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Medical devices — Connectors for reservoir delivery systems for healthcare applications —

Part 8: Citrate-based anticoagulant solution for apheresis applications

Dispositifs médicaux — Connecteurs pour systèmes de livraison de réservoir pour des applications de soins de santé —

Partie 8: Solution anticoagulante à base de citrate pour les applications d'aphérèse

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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Contents

Page

Foreword iv
Introduction vi
1 Scope 1
2 Normative references 1
3 Terms and definitions 1
4 General requirements 3
4.1 NON-INTERCONNECTABILITY through conformance to ISO 18250-8 3
4.2 *Materials 3
4.3 APHERESIS AC RESERVOIR CONNECTOR Descriptions 3
4.4 *Design 4
4.5 Reference CONNECTORS 4
5 Performance requirements 4
5.1 General 4
5.2 *Positive pressure liquid leakage 4
5.3 Stress-cracking 4
5.4 Resistance to separation from axial load 4
5.5 Resistance to separation from unscrewing 4
5.6 Resistance to overriding 5
5.7 *Subatmospheric pressure air leakage 5
Annex A (informative) **Rationale and guidance** 6
Annex B (normative) **CONNECTORS drawings and dimensions** 7
Annex C (normative) **Reference CONNECTORS** 10
Annex D (informative) **Summary of assessment of the design of the APHERESIS AC RESERVOIR CONNECTORS** 19
Bibliography 24

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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.

This document was prepared by Technical Committee ISO/TC 210, *Quality management and corresponding general aspects for medical devices*.

A list of all parts in the ISO 18250 series can be found on the ISO website.

In this document, the following print types are used:

— Requirements and definitions: roman type.

— Informative material appearing outside of tables, such as notes, examples and references: in smaller type.

— Normative text of tables is also in a smaller type.

— TERMS DEFINED IN THIS STANDARD: SMALL CAPS.

— *Compliance requirements: italic type.*

In this document, the conjunctive "or" is used as an "inclusive or" so a statement is true if any combination of the conditions is true.

For the purposes of this document, the following verbal forms are used:

— "shall" means that compliance with a requirement or a test is mandatory for compliance with this document;

— "should" means that compliance with a requirement or a test is recommended but is not mandatory for compliance with this document;

— "may" is used to describe a permissible way to achieve compliance with a requirement or test.

An asterisk (*) as the first character of a title or at the beginning of a paragraph or table title indicates that there is guidance or rationale related to that item in Annex A.

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

During the development of the series of standards for small-bore CONNECTORS for liquids and gases in healthcare applications (see ISO 80369) it became clear that the risk of MISCONNECTIONS was not limited to the patient access CONNECTORS and that the whole RESERVOIR system needed to be considered. The possible MISCONNECTION between APHERESIS AC RESERVOIR CONNECTORS and spikes was also reviewed. However, as APHERESIS AC RESERVOIR CONNECTORS are not exactly within the definition of small-bore CONNECTORS it was decided to develop this separate standard for these CONNECTORS, taking into account the risks of MISCONNECTIONS with other devices such as IV bags, and blood pressure cuffs that are likely to be used on the same patient.

This document, therefore, defines the APHERESIS AC RESERVOIR CONNECTORS in geometry, material, and performance to permit them being analyzed (and avoided) by other CONNECTORS intended for non-APHERESIS applications (i.e. the other application parts of the ISO 18250 series).

This document is not a device standard as it specifies only the dimensions of the interfaces for the APHERESIS AC RESERVOIR CONNECTORS used on the disposable tubing sets and solution RESERVOIRS.

Medical devices — Connectors for reservoir delivery systems for healthcare applications —

Part 8: Citrate-based anticoagulant solution for apheresis applications

1 Scope

This document specifies dimensions and requirements for the design and functional performance of APHERESIS ANTICOAGULANT (AC) RESERVOIR CONNECTORS.

This document does not specify the dimensions and requirements for the MEDICAL DEVICES or ACCESSORIES that use these CONNECTORS. Such requirements are given in particular International Standards for specific MEDICAL DEVICES or ACCESSORIES.

The following examples of MEDICAL DEVICES are intended to use the CONNECTORS of this document:

— APHERESIS tubing sets and mating RESERVOIRS containing CITRATE-BASED ANTICOAGULANT solution.

— APHERESIS tubing sets may include, but are not limited to those for use in blood collection, therapeutic applications, and plasma collection.

Some APHERESIS sets are manufactured with a pre-connected RESERVOIR containing CITRATE-BASED ANTICOAGULANT solution. These MEDICAL DEVICES are not intended to use the CONNECTORS of this document.

NOTE Manufacturers are encouraged to incorporate the CONNECTORS specified in this document into APHERESIS devices or ACCESSORIES, even if not currently required by the particular MEDICAL DEVICE standards. It is expected that when the particular MEDICAL DEVICE standards are revised, requirements for APHERESIS AC RESERVOIR CONNECTORS, will be included.

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.

ISO 18250-1:—[1], *Medical devices — Connectors for reservoir delivery systems for healthcare applications — Part 1: General requirements and common test methods*

ISO 80369-20:2015, *Small-bore connectors for liquids and gases in healthcare applications — Part 20: Common test methods*

3 Terms and definitions

3.1
ACCESSORY
additional part(s) for use with MEDICAL DEVICE (3.7) in order to:

— achieve the intended use,

1) Under preparation. Stage at the time of publication: ISO/FDIS 18250-1.

— adapt it to some special use,

— facilitate its use,

— enhance its performance, or

— enable its functions to be integrated with those of other MEDICAL DEVICES (3.7)

[SOURCE: ISO 80369-1:—[2)], definition 3.1]

3.2
APHERESIS
procedure in which blood is drawn from a donor or patient and separated into its components, some of which are retained and the remainder returned by transfusion to the donor or patient

3.3
APHERESIS ANTICOAGULANT RESERVOIR CONNECTOR
APHERESIS AC RESERVOIR CONNECTOR
CONNECTOR (3.6) for CITRATE-BASED ANTICOAGULANT (3.4) solutions for APHERESIS (3.2) applications

3.4
CITRATE-BASED ANTICOAGULANT
citrate, in the form of sodium citrate or acid-citrate-dextrose, added to the blood as it is drawn from the subject's circulation which binds or chelates ionised calcium within the blood, impeding those steps of the coagulation pathway that are dependent on the presence of ionised calcium

3.5
CONNECTION
union or joining of mating halves of a CONNECTOR (3.6)

[SOURCE: ISO 80369-1:—, definition 3.4]

3.6
CONNECTOR
mechanical device, consisting of one of two mating halves and designed to join a conduit to convey liquids or gases

[SOURCE: ISO 80369-1:—, definition 3.5]

3.7
MEDICAL DEVICE
instrument, apparatus, implement, machine, appliance, implant, in vitro reagent or calibrator, software, material or other similar or related article, intended by the manufacturer to be used, alone or in combination, for human beings for one or more of the specific purpose(s) of

— diagnosis, prevention, monitoring, treatment or alleviation of disease,

— diagnosis, monitoring, treatment, alleviation of or compensation for an injury,

— investigation, replacement, modification, or support of the anatomy or of a physiological process,

— supporting or sustaining life,

— control of conception,

— disinfection of MEDICAL DEVICES, or

— providing information for medical purposes by means of in vitro examination of specimens derived from the human body,

2) To be published. Revision of ISO 80369-1:2010.

and which does not achieve its primary intended action in or on the human body by pharmacological, immunological or metabolic means, but which may be assisted in its function by such means

Note 1 to entry: Products which might be considered to be MEDICAL DEVICES in some jurisdictions but not in others include:

— disinfection substances;

— aids for persons with disabilities;

— devices incorporating animal or human tissues;

— devices for in-vitro fertilization or assisted reproduction technologies.

[SOURCE: Based on GHTF/SG1/N071 2012, definition 5.1]

3.8
MISCONNECTION
CONNECTION (3.5) between CONNECTORS (3.6) intended for different APPLICATIONS or from different designs within the same APPLICATION and not intended to connect

3.9
NON-INTERCONNECTABLE
having characteristics which incorporate geometries or other characteristics that prevent different CONNECTORS (3.6) from being connected

3.10
RESERVOIR
fluid container within MEDICAL DEVICE (3.7) or pharmaceutical fields

4 General requirements

4.1 NON-INTERCONNECTABILITY through conformance to ISO 18250-8

Conformance to 4.2, 4.4 and Clause 5 of this document is sufficient to demonstrate conformance to ISO 18250-1 (i.e. NON-INTERCONNECTABILITY with clinical applications other than APHERESIS).

NOTE 1 A summary of the evaluation and residual risks of the NON-INTERCONNECTABLE characteristics of the designs for this document is included in Annex D.

NOTE 2 The NON-INTERCONNECTABLE criteria used in this document deviates from the ISO 18250-1:—, Annex B in that the risk of MISCONNECTIONS between applications that will connect but do not permit transfer of fluids is deemed acceptable.

4.2 *Materials

APHERESIS AC RESERVOIR CONNECTORS shall be made of materials as specified by ISO 18250-1:—, Clause 4.

Compliance shall be checked by applying the tests of ISO 18250-1:—, Clause 4.

4.3 APHERESIS AC RESERVOIR CONNECTOR Descriptions

One pair of connectors are used in the APHERESIS AC RESERVOIR CONNECTOR application. These are:

— The male APHERESIS AC RESERVOIR CONNECTOR. This CONNECTOR shall be on the APHERESIS set.

— The female APHERESIS AC RESERVOIR CONNECTOR. This CONNECTOR shall be on the RESERVOIR.

4.4 *Design

APHERESIS AC RESERVOIR CONNECTORS shall comply with the relevant dimensions and tolerances as given in:

— Figure B.1 for a male APHERESIS AC RESERVOIR CONNECTOR;

— Figure B.2 for a female APHERESIS AC RESERVOIR CONNECTOR.

4.5 Reference CONNECTORS

Reference CONNECTORS shall be manufactured from corrosion-resistant metal with a surface roughness value, *Ra*, not exceeding 0,8 µm on critical surfaces to the dimensions shown in Annex C.

5 Performance requirements

5.1 General

The tests described in this document are type tests.

5.2 *Positive pressure liquid leakage

APHERESIS AC RESERVOIR CONNECTORS shall be evaluated for fluid leakage performance with the positive pressure liquid leakage test method and shall show no signs of leakage sufficient to form a falling drop of water from the CONNECTOR, over a hold period of 30 s to 35 s while being subjected to an applied pressure of between 50 kPa and 60 kPa. Manufacturers may use a greater applied pressure or a longer hold period.

Compliance shall be checked by applying the tests of ISO 80369-20:2015, Annex C, while using the reference CONNECTOR specified in Annex C.

5.3 Stress-cracking

APHERESIS AC RESERVOIR CONNECTORS shall be evaluated for stress cracking. When tested in accordance with 5.2 there shall be no evidence of stress-cracking of the CONNECTOR.

Compliance shall be checked by applying the tests of ISO 80369-20:2015, Annex E, while using the reference CONNECTOR specified in Annex C.

5.4 Resistance to separation from axial load

APHERESIS AC RESERVOIR CONNECTORS shall be evaluated for separation from axial load. APHERESIS AC RESERVOIR CONNECTORS shall not separate from the reference CONNECTOR over a hold period between 10 s and 15 s while being subjected to a disconnection applied axial force between 32 N and 35 N.

Compliance shall be checked by applying the tests of ISO 80369-20:2015, Annex F, while using the reference CONNECTOR specified in Annex C.

5.5 Resistance to separation from unscrewing

APHERESIS AC RESERVOIR CONNECTORS shall be evaluated for separation from unscrewing. APHERESIS AC RESERVOIR CONNECTORS shall not separate from the reference CONNECTOR when an unscrewing torque of between 0,018 Nm and 0,02 Nm is applied to the body of the CONNECTOR for at least 10 s.

Compliance shall be checked by applying the tests of ISO 80369-20:2015, Annex G while using the reference CONNECTOR specified in Annex C.

5.6 Resistance to overriding

APHERESIS AC RESERVOIR CONNECTORS shall be evaluated for resistance to overriding. APHERESIS AC RESERVOIR CONNECTORS shall not override the threads or lugs of the reference CONNECTOR while being subjected to an applied torque of between 0,15 Nm to 0,17 Nm over a hold period between 5 s and 10 s.

Compliance shall be checked by applying the tests of ISO 80369-20:2015, Annex H, while using the reference CONNECTOR specified in Annex C.

5.7 *Subatmospheric pressure air leakage

APHERESIS AC RESERVOIR CONNECTORS shall be evaluated for subatmospheric pressure air leakage. APHERESIS AC RESERVOIR CONNECTORS shall not leak by more than 0,005 Pa m^3/s while being subjected to an applied subatmospheric pressure of between 80,0 kPa and 88,0 kPa over a hold period of between 15 s and 20 s.

Compliance shall be checked by applying the tests of ISO 80369-20:2015, Annex D, while using the reference CONNECTOR specified in Annex C.

Annex A
(informative)

Rationale and guidance

A.1 General

This annex provides a rationale for some requirements of this document, and is intended for those who are familiar with the subject of this document but who have not participated in its development. An understanding of the rationale underlying these requirements is considered to be essential for their proper application. Furthermore, as clinical practice and technology change, it is believed that a rationale will facilitate any revision of this document necessitated by those developments.

A.2 Rationale for particular clauses and subclauses

The clauses and subclauses in this annex have been numbered to correspond to the numbering of the clauses and subclauses of this document to which they refer. The numbering is, therefore, not consecutive.

Subclause 4.2 Materials

To prevent MISCONNECTION between devices of different applications, the rigidity of the materials from which the CONNECTORS are made plays a major part in ensuring they do not MISCONNECT. In order to verify MISCONNECTION characteristics, it was decided that a rigid (700 to 800 MPa) material be specified for the testing and validating of the CONNECTORS included in this series.

Subclause 4.4 Design

The interface dimensions and requirements in this standard have been developed taking into account the risks of MISCONNECTION with other RESERVOIRS. It can therefore be assumed that if a CONNECTOR is manufactured to the dimensions and materials in this standard then the potential risk of MISCONNECTION with other standardized RESERVOIR CONNECTORS of other applications will be reduced.

Subclause 5.2 Positive pressure liquid leakage and Subclause 5.7 Subatmospheric pressure air leakage

The test pressures were chosen to be representative of pressures the CONNECTORS will be exposed to during use or are representative of test pressures that are used for RESERVOIRS, for example 50 kPa is taken from ISO 15747.