard ISO 10651-5:2006 through fast track .

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**Lung ventilators for medical use —
Particular requirements for basic
safety and essential performance —**

Part 5:
**Gas-powered emergency
resuscitators**

*Ventilateurs pulmonaires à usage médical — Exigences particulières
pour la sécurité de base et les performances essentielles —*

Part 5: Appareils de réanimation d'urgence alimentés par gaz



Reference number
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Contents		Page
Foreword		vi
Introduction		vii
1 * Scope		1
2 Normative references		1
3 Terms and definitions		2
4 General requirements		
4.1 General		
4.2 Other test methods		
4.3 Acceptance criteria		
5 Constructional requirements		
5.1 General		
5.1.1 Materials of construction		
5.1.2 Surfaces, corners and edges		
5.1.3 Leaching of substances		
5.1.4 Breathing tubes		
5.1.5 Supply of sterile components		
5.1.6 * Breathing system filter		
5.1.7 Arrangement of functions		
5.1.8 Protection against accidental adjustments		
5.1.9 Selector switches/controls		
5.1.10 Accuracy of operating data		
5.1.11 * Resuscitator set		
5.2 Connectors		
5.2.1 Connection to the medical gas supply system		
5.2.2 Connection to the high-pressure gas input port		
5.2.3 Patient connection port connector		
5.2.4 Facemask connector		
5.2.5 * Gas exhaust port connector		
5.2.6 Resuscitator inspiratory limb connectors		
5.2.7 Emergency air intake port		
6 Operational requirements		
6.1 General		
6.1.1 * Patient valve function after contamination with vomitus		
6.1.2 Cleaning, and sterilization or disinfection		
6.1.3 * Functional test after reassembly		
6.1.3.1 Reassembly		
6.1.3.2 Functional test		
6.1.4 Flow-direction-sensitive component connectors		
6.2 Resistance to environmental influences		
6.2.1 * Storage and operating conditions		
6.2.1.1 Storage		
6.2.1.2 Operating conditions		
6.3 Resistance to typical use		
6.3.1 Mechanical shock		
6.3.1.1 * Drop test		
6.3.2 Splash proof		
6.3.3 * Immersion in water		
6.4 Size and mass		
6.4.1 * Size		

6.4.2	* Mass	
6.5	Gas supply	
6.5.1	Gas cylinders and cylinder valve	
6.5.2	Captive cylinder valve key	
6.5.3	Cylinder regulator	
6.5.4	External supply	
6.5.5	Permanently connected resuscitator	
6.5.6	* Intermediate hose	
6.5.7	Gas container capacity	
7	Performance	
7.1	Ventilatory requirements	
7.1.1	* Delivered oxygen concentration	
7.1.2	* Resistance to spontaneous breathing	
7.1.2.1	General	
7.1.2.2	Inspiratory resistance during the resuscitator expiratory phase	
7.1.2.3	Spontaneous breathing with the gas input pressure outside the rated range	
7.1.2.4	Expiratory resistance	
7.1.3	* Inadvertent PEEP	
7.1.4	* Inadvertent continuing expiratory pressure	
7.1.5	* Resuscitator dead space and dead space of airway accessories	
7.2	* Ventilation performance	
7.2.1	General	
7.2.1.1	Manually-cycled resuscitator	
7.2.1.2	Automatic pressure-cycled resuscitator	
7.2.1.3	Automatic time-cycled or volume-cycled resuscitator	
7.2.1.4	Resuscitator with patient-triggering	
7.2.1.5	Resuscitator with demand valve	
7.2.2	* Delivered volume (V_{del})	
7.2.3	* Consistency of delivered volume	
7.2.4	Pressure limitation under normal use	
7.2.5	Pressure limitations under single fault condition	
7.2.6	* Pressure-limitation activation alarm signal	
7.2.7	* Inspiratory flow	
7.2.8	Operation of manual trigger on a manually-cycled resuscitator	
7.2.9	Demand valve	
7.2.9.1	General	
7.2.9.2	Threshold pressure for initiation of flow	
7.2.9.3	Peak inspiratory flow	
7.2.9.4	Termination pressure	
7.2.10	* Patient-triggered resuscitator	
8	Identification, marking and documents	
8.1	General	
8.1.1	Conditions	
8.1.2	Units of measure	
8.2	Marking	
8.2.1	* Legibility of markings	
8.2.2	* Durability of markings	
8.2.3	Identification	
8.2.4	Controls and indicators	
8.2.5	Indication of pressure-limiting device setting	
8.2.6	Indication of use of function affecting performance	
8.2.7	Indication of pneumatic power rating	
8.2.8	Flow-direction-sensitive component	
8.2.9	Indication of latex	
8.2.10	Indication of protection against water ingress	
8.3	Information provided by the manufacturer for operation and maintenance	

8.3.1 General
8.3.2 Contents
**Annex A (informative) Rationale
Annex B (normative) Test methods
Annex C (informative) Relationship between this part of ISO 10651 and cardiopulmonary
resuscitation guidelines
Annex D (informative) Clauses of this part of ISO 10651 addressing the essential principles
Annex E (informative) Terminology — Index of defined terms
Bibliography 6**

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 10651-5 was prepared by Technical Committee ISO/TC 121, *Anaesthetic and respiratory equipment*, Subcommittee SC 3, *Lung ventilators and related equipment*.

This first edition of ISO 10651-5, together with ISO 10651-4:2002, cancels and replaces ISO 8382:1988, which has been technically revised.

ISO 10651 consists of the following parts, under the general title *Lung ventilators for medical use — Particular requirements for basic safety and essential performance*:

- *Part 2: Home care ventilators for ventilator-dependent patients*
- *Part 3: Particular requirements for emergency and transport ventilators*
- *Part 4: Particular requirements for operator-powered resuscitators*
- *Part 5: Gas-powered emergency resuscitators*
- *Part 6: Home-care ventilatory support devices*

NOTE ISO 10651-1:1993, *Lung ventilators for medical use — Part 1: Requirements*, was withdrawn in 2001 and has been revised as IEC 60601-2-12:2001, *Medical electrical equipment — Part 2-12: Particular requirements for the safety of lung ventilators — Critical care ventilators*.

Introduction

For victims whose lives are at risk from respiratory failure, in particular during cardiac arrest, resuscitation councils and associations teach that the best ultimate outcome will be achieved if there is a continuous chain of care starting with earliest possible bystander **cardiopulmonary resuscitation** and continuing until the victim can be put under professional medical care. In order to improve the care possible at the early stages of this chain, authorities and organizations are training non-specialized personnel in key situations, such as where people congregate or where there are increased risks, so that they can be available to provide a higher level of care with a minimum of delay.

There is a growing realization that the effectiveness of such intervention can be greatly enhanced by the use of certain basic **equipment**, such as that which provides ventilation whilst avoiding mouth-to-mouth contact. Simple, **gas-powered emergency resuscitators** can deliver controlled ventilation for this purpose and this document specifies the criteria they are required to satisfy.

In this part of ISO 10651, the following symbols and notations are used:

- requirements, compliance with which can be tested, and definitions: roman type;
- notes, explanations, advice, introductions, general statements and references: smaller roman type;
- test specifications: *italic type*;
- terms defined in ISO 4135:2001, IEC 60601-1:1988 or in this part of ISO 10651: **bold type**.

Throughout this part of ISO 10651, text for which a rationale is provided in Annex A is indicated by an asterisk (*).

Lung ventilators for medical use — Particular requirements for basic safety and essential performance —

Part 5: Gas-powered emergency resuscitators

1 * Scope

This part of ISO 10651 specifies the basic safety and essential performance requirements for gas-powered emergency resuscitators (3.10) intended for use with humans by **first responders**. This **equipment** is intended for emergency field use and is intended to be continuously **operator** attended in **normal use**.

This part of ISO 10651 also specifies the requirements for **resuscitator sets** (3.22).

This part of ISO 10651 is not applicable to electrically-powered **resuscitators**.

NOTE ISO 10651-3 covers emergency and transport ventilators.

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 31 (all parts), *Quantities and units*

ISO 32, *Gas cylinders for medical use — Marking for identification of content*

ISO 1000, *SI units and recommendations for the use of their multiples and of certain other units*

ISO 4135:2001, *Anaesthetic and respiratory equipment — Vocabulary*

ISO 5356-1, *Anaesthetic and respiratory equipment — Conical connectors — Part 1: Cones and sockets*

ISO 5356-2, *Anaesthetic and respiratory equipment — Conical connectors — Part 2: Screw-threaded weight-bearing connectors*

ISO 5359, *Low-pressure hose assemblies for use with medical gases*

ISO 5367, *Breathing tubes intended for use with anaesthetic apparatus and ventilators*

ISO 9170-1, *Terminal units for medical gas pipeline systems — Part 1: Terminal units for use with compressed medical gases and vacuum*

ISO 10297, *Gas cylinders — Refillable gas cylinder valves — Specification and type testing*

ISO 10524-1, *Pressure regulators for use with medical gases — Part 1: Pressure regulators and pressure regulators with flow-metering devices*

ISO 10524-3, *Pressure regulators for use with medical gases — Part 3: Pressure regulators integrated with cylinder valves*

ISO 11607, *Packaging for terminally sterilized medical devices*

ISO 14971, *Medical devices — Application of risk management to medical devices and Amendment 1:2003*

ISO 15223:2000, *Medical devices — Symbols to be used with medical device labels, labelling and information to be supplied and Amendment 1:2002 and Amendment 2:2004*

ISO 17664, *Sterilization of medical devices — Information to be provided by the manufacturer for the processing of resterilizable medical devices*

ISO 23328-1:2003, *Breathing system filters for anaesthetic and respiratory use — Part 1: Salt test method to assess filtration performance*

ISO 23328-2:2002, *Breathing system filters for anaesthetic and respiratory use — Part 2: Non-filtration aspects*

IEC 60529:2001, *Degrees of protection provided by enclosures (IP code)*

IEC 60601-1:1988, *Medical electrical equipment — Part 1: General requirements for safety and Amendment 1:1991 and Amendment 2:1995*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4135:2001, IEC 60601-1:1988 and the following apply. For convenience, the sources of all defined terms used in this document are given in Annex E.

3.1 accompanying documents

documents accompanying **resuscitator** or **resuscitator sets** and containing all important information for the **user, operator**, installer or assembler of the **resuscitator**, particularly regarding safety

Note 1 to entry: Adapted from IEC 60601-1:1988, definition 2.1.4.

3.2 automatic pressure-cycled resuscitator

resuscitator in which the cycling from the **inspiratory phase** to the **expiratory phase** occurs after attaining a pressure determined by the control setting

3.3 automatic time-cycled resuscitator

resuscitator in which the cycling between the **inspiratory phase** and **expiratory phase** is controlled automatically at time intervals determined by the control setting

3.4 automatic volume-cycled resuscitator

resuscitator in which the cycling from the **inspiratory phase** to the **expiratory phase** occurs after the delivery of a **delivered volume** determined by the control setting

3.5**cardiopulmonary resuscitation**

combination of rescue breathing and chest compressions delivered to victims thought to be in cardiac arrest

[SOURCE: AHA Guidelines for Cardiopulmonary Resuscitation and Emergency Care]

3.6**clearly legible**

capable of being read by the **operator** or other relevant person with normal vision

NOTE See 8.2.1 * Legibility of markings.

3.7*** delivered volume**

V_{del}

volume of gas delivered through the **patient connection port** during an **inspiratory phase**

3.8**demand valve**

part of the **resuscitator** that delivers a flow of gas related to a reduction of pressure generated by the **patient** at the **patient connection port**

3.9**first responder**

individual who has been trained to provide primary response to a respiratory emergency

EXAMPLE Fire fighter.

EXAMPLE Emergency medical technician.

3.10**gas-powered emergency resuscitator resuscitator**

portable **equipment**, powered by compressed gas, intended for immediate use to provide lung ventilation in the resuscitation of individuals who have sudden breathing difficulties

3.11**inadvertent positive end-expiratory pressure****inadvertent PEEP**

unintended positive pressure at the **patient connection port** at the end of the **expiratory phase**

3.12**intermediate hose**

hose that conducts gas between parts of the **resuscitator**

3.13**manually-cycled resuscitator**

resuscitator in which the **inspiratory phase** and **expiratory phase** are controlled by a repeated manual action of the **operator**

Note 1 to entry: A **demand valve** that can be overridden with a manual trigger is, for the purposes of this document, classified as a 'manually-cycled resuscitator incorporating a demand valve' and not as a 'demand valve' as they are commonly termed in some countries.

3.14

minute volume

V

volume of gas per minute entering or leaving the **patient's** lungs

3.15

operator

person handling the **resuscitator**

Note 1 to entry: Adapted from IEC 60601-1:1988, definition 2.12.17.

3.16

patient-triggered resuscitator

resuscitator in which the cycling from the **expiratory phase** to the **inspiratory phase** is triggered by an inspiratory effort of the **patient**

3.17

patient-triggering

mode of operation in which a reduction of pressure generated by the **patient** at the **patient connection port** initiates the set **inspiratory phase**

3.18

patient valve

valve in the **resuscitator breathing system** that directs gas into the lungs during the **inspiratory phase** and from the lungs into the atmosphere during the **expiratory phase**

3.19

pressure-limiting device

means for limiting the maximum pressure within the **resuscitator breathing system**

3.20

resuscitator breathing system

breathing system bounded by the **low-pressure gas input port(s)**, the gas intake port(s) and the **patient connection port**, together with the **fresh gas intake port** and **exhaust port(s)**, if these are provided

3.21

resuscitator dead space

volume of previously exhaled gas within the **resuscitator breathing system** that is delivered to the **patient** in the succeeding **inspiratory phase**

3.22

resuscitator set

pack of all the necessary components that enable the **resuscitator** to be carried to the site of a resuscitation emergency and that enable the **resuscitator** to be made ready for immediate use

3.23

safety hazard

potentially detrimental effect on the **patient**, other persons, animals, or the surroundings, arising directly from the **resuscitator**

Note 1 to entry: Adapted from IEC 60601-1:1988, definition 2.12.18.

3.24

single fault condition

condition in which a single means for protection against a **safety hazard** in the **resuscitator** is defective or a single external abnormal condition is present

Note 1 to entry: Adapted from IEC 60601-1:1988, definition 2.10.11.

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