



Designation: F1343 – 02

Standard Specification for Anesthetic Gas Scavenging Systems—Transfer and Receiving Systems¹

This standard is issued under the fixed designation F1343; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification establishes requirements for transfer and receiving systems of active anesthetic gas scavenging systems (AGSS) intended to reduce the exposure of healthcare personnel to anesthetic gases and vapors. This specification also specifies requirements for AGSS in which the receiving system is integrated with the disposal system.

1.2 This specification does not specify requirements for non-active AGSS (passive AGSS), proximity gas extraction systems (see 3.1.17), and disposal systems (see 3.1.5).

NOTE 1—For requirements for “disposal systems” only, see NFPA 99, Standard for Healthcare Facilities.

2. Referenced Documents

2.1 *ASTM Standards*:²

F1054 Specification for Conical Fittings³

2.2 *Other Documents*:

CGA V-5: 2000 Diameter Index Safety System⁴

ISO 5356-2: 1987 Anaesthetic and Respiratory Equipment—Conical Connectors—Part 2: Screw-Threaded Weight-Bearing Connectors⁵

ISO 5359: 2000 Low-Pressure Hose Assemblies for Use with Medical Gases⁵

IEC 60601-1:1988 Medical Electrical Equipment—Part 1: General Requirements for Safety⁶

¹ This specification is under the jurisdiction of ASTM Committee F29 on Anesthetic and Respiratory Equipment and is the direct responsibility of Subcommittee F29.10 on Anesthesia Workstations.

Current edition approved Apr. 10, 2002. Published June 2002. Originally published as F1343 – 91. Discontinued February 2000 and reinstated as F1343 – 02. DOI: 10.1520/F1343-02.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Withdrawn. The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from Compressed Gas Association (CGA), 4221 Walney Rd., 5th Floor, Chantilly, VA 20151-2923, <http://www.cganet.com>.

⁵ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁶ Available from International Electrotechnical Commission (IEC), 3 rue de Varembe, Case postale 131, CH-1211, Geneva 20, Switzerland, <http://www.iec.ch>.

NFPA 99:1999 Standard for Healthcare Facilities⁷

3. Terminology

3.1 *Definitions of Terms Specific to This Standard*:

3.1.1 *active anesthetic gas scavenging system (AGSS)*, *n*—AGSS in which the gas flow in the disposal system results from a power device.

3.1.2 *anesthetic gas*, *n*—vapor of a volatile agent or a gas used in anesthesia.

3.1.3 *anesthetic gas scavenging system (AGSS)*, *n*—complete system which is connected to the exhaust port of a breathing system or to other equipment for the purpose of conveying expired or excess anesthetic gases, or both, to an appropriate place of discharge.

NOTE 2—Functionally, a complete system comprises three parts: a transfer system, a receiving system, and a disposal system (See Fig. 1). These three functionally discrete parts may be either separate or combined in part or in total. One or more parts of an AGSS may be combined with a breathing system component or other equipment.

3.1.4 *breathing system*, *n*—those inspiratory and expiratory pathways through which gas flows at respiratory pressures between the fresh gas inlet, the patient connection port and the exhaust valve or port.

NOTE 3—In practice, a breathing system usually extends from: (1) the point of supply of a gas mixture, for example, the fresh gas outlet of an anesthetic machine. In some situations, particularly in lung ventilators, this point may be inside a piece of equipment and should not be confused with a connection port fitted elsewhere, for example, on the casing of the ventilator; or (2) the fresh gas inlet of a circle system, lung ventilator, T-piece, and so forth; or (3) the fresh gas inlet of a manually operated resuscitator.

NOTE 4—The breathing system usually extends to the point at which the gas mixtures escapes to atmosphere or to an anesthetic gas scavenging system, for example, from an APL valve or the open end of a T-piece.

NOTE 5—The arrangement of any system and the method of use influences affect the composition of the inspired gas mixture.

NOTE 6—Gas pathways exclusively concerned with anesthetic gas scavenging systems are not regarded as a part of a breathing system.

NOTE 7—It is not possible to eliminate all ambiguity in defining the term “breathing system.” When this term is used in any standard or

⁷ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, <http://www.nfpa.org>.

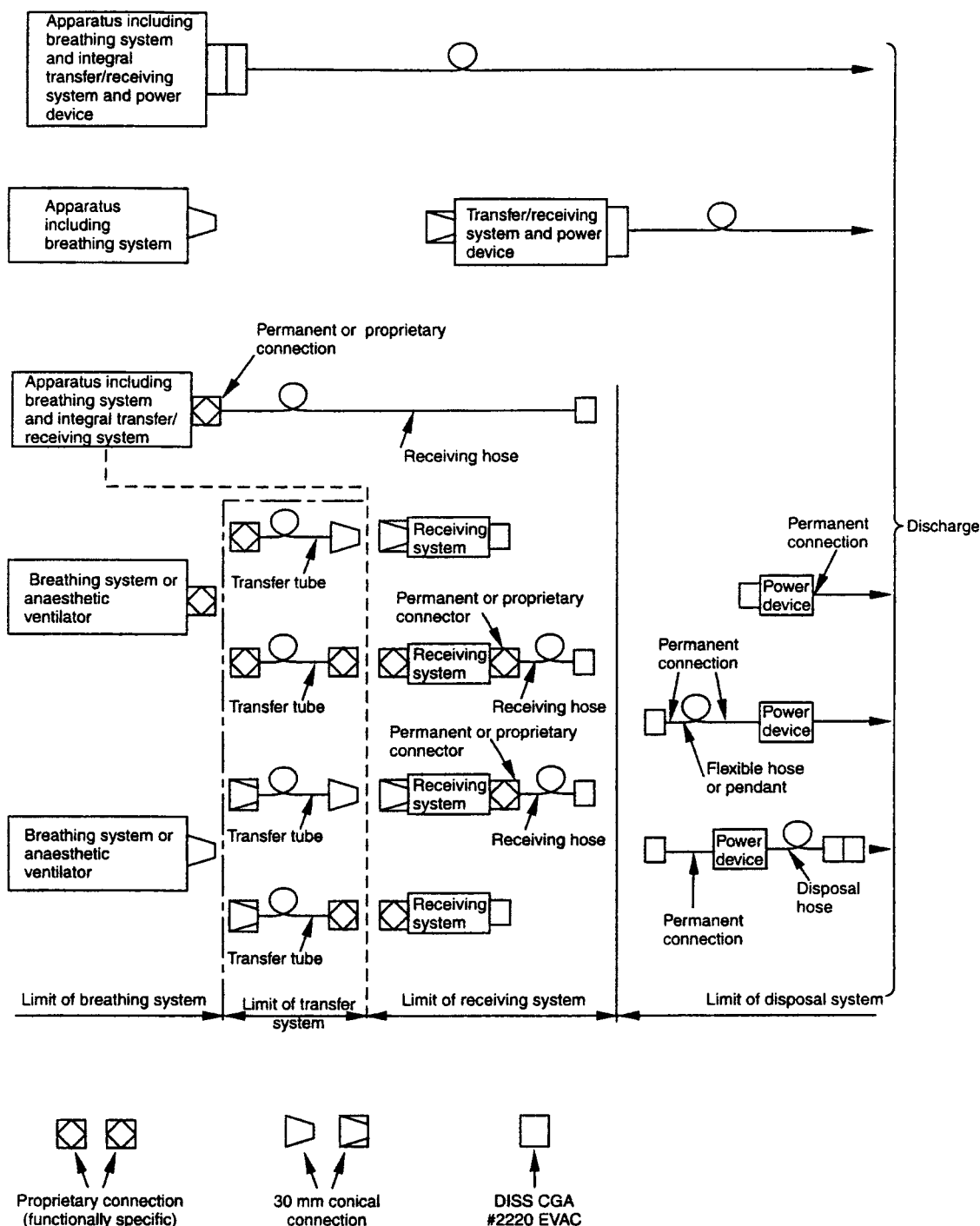


FIG. 1 Schematic Diagram of Typical AGSS Connections

document, or other scientific publication, in which it could affect the precise interpretation thereof, the limits and configuration of any "breathing system" referred to therein should be clearly defined.

3.1.5 disposal system, n—that part of an AGSS by means of which the expired or excess anesthetic gases, or both, are conveyed from a receiving system to a point of discharge.

NOTE 8—In an active AGSS, the disposal system contains a power device which may either form part of a permanent disposal system installation or be installed within the operator's working environment, either as a discrete device or integrated with the receiving system.

3.1.6 extract flow, n—flow of gas from the transfer and receiving system of an AGSS at the entry to the disposal system.

3.1.7 high-flow disposal system, n—disposal system which can generate extract flows in excess of 50 L/min.

3.1.8 induced flow, n—flow at the inlet of the transfer system which is caused by the sub-atmospheric pressure generated in the AGSS.

3.1.9 interchangeable, adj—equipment or components, or both, with compatible interfaces and performance.

3.1.10 *legible, adj*—displayed qualitative or quantitative information, values, functions, or markings discernible or identifiable to an operator with 6-6 (20/20) vision (corrected if necessary).

3.1.11 *low-flow disposal system, n*—disposal system which cannot generate extract flows in excess of 50 L/min.

3.1.12 *maximum extract flow, n*—highest flow of gas at the entry to the disposal system which under normal conditions can be accommodated without exceeding the limitations for induced flow.

3.1.13 *minimum extract flow, n*—lowest flow of gas at the entry to the disposal system which under normal conditions ensures that spillage to atmosphere does not occur.

3.1.14 *normal condition, n*—condition in which all means provided for protection against safety hazards are intact.

3.1.15 *operator detachable, n*—equipment that can be connected or detached by the operator without the use of a tool.

3.1.16 *power device, n*—that part of the disposal system of an active AGSS which generates the extract flow.

3.1.17 *proximity gas extraction system, n*—system used proximal (within 2 in.) to the patient or surgical site to extract gases, smoke, and particulate matter away from the surgical site.

NOTE 9—Proximity gas extraction systems sometimes discharge the extracted gas within the same room.

3.1.18 *receiving hose, n*—that part of an AGSS which transfers expired or excess gases, or both, from the receiving system to the disposal system.

3.1.19 *receiving system, n*—that part of an AGSS which provides an interface between a transfer system and a disposal system.

3.1.20 *single fault condition, n*—condition in which a single means for protection against a safety hazard in equipment is defective or a single external abnormal condition is present.

3.1.21 *spillage, n*—volume of expired or excess anesthetic gas, or both, which cannot be accommodated by the AGSS over the specified period.

3.1.22 *transfer tube, n*—that part of an AGSS transfer system which transfers gases from the breathing system to the receiving system.

3.1.23 *transfer system, n*—that part of an AGSS which transfers expired or excess anesthetic gases, or both, from the exhaust port of a breathing system to a receiving system.

4. Patient and Environmental Protection

4.1 Normal Operating Conditions:

4.1.1 *Pressure*—The pressure rise at the inlet of the AGSS shall not exceed 350 Pa (3.5 cm H₂O). Test for compliance by functional testing.

NOTE 10—Annex A1 describes an example of a testing method and test fixture arrangement.

4.1.2 *Induced Flow*—The effect of operating the AGSS at the maximum extract flow specified for the transfer and receiving systems shall be such that the induced flow does not exceed 50 mL/min. Test for compliance by functional testing.

NOTE 11—Annex A2 describes an example of a testing method and test fixture arrangement.

4.1.3 *Leakage*—The leakage rate of gas from the transfer and receiving systems shall be less than 100 mL/min. Test procedures used by the manufacturer should be presented in the instructions for use and shall be available upon request. Test for compliance by functional testing.

NOTE 12—Leakage may be increased under single fault condition.

4.1.4 *Sub-Atmospheric Pressure*—The sub-atmospheric pressure at the inlet of the transfer system shall not exceed 50 Pa (0.5 cm H₂O). Test for compliance by functional testing.

NOTE 13—Annex A3 describes an example of a testing method and test fixture arrangement.

4.2 Single Fault Condition:

4.2.1 *Pressure*—With a steady state flow of air to the inlet of the AGSS, the pressure rise at the inlet shall not exceed 1.5 kPa (15 cm H₂O) under any single fault condition. Test for compliance by functional testing.

NOTE 14—An example of a single fault is occlusion of the transfer tube.

NOTE 15—Annex A1 describes an example of a testing method and test fixture arrangement.

4.2.2 *Induced Flow*—The induced flow at the inlet to the AGSS shall not exceed 500 mL/min under any single fault condition. Test for compliance by functional testing.

NOTE 16—An example of a single fault is occlusion of any air-entrainment inlet.

NOTE 17—Annex A2 describes an example of a testing method and test fixture arrangement.

4.3 *Materials*—All components of the AGSS shall be made of materials that are compatible with the gases and anesthetic agents with which these components are designed to come into contact.

NOTE 18—These components should also be designed and manufactured from materials that minimize the leaching of substances during normal use.

5. Means of Pressure Relief

5.1 The means of pressure relief, if provided, shall be accessible for cleaning or servicing, or both.

NOTE 19—When the means of pressure relief is actuated, anesthetic gases may be spilled into the atmosphere.

6. Transfer Systems

6.1 *Inlet to Interchangeable Transfer Systems*—The inlet to an interchangeable transfer system shall be a 30 mm diameter female connector complying with 8.1 and 8.2 and shall incorporate a means of pressure relief complying with 4.1.1 and 4.2. Alternatively, in place of the pressure relief, the transfer system shall be so constructed (for example, wire-reinforced tubing) that by application of a force of 200 N (45 lbf), a total occlusion will not occur and the transfer system shall still comply with 4.2.1. Test for compliance by visual inspection and functional testing. Test for occlusion using the test set-up for occlusion found in ISO 5359: 2000.

6.2 *Inlet to Transfer Systems that are Not Interchangeable*—The inlet to a transfer system that is not interchangeable shall be either: (1) a proprietary fitting complying with 8.1 and 8.3, or (2) not operationally suitable.