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(e) A new designation of the Secretary
under this section will take effect
30 calendar days after the date on
which the report of the Secretary
under paragraph (d) of this section is
submitted to Congress, unless Congress
takes an action that reverses or expedites
the designation. Such new designations
and related congressional actions
will be further reported by the
Secretary pursuant to paragraphs (d)
and (e) of 83.17.
[70 FR 75953, Dec. 22, 2005]

83.19 How can the Secretary cancelor modify a final decision to add aclass of employees to the Cohort?

(a) The Secretary can cancel a final
decision to add a class to the Cohort,
or can modify a final decision to reduce
the scope of a class added by the Secretary,
if HHS obtains records relevant
to radiation exposures of members of
the class that enable NIOSH to estimate
the radiation doses incurred by
individual members of the class
through dose reconstructions conducted
under the requirements of 42
CFR part 82.
(b) Before canceling a final decision
to add a class or modifying a final decision
to reduce the scope of a class, the
Secretary intends to follow evaluation
procedures that are substantially similar
to those described in this part for
adding a class of employees to the Cohort.
The procedures will include the
following:
(1) Publication of a notice in the FEDERAL

REGISTER informing the public of
the intent of the Secretary to review
the final decision on the basis of new
information and describing procedures
for this review;
(2) An analysis by NIOSH of the utility
of the new information for conducting
dose reconstructions under 42
CFR part 82; the analysis will be performed
consistently with the requirements
for analysis of a petition by
NIOSH under 83.13(c)(1) and (2), and
83.13(c)(2) and (3);
(3) A recommendation by the Board
to the Secretary as to whether or not
the Secretary should cancel or modify
his final decision that added the class
to the Cohort, based upon a review by
the Board of the NIOSH analysis under
paragraph (b)(2) of this section and any

other relevant information considered
by the Board;

(4) An opportunity for members of
the class to contest a proposed decision
to cancel or modify the prior final decision
that added the class to the Cohort,
including a reasonable and timely effort
by the Secretary to notify members
of the class of this opportunity;
and
(5) Publication in the FEDERAL REGISTER
of a final decision to cancel or
modify the prior final decision that
added the class to the Cohort.
[69 FR 30780, May 28, 2004. Redesignated at 70
FR 75953, Dec. 22, 2005]

PART 84APPROVAL OF
RESPIRATORY PROTECTIVE DEVICES

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AUTHORITY: 29 U.S.C. 577a, 651 et seq., and 657(g); 30 U.S.C. 3, 5, 7, 811, 842(h), 844.

SOURCE: 60 FR 30355, June 8, 1995, unless otherwise noted.

EDITORIAL NOTE: Nomenclature changes to part 84 appear at 69 FR 18803, Apr. 9, 2004.

Subpart AGeneral Provisions

84.1 Purpose.

The purpose of the regulations contained in this part 84 is:

(a) To establish procedures and prescribe requirements which must be met in filing applications for approval by

the National Institute for Occupational Safety and Health of respirators or changes or modifications of approved respirators;
(b) To establish a schedule of fees to be charged each applicant for the inspections, examinations, and testing conducted by the Institute under the provisions of this part;
(c) To provide for the issuance of certificates of approval or modifications of certificates of approval for respirators which have met the applicable construction, performance, and respiratory protection requirements set forth in this part; and
(d) To specify minimum requirements and to prescribe methods to be employed by the Institute and by the applicant in conducting inspections, examinations, and tests to determine the effectiveness of respirators used during entry into or escape from hazardous atmospheres.
84.2 Definitions.

As used in this part

(a) Applicant means an individual, partnership, company, corporation, association, or other organization that designs, manufactures, assembles, or controls the assembly of a respirator and who seeks to obtain a certificate of approval for such respirator.
(b) Approval means a certificate or formal document issued by the Institute stating that an individual respirator or combination of respirators has met the minimum requirements of this part, and that the applicant is authorized to use and attach an approval label to any respirator, respirator container, or instruction card for any respirator

manufactured or assembled in conformance with the plans and specifications upon which the approval was based, as evidence of such approval.
(c) Approved means conforming to the minimum requirements of this part.
(d) Auxiliary equipment means a self-contained breathing apparatus, the use of which is limited in underground mine rescue and recovery operations to situations where the wearer has ready access to fresh air and at least one crew equipped with approved self-contained breathing apparatus of 2 hours or longer rating, is in reserve at a fresh-air base.
(e) Certification and Quality Assurance Branch means the Certification and Quality Assurance Branch, Division of Safety Research, Appalachian Laboratory for Occupational Safety and Health, National Institute for Occupational Safety and Health, 1095 Willowdale Road, Morgantown, West Virginia 265052888.
(f) Compressed-breathing gas means oxygen or air stored in a compressed state and supplied to the wearer in gaseous form.
(g) dBA means sound pressure levels in decibels, as measured with the A-weighted network of a standard sound level meter using slow response.
(h) Dust means a solid mechanically produced particle with a size ranging from submicroscopic to macroscopic.
(i) Respirators for entry into and escape from means respiratory devices providing protection during entry into and escape from hazardous atmospheres.

(j) Respirators for escape only means respiratory devices providing protection only during escape from hazardous atmospheres.
(k) A facepiece or mouthpiece is a respirator component designed to provide a gas-tight or dust-tight fit with the face and may include headbands, valves, and connections for canisters, cartridges, filters, or respirable gas source.
(l) Final inspection means that activity carried out on a product after all manufacturing and assembly operations are completed to insure completeness and adherence to performance or other specifications, including satisfactory appearance.
(m) Fume means a solid condensation particle, generally less than 1 micrometer in diameter.
(n) Gas means an aeriform fluid which is in a gaseous state at ordinary temperature and pressure.
(o) Hazardous atmosphere means:
(1) Any atmosphere containing a toxic or disease producing gas, vapor, dust, fume, mist, or pesticide, either immediately or not immediately dangerous to life or health; or
(2) Any oxygen-deficient atmosphere.
(p) A hood or helmet is a respirator component which covers the wearers head and neck, or head, neck, and shoulders, and is supplied with incoming respirable air for the wearer to breathe. It may include a headharness and connection for a breathing tube.
(q) Immediately dangerous to life or health means conditions that pose an immediate threat to life or health or conditions that pose an immediate threat of severe exposure to contaminants,

such as radioactive materials, which are likely to have adverse cumulative or delayed effects on health.

(r) Incoming inspection means the activity of receiving, examining, and accepting only those materials and parts whose quality conforms to specification requirements.

(s) In-process inspection means the control of products at the source of production and at each step of the manufacturing process, so that departures from specifications can be corrected before defective components or materials are assembled into the finished product.

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(t) Institute means the National Institute for Occupational Safety and Health, Department of Health and Human Services.

(u) Liquefied-breathing gas means oxygen or air stored in liquid form and supplied to the wearer in a gaseous form.

(v) Mist means a liquid condensation particle with a size ranging from submicroscopic to macroscopic.

(w) MSHA means the Mine Safety and Health Administration, U.S. Department of Labor.

(x) Not immediately dangerous to life or health means any hazardous atmosphere which may produce physical discomfort immediately, chronic poisoning after repeated exposure, or acute adverse physiological symptoms after prolonged exposure.

(y) Oxygen-deficient atmosphere means an atmosphere which contains an oxygen partial pressure of less than 148 millimeters of mercury (19.5 percent by volume at sea level).

(z) Powered air-purifying respirator

means a device equipped with a face-piece, hood, or helmet, breathing tube, canister, cartridge, filter, canister with filter, or cartridge with filter, and a blower.

(aa) Respirator means any device designed to provide the wearer with respiratory protection against inhalation of a hazardous atmosphere.

(bb) Single-use respirator means a respirator that is entirely discarded after excessive resistance, sorbent exhaustion, or physical damage renders it unsuitable for further use.

(cc) Vapor means the gaseous state of a substance that is solid or liquid at ordinary temperature and pressure.

84.3 Respirators for mine rescue or other emergency use in mines.

(a)(1) NIOSH and the Mine Safety and Health Administration (MSHA), U.S. Department of Labor, shall jointly review and issue certifications for respirators used for mine emergencies and mine rescue, including any associated service life plans, users manuals and other supporting documentation.

(2) Each certification for a respirator designed for mine rescue or other emergency use in mines shall include,

84.10

as a condition of approval, any use limitations related to mine safety and health.

(b) NIOSH and MSHA shall jointly determine appropriate recall and retrofit remedies for field complaints or identified deficiencies involving any respirators used in the mining environment.
Subpart BApplication for Approval

84.10 Application procedures.

(a) Inspection, examination, and testing leading to the approval of the types of respirators classified in subpart F of this part shall be undertaken by the Institute only pursuant to written applications which meet the minimum requirements set forth in this subpart B.
(b) Applications shall be submitted to the Certification and Quality Assurance Branch, and shall be accompanied by a check, bank draft, or money order in the amount specified in subpart C of this part, payable to the order of the National Institute for Occupational Safety and Health.
(c) Except as provided in 84.64, the examination, inspection, and testing of all respirators shall be conducted by the Certification and Quality Assurance Branch.
(d) Applicants, manufacturers, or their representatives may visit or communicate with the Certification and Quality Assurance Branch in order to discuss the requirements for approval of any respirator or the proposed designs thereof. No charge shall be made for such consultation and no written

report shall be issued to applicants, manufacturers, or their representatives by the Institute as a result of such consultation.

(e) Respirators having electrical or electronic components that are required to be permissible under chapter I of title 30 shall be tested in accordance with 30 CFR part 18. Applications for approval of such respirators by MSHA shall be submitted in writing to: MSHA, Approval and Certification Center, Box 251, Industrial Park Road, Triadelphia, West Virginia 26059.

84.11 Contents of application.

(a) Each application for approval shall contain a complete written description of the respirator for which approval is requested together with drawings and specifications (and lists thereof) showing full details of construction of the respirator and of the materials used.

(b) Drawings shall be titled, numbered, and dated; any revision dates shall be shown on the drawings, and the purpose of each revision being sought shall be shown on the drawing or described on an attachment to the drawing to which it applies.

(c) Each application for approval shall contain a proposed plan for quality control which meets the minimum requirements set forth in subpart E of this part.

(d) Each application shall contain a statement that the respirator has been pretested by the applicant as prescribed in 84.64, and shall include the results of such tests.

(e) Each application for approval shall contain a statement that the respirator and component parts submitted for approval are either prototypes, or

made on regular production tooling, with no operation included which will not be incorporated in regular production processing.
(The information collections contained in this section are approved under OMB control number 09200109)

84.12 Delivery of respirators and components by applicant; requirements.

(a) Each applicant shall, when an application is filed pursuant to 84.10, be advised by the Institute of the total number of respirators and component parts required for testing.
(b) The applicant shall deliver, at his own expense, the number of completely assembled respirators and component parts required for testing, to the Certification and Quality Assurance Branch.
(c) Respirators and component parts submitted for approval must be made from materials specified in the application.
(d) One completely assembled respirator approved under the provisions

of this part may be retained by the Institute as a laboratory exhibit, the remaining respirators may be returned to the applicant at his own expense, upon written request within 30 days after notice of approval. If no such request is made, the respirators will be disposed of by the Institute in such manner as it deems appropriate.

(e) Where a respirator fails to meet the requirements for approval set forth in this part, all respirators and components delivered in accordance with this section may be returned to the applicant at his own expense, upon written request within 30 days after notice of disapproval. If no such request is made, the respirators will be disposed of by the Institute in such manner as it deems appropriate.

Subpart CFees

84.20 Examination, inspection, and

testing of complete respirator as

semblies; fees.

Except as provided in 84.22, the following fees shall be charged by the Institute for the examination, inspection and testing of complete respirator assemblies:

Self-contained breathing apparatus:

Entry and escape, 1 hour or more ... $3,500

Entry and escape, less than 1 hour 2,750

Escape only 2,000

Gas masks:

Single hazard 1,100

Type N 4,100
Supplied-air respirators 750
Particulate respirators 1,250
Chemical cartridge respirators 1,150

84.21 Examination, inspection, and

testing of respirator components or

subassemblies; fees.

Except as provided in 84.22, the following fees shall be charged by the Institute for the examination, inspection and testing of the individual respirator components or subassemblies:

Facepieces $450
Canisters 900
Cartridges 600
Filters 650
Hoses 250
Blowers 250
Harnesses 100

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84.22 Unlisted fees; additional fees; payment by applicant prior to approval.

(a) Applications for the examination, inspection and testing of complete respirator assemblies which are not listed in 84.20, or for the examination, inspection, and testing of respirator components or subassemblies which are not listed in 84.21, shall be accompanied by the following deposits:

~~Complete respirator assembly ..... $1,500~~
~~Each individual component or subassembly ..... 500~~

~~(b) The Institute reserves the right to conduct any examination, inspection, or test it deems necessary to determine the quality and effectiveness of any listed or unlisted respirator assembly or respirator component or subassembly, and to assess the cost of such examinations, inspections, or tests against the applicant prior to the issuance of any approval for such assembly, component, or subassembly.~~
~~(c) The fees charged for the examination, inspection, and testing of unlisted respirator assemblies, unlisted individual respirator components or subassemblies, and for the additional examination, inspection, and testing of listed respirator assemblies and components or subassemblies shall be at the rate of $100 per day for each man-day required to be expended by the Institute.~~
~~(d) Upon completion of all examinations, inspections, and tests of unlisted respirator assemblies or components, or following the completion of any additional examination, inspections, or tests of listed assemblies, or components or subassemblies, including retesting subsequent to disapproval, the Institute shall advise the applicant in writing of the total cost assessed and the additional amount, if any, which must be paid to the Institute as a condition of approval.~~
~~(e) In the event the amount assessed by the Institute for unlisted assemblies, or components or subassemblies is less than the amount of the deposit submitted in accordance with paragraph (a) of this section, the Institute shall refund the overpayment upon the issuance of any approval or notice of~~

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Subpart DApproval and Disapproval

84.30 Certificates of approval; scope of approval.

(a) The Institute shall issue certificates of approval pursuant to the provisions of this subpart only for individual, completely assembled respirators which have been examined, inspected, and tested, and which meet the minimum requirements set forth in subparts H through L of this part, as applicable.
(b) The Institute will not issue certificates of approval for any respirator component or for any respirator subassembly.
(c) The Institute shall not issue an informal notification of approval. However, if the application for approval, submitted in accordance with 84.11, states that the submitted respirator and component parts are only prototypes, the Institute will examine, inspect, and test such respirator and component parts in accordance with the provisions of this part. If, upon completion of such examinations, inspections and tests, it is found that the prototype meets the minimum requirements set forth in this part, the Institute may inform the applicant, in writing, of the results of the examinations, inspections, and tests, and may require him to resubmit respirators and component parts made on regular production tooling, with no operations included which will not be incorporated in regular production processing, for further examination, inspection, and testing, prior to issuance of the certificate

of approval.
(d) Applicants required to resubmit respirators and component parts made on regular production tooling, with no operation included which will not be incorporated in regular production processing, shall be charged fees in accordance with subpart C of this part.
84.31 Certificates of approval; contents.

(a) The certificate of approval shall contain a classification and a description of the respirator or combination of respirators for which it is issued, as provided in this part.

(b) The certificate of approval shall specifically set forth any restrictions or limitations on the respirators use in hazardous atmospheres.
(c) Each certificate of approval shall be accompanied by the drawings and specifications (and lists thereof) submitted by the applicant in accordance with 84.11. These drawings and specifications shall be referenced in the certificate of approval, and shall be maintained by the applicant. The drawings and specifications listed in each certificate of approval shall set forth in detail the design and construction requirements which shall be met by the applicant during commercial production of the respirator.
(d) Each certificate of approval shall be accompanied by a reproduction of the approval label design to be employed by the applicant with each approved respirator, as provided in 84.33.
(e) No test data or specific laboratory findings will accompany any certificate of approval, however, the Institute will release pertinent test data and specific findings upon written request

by the applicant, or as required by statute or regulation.

(f) Each certificate of approval shall also contain the approved quality control plan as specified in 84.42.

84.32 Notice of disapproval.

(a) If, upon the completion of the examinations, inspections, and tests required to be conducted in accordance with the provisions of this part, it is found that the respirator does not meet the minimum requirements set forth in this part, the Institute shall issue a written notice of disapproval to the applicant.

(b) Each notice of disapproval shall be accompanied by all pertinent data or findings with respect to the defects of the respirator for which approval was sought with a view to the possible correction of any such defects.

(c) The Institute shall not disclose, except to the applicant or as required by statute or regulation, any data, findings, or other information with respect to any respirator for which a notice of disapproval is issued.

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84.33 Approval labels and markings; approval of contents; use.

(a) Full-scale reproductions of approval labels and markings, and a sketch or description of the method of application and position on the harness, container, canister, cartridge, filter, or other component, together with instructions for the use and maintenance of the respirator shall be submitted to the Institute for approval.
(b) Approval labels shall bear the emblem of the National Institute for Occupational Safety and Health and the seal of the Department of Health and Human Services, the applicants name and address, an approval number assigned by the Institute and, where ap
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propriate, restrictions or limitations placed upon the use of the respirator by the Institute. The approval number assigned by the Institute shall be designated by the prefix TC and a serial number.

(c) The Institute shall, where necessary, notify the applicant when additional labels, markings, or instructions will be required.
(d) Approval labels and markings shall only be used by the applicant to whom they were issued.
(e) Legible reproductions or abbreviated forms of the label approved by the Institute for use on each respirator shall be attached to or printed at the following locations:
Respirator type Label type Location
Self-contained breathing apparatus.
Gas mask .....

Supplied air respirator .....
Particulate respirator .....
Chemical-cartridge respirator ...
Entire .....
Entire .....
.....do .....
.....do .....
Abbreviated .....
Entire .....
Abbreviated .....
Harness assembly and canister (where applicable).
Mask container and canister.
Respirator container or instruction card.
Respirator container and filter container.
Filters.
Respirator container, cartridge container, and filter containers (where applicable).
Cartridges and filters and filter containers.

(f) The use of any Institute approval label obligates the applicant to whom it is issued to maintain or cause to be maintained the approved quality control sampling schedule and the acceptable quality level for each characteristic tested, and to assure that it is manufactured according to the drawings and specifications upon which the certificate of approval is based.
(g) Each respirator, respirator component, and respirator container shall, as required by the Institute to assure quality control and proper use of the respirator, be labeled distinctly to show the name of the applicant, and the name and letters or numbers by which the respirator or respirator component is designated for trade purposes, and the lot number, serial number, or approximate date of manufacture.
84.34 Revocation of certificates of approval.

The Institute reserves the right to revoke, for cause, any certificate of approval issued pursuant to the provisions

of this part. Such causes include,

but are not limited to, misuse of approval labels and markings, misleading advertising, and failure to maintain or cause to be maintained the quality control requirements of the certificate of approval.

84.35 Changes or modifications of approved respirators; issuance of modification of certificate of approval.

(a) Each applicant may, if he desires to change any feature of an approved respirator, request a modification of the original certificate of approval issued by the Institute for such respirator by filing an application for such modification in accordance with the provisions of this section.
(b) Applications shall be submitted as for an original certificate of approval, with a request for a modification of the existing certificate to cover any proposed change.
(c) The application shall be accompanied by appropriate drawings and specifications, and by a proposed quality control plan which meets the requirements of subpart E of this part.
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(d) The application for modification, together with the accompanying material, shall be examined by the Institute to determine whether testing will be required.
(e) The Institute shall inform the applicant of the fee required for any additional testing and the applicant will be charged for the actual cost of any examination, inspection, or test required, and such fees shall be submitted in accordance with the provisions of subpart C of this part.
(f) If the proposed change or modification meets the requirements of this part, a formal certificate of modification will be issued, accompanied, where necessary, by a list of new and revised drawings and specifications covering the change(s) and reproductions of revised approval labels.
(The information collections contained in this section are approved under OMB control number 09200109)

84.36 Delivery of changed or modified approved respirator.

An approved respirator for which a formal certificate of modification has been issued shall be delivered, with proper markings and containers, by the applicant to the Certification and Quality Assurance Branch, as soon as it is commercially produced.

Subpart EQuality Control

84.40 Quality control plans; filing requirements.

As a part of each application for approval or modification of approval submitted

pursuant to this part, each applicant shall file with the Institute a proposed quality control plan which shall be designed to assure the quality of respiratory protection provided by the respirator for which approval is sought.

84.41 Quality control plans; contents.

(a) Each quality control plan shall contain provisions for the management of quality, including:
(1) Requirements for the production of quality data and the use of quality control records;
(2) Control of engineering drawings, documentations, and changes;

(3) Control and calibration of measuring and test equipment;
(4) Control of purchased material to include incoming inspection;
(5) Lot identification, control of processes, manufacturing, fabrication, and assembly work conducted in the applicants plant;
(6) Audit of final inspection of the completed product; and
(7) The organizational structure necessary to carry out these provisions.
(b) Each provision for incoming and final inspection in the quality control plan shall include a procedure for the selection of a sample of respirators and the components thereof for testing, in accordance with procedures set forth in Military Standard MIL-STD-414, 11 June 1957, including Change Notice No. 1, Sampling Procedures and Tables for Inspection by Variables for Percent Defective, or an approved equivalent sampling procedure, or an approved combination of sampling procedures. The procedure of Military Standard

MIL-STD-105D, 29 April 1963, Sampling Procedures and Tables for Inspection by Attributes, is an example of an equivalent sampling procedure. MIL-STD-414 is incorporated by reference and has been approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from DODSSP, Standardization Document Order Desk, 700 Robbins Avenue, Bldg. 4D, Philadelphia, PA 191115094. Copies may be inspected at the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 2027416030, or go to: http://www.archives.gov/federallregister/codeloflfederallregulations/ibrllocations.html. Copies of MIL-STD-105D may be inspected or obtained from the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888. Incoming bulk raw material inspection or verification of specification, and in-process inspection shall be sufficient to ensure control of product quality through the manufacturing cycle.

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(c) The sampling procedure shall include a list of the characteristics to be tested by the applicant or his agent.
(d) The characteristics listed in accordance with paragraph (c) of this section shall be classified according to the potential effect of such defect and grouped into the following classes:
(1) Critical. A defect that judgment and experience indicate is likely to result in a condition immediately hazardous to life or health for individuals using or depending upon the respirator;
(2) Major A. A defect, other than critical, that is likely to result in failure to the degree that the respirator does not provide any respiratory protection, or a defect that reduces protection and is not detectable by the user;
(3) Major B. A defect, other than Major A or critical, that is likely to result in reduced respiratory protection, and is detectable by the user; and
(4) Minor. A defect that is not likely to materially reduce the usability of the respirator for its intended purpose, or a defect that is a departure from established standards and has little bearing on the effective use or operation of the respirator.
(e) The quality control inspection test method to be used by the applicant or his agent for each characteristic required to be tested shall be described in detail.
(f) Each item manufactured shall be 100 percent inspected for defects in all critical characteristics and all defective items shall be rejected.
(g) The Acceptable Quality Level (AQL) for each major or minor defect so classified by the applicant shall be:
(1) Major A. 1.0 percent;

(2) Major B. 2.5 percent; and
(3) Minor. 4.0 percent.
(h) Except as provided in paragraph (i) of this section, inspection level IV as described in MIL-STD-414, 11 June 1957, including Change Notice No.1, Sampling Procedures and Tables for Inspection by Variables for Percent Defective, or an equivalent procedure, shall be used for major and minor characteristics and 100 percent inspection for critical characteristics. Inspection level II as described in MIL-STD-105D, 29 April 1963, Sampling Procedures and Tables for Inspection by At

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tributes, is an example of an equivalent procedure.

(i) Subject to the approval of the Institute, where the quality control plan provisions for raw material, processes, manufacturing, and fabrication, inspections are adequate to ensure control of finished article quality, destructive testing of finished articles may be conducted at a lower level of inspection than that specified in paragraph (h) of this section.
(The information collections contained in this section are approved under OMB control number 09200109)

84.42 Proposed quality control plans; approval by the Institute.

(a) Each proposed quality control plan submitted in accordance with this subpart shall be reviewed by the Institute to determine its effectiveness in ensuring the quality of respiratory protection provided by the respirator for which an approval is sought.
(b) If the Institute determines that the proposed quality control plan submitted

by the applicant will not ensure
adequate quality control, the Institute
shall require the applicant to modify
the procedures and testing requirements
of the plan prior to approval of
the plan and issuance of any certificate
of approval.
(c) Approved quality control plans
shall constitute a part of and be incorporated
into any certificate of approval
issued by the Institute, and compliance
with such plans by the applicant shall
be a condition of approval.
84.43 Quality control records; reviewby the Institute; revocation of approval.

(a) The applicant shall keep quality
control inspection records sufficient to
carry out the procedures required in
MIL-STD-414, 11 June 1957, including
Change Notice No. 1, Sampling Procedures
and Tables for Inspection by
Variables for Percent Defective, or an
approved equivalent sampling procedure.
MIL-STD-105D, 29 April 1963,
Sampling Procedures and Tables for
Inspection by Attributes, is an example
of an approved equivalent sampling
procedure. MIL-STD-414 is incorporated
by reference and has been approved
by the Director of the Federal
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Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from DODSSP, Standardization Document Order Desk, 700 Robbins Avenue, Bldg. 4D, Philadelphia, Pa. 191115094. Copies may be inspected at the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 2027416030, or go to: http://www.archives.gov/federallregister/codeloflfederallregulations/ibrllocations.html. Copies of MIL-STD-105D may be inspected or obtained from the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888.

(b) The Institute reserves the right to have its representatives inspect the applicants quality control test methods, equipment, and records, and to interview any employee or agent of the applicant in regard to quality control test methods, equipment, and records.
(c) The Institute reserves the right to revoke, for cause, any certificate of approval where it is found that the applicants quality control test methods, equipment, or records do not ensure effective quality control over the respirator for which the approval was issued.
(The information collections contained in this section are approved under OMB control number 09200109)

Subpart FClassification of Approved Respirators; Scope ofApproval; Atmospheric Hazards;

Service Time

84.50 Types of respirators to be approved; scope of approval.

Approvals shall be issued for the types of respirators which have been classified pursuant to this subpart F, have been inspected, examined and tested by the Institute, in accordance with the provisions of subparts G through L of this part, and have been found to provide respiratory protection for fixed periods of time against the hazards specified in such approval.

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84.51 Entry and escape, or escapeonly; classification.

Respirators described in subparts H through L of this part shall be classified for use as follows:

(a) Entry and escape. Respirators designed and approved for use during entry into a hazardous atmosphere, and for escape from a hazardous atmosphere; or
(b) Escape only. Respirators designed and approved for use only during escape from a hazardous atmosphere.
84.52 Respiratory hazards; classification.

Respirators described in subparts H through L of this part shall be classified as approved for use against any or all of the following respiratory hazards:

(a) Oxygen deficiency;
(b) Gases and vapors; and
(c) Particles, including dusts, fumes and mists.
84.53 Service time; classification.

(a) Respirators described in subparts H through L of this part shall be classified, where applicable, as approved for use during the following prescribed service times:
(1) Four hours;
(2) Three hours;
(3) Two hours;
(4) One hour;
(5) Forty-five minutes;
(6) Thirty minutes;
(7) Fifteen minutes;
(8) Ten minutes;
(9) Five minutes; or
(10) Three minutes.
(b) Other service times may be prescribed by the Institute.
Subpart GGeneral Constructionand Performance Requirements

84.60 Construction and performance requirements; general.

(a) The Institute shall issue approvals for the types of respirators described in subparts H through L of this part which have met the minimum requirements set forth for such respirators in this part.
(b) In addition to the types of respirators specified in subparts H through L of this part, the Institute

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shall issue approvals for other respiratory protective devices not specifically described in this part subject to such additional requirements as may be imposed in accordance with 84.63(c).

84.61 General construction requirements.

(a) Respirators will not be accepted by the Institute for examination, inspection and testing unless they are designed on sound engineering and scientific principles, constructed of suitable materials and evidence good workmanship.
(b) Respirator components which come into contact with the wearers skin shall be made of nonirritating materials.
(c) Components replaced during or after use shall be constructed of materials which will not be damaged by normal handling.
(d) Mouthpieces, hoods, helmets, and facepieces, except those employed in single-use respirators, shall be constructed of materials which will withstand repeated disinfection as recommended by the applicant in his instructions for use of the device.
84.62 Component parts; minimum requirements.

(a) The component parts of each respirator shall be:
(1) Designed, constructed, and fitted to insure against creation of any hazard to the wearer;
(2) Assembled to permit easy access for inspection and repair of functional parts; and
(3) Assembled to permit easy access to parts which require periodic cleaning

and disinfecting.
(b) Replacement parts shall be designed and constructed to permit easy installation and to maintain the effectiveness of the respirator.
84.63 Test requirements; general.

(a) Each respirator and respirator component shall when tested by the applicant and by the Institute, and meet the applicable requirements set forth in subparts H through L of this part.
(b) Where a combination respirator is assembled from two or more types of respirators, as described in this part, 84.64

each of the individual respirator types which have been combined shall, as applicable, meet the minimum requirements for such respirators set forth in subparts H through L of this part, and such combination respirators, except as specified in 84.70(b)(2), will be classified by the type of respirator in the combination which provides the least protection to the user.

(c) In addition to the minimum requirements set forth in subparts H through L of this part, the Institute reserves the right to require, as a further condition of approval, any additional requirements deemed necessary to establish the quality, effectiveness, and safety of any respirator used as protection against hazardous atmospheres.
(d) Where it is determined after receipt of an application that additional requirements will be required for approval, the Institute will notify the applicant in writing of these additional requirements, and necessary examinations, inspections, or tests, stating generally the reasons for such requirements, examinations, inspections, or

tests.

84.64 Pretesting by applicant; approval of test methods.

(a) Prior to making or filing any application for approval or modification of approval, the applicant shall conduct, or cause to be conducted, examinations, inspections, and tests of respirator performance which are equal to or exceed the severity of those prescribed in this part.

(b) With the application, the applicant shall provide a statement to the Institute showing the types and results of the examinations, inspections, and tests required under paragraph (a) of this section and state that the respirator meets the minimum requirements of subparts H through L of this part, as applicable. Complete examination, inspection, and test data shall be retained on file by the applicant and be submitted, upon request, to the Institute.

(c) The Institute may, upon written request by the applicant, provide drawings and descriptions of its test equipment and otherwise assist the applicant in establishing a test laboratory

or securing the services of a testing agency.

(d) No approval will be issued until the Institute has validated the applicants test results.

84.65 Conduct of examinations, inspections, and tests by the Institute; assistance by applicant; observers; recorded data; public demonstrations.

(a) All examinations, inspections, and tests conducted pursuant to subparts H through L of this part will be under the sole direction and control of the Institute.

(b) The Institute may, as a condition of approval, require the assistance of the applicant or agents of the applicant during the assembly, disassembly, or preparation of any respirator or respirator component prior to testing or in the operation of such equipment during testing.

(c) Only Institute personnel, persons assisting the Institute pursuant to paragraph (b) of this section, and such other persons as are requested by the Institute or the applicant to be observers, shall be present during any examination, inspection, or test conducted prior to the issuance of an approval by the Institute for the equipment under consideration.

(d) The Institute shall hold as confidential any analyses, drawings, specifications, or materials submitted by the applicant and shall not disclose any principles or patentable features of such equipment, except as required by statute or regulation.

(e) As a condition of each approval

issued for any respirator, the Institute reserves the right, following the issuance of such approval, to conduct such public tests and demonstrations of the approved respiratory equipment as is deemed appropriate.

84.66 Withdrawal of applications; refund of fees.

(a) Any applicant may, upon a written request submitted to the Institute, withdraw any application for approval of any respirator.

(b) Upon receipt of a written request for the withdrawal of an application, the Institute shall determine the total man-days expended and the amount due for services already performed dur

ing the course of any examinations, inspections, or tests conducted pursuant to such application. The total amount due shall be determined in accordance with the provisions of 84.22 and assessed against the fees submitted by the applicant. If the total amount assessed is less than the fees submitted, the Institute shall refund the balance together with a statement of the charges made for services rendered.

Subpart HSelf-Contained Breathing Apparatus

84.70 Self-contained breathing apparatus; description.

(a) Self-contained breathing apparatus, including all completely assembled, portable, self-contained devices designed for use as respiratory protection during entry into and escape from or escape only from hazardous atmospheres, are described as follows:

(1) Closed-circuit apparatus. An apparatus of the type in which the exhalation is rebreathed by the wearer after the carbon dioxide has been effectively removed and a suitable oxygen concentration restored from sources composed of:

(i) Compressed oxygen; or

(ii) Chemical oxygen; or

(iii) Liquid-oxygen.

(2) Open-circuit apparatus. An apparatus of the following types from which exhalation is vented to the atmosphere and not rebreathed:

(i) Demand-type apparatus. An apparatus in which the pressure inside the facepiece in relation to the immediate environment is positive during exhalation and negative during inhalation; or

(ii) Pressure-demand-type apparatus. An apparatus in which the pressure inside the facepiece in relation to the immediate environment is positive during both inhalation and exhalation.

(b) The following respirators may be classified as designed and approved for use during emergency entry into a hazardous atmosphere:

(1) A combination respirator which includes a self-contained breathing apparatus; and

(2) A Type C or Type CE supplied air respirator, where

(i) The self-contained breathing apparatus is classified for 3-, 5-, or 10-

minute service time and the air line supply is used during entry; or

(ii) The self-contained breathing apparatus is classified for 15 minutes or longer service time and not more than 20 percent of the rated capacity of the air supply is used during entry.

(c) Self-contained breathing apparatus classified for less than 1 hour service time will not be approved for use during underground mine rescue and recovery operations except as auxiliary equipment.

(d) Self-contained breathing apparatus classified for less than 30 minutes service time will not be approved for use as auxiliary equipment during underground mine rescue and recovery operations.

84.71 Self-contained breathing apparatus; required components.

(a) Each self-contained breathing apparatus described in 84.70 shall, where its design requires, contain the following component parts:

(1) Facepiece or mouthpiece, and noseclip;

(2) Respirable breathing gas container;

(3) Supply of respirable breathing gas;

(4) Gas pressure or liquid level gages;

(5) Timer;

(6) Remaining service life indicator or warning device;

(7) Hand-operated valves;

(8) Breathing bag;

(9) Safety relief valve or safety relief system; and

(10) Harness.

(b) The components of each self-contained breathing apparatus shall meet

the minimum construction requirements
set forth in subpart G of this
part.
84.72 Breathing tubes; minimum requirements.

Flexible breathing tubes used in conjunction
with breathing apparatus
shall be designed and constructed to
prevent:

(a) Restriction of free head movement;
(b) Disturbance of the fit of
facepieces and mouthpieces;
(c) Interference with the wearers activities;
and
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(d) Shutoff of airflow due to kinking,
or from chin or arm pressure.
84.73 Harnesses; installation and construction;
minimum requirements.

(a) Each apparatus shall, where necessary,
be equipped with a suitable harness
designed and constructed to hold
the components of the apparatus in position
against the wearers body.
(b) Harnesses shall be designed and
constructed to permit easy removal
and replacement of apparatus parts
and, where applicable, provide for holding
a full facepiece in the ready position
when not in use.
84.74 Apparatus containers; minimum
requirements.

(a) Apparatus may be equipped with a
substantial, durable container bearing
markings which show the applicants
name, the type and commercial designation
of the respirator it contains,
and all appropriate approval labels.
(b) Containers supplied by the applicant
for carrying or storing self-contained
breathing apparatus will be inspected,

examined, and tested as components of the respirator for which approval is sought.

(c) Containers for self-contained breathing apparatus shall be designed and constructed to permit easy removal of the apparatus.

84.75 Half-mask facepieces, full facepieces, mouthpieces; fit; minimum requirements.

(a) Half-mask facepieces and full facepieces shall be designed and constructed to fit persons with various facial shapes and sizes, either:

(1) By providing more than one face-piece size; or

(2) By providing one facepiece size which will fit varying facial shapes and sizes.

(b) Full facepieces shall provide for the optional use of corrective spectacles or lenses which shall not reduce the respiratory protective qualities of the apparatus.

(c) Apparatus with mouthpieces shall be equipped with noseclips which are securely attached to the mouthpiece or apparatus and provide an airtight seal.

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(d) Facepieces shall be designed to prevent eyepiece, spectacle, and lens fogging.

84.76 Facepieces; eyepieces; minimum requirements.

(a) Facepieces shall be designed and constructed to provide adequate vision which is not distorted by the eyepiece.

(b) All eyepieces shall be designed and constructed to be impact and penetration resistant. Federal Specification, Mask, Air Line: and Respirator, Air Filtering, Industrial, GGG-M-125d, October 11, 1965 with interim amendment-1, July 30, 1969, is an example of an appropriate standard for determining impact and penetration resistance. Copies of GGG-M-125d may be obtained from the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888.

84.77 Inhalation and exhalation valves; minimum requirements.

(a) Inhalation and exhalation valves shall be provided where necessary and protected against damage and distortion.

(b) Exhalation valves shall be

(1) Protected against external influence; and

(2) Designed and constructed to prevent inward leakage of contaminated air.

84.78 Head harnesses; minimum requirements.

(a) Facepieces shall be equipped with adjustable and replaceable head harnesses designed and constructed to provide adequate tension during suspension and an even distribution of pressure

over the entire area in contact with the face.

(b) Mouthpieces shall be equipped, where applicable, with adjustable and replaceable harnesses designed and constructed to hold the mouthpiece in place.

84.79 Breathing gas; minimum requirements.

(a) Breathing gas used to supply apparatus shall be respirable and contain no less than 19.5 (dry atmosphere) volume percent of oxygen.

(b) Oxygen, including liquid oxygen, shall contain not less than 99.0 percent, by volume, of pure O_2, not more than 0.03%, by volume, carbon dioxide, and not more than 0.001%, by volume, carbon monoxide. Methods for making these determinations can be found in the U.S. Pharmacopeia National Formulary. Containers used for oxygen must not be treated with any toxic, sleep-inducing, narcosis-producing, or respiratory tract irritating compounds.

(c) Compressed, gaseous breathing air shall meet the applicable minimum grade requirements for Type I gaseous air set forth in the Compressed Gas Association Commodity Specification for Air, G7.1, 1966 (Grade D or higher quality). G7.1 is incorporated by reference and has been approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018. Copies may be inspected at the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888, or at the National Archives and Records Administration

(NARA). For information on the availability of this material at NARA, call 2027416030, or go to: http://www.archives.gov/federallregister/codeloflfederallregulations/ibrllocations.html.

(d) Compressed, liquefied breathing air shall meet the applicable minimum grade requirements for Type II liquid air set forth in the Compressed Gas Association Commodity Specification for Air, G7.1, 1966 (Grade B or higher quality). G7.1 is incorporated by reference and has been approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018. Copies may be inspected at the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 2027416030, or go to: http://www.archives.gov/federallregister/

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codeloflfederallregulations/
ibrllocations.html.

84.80 Interchangeability of oxygen
and air prohibited.

Approvals shall not be issued by the
lnstitute for any apparatus, combination
of respirator assemblies, or any
apparatus or respirator component
which is designed or constructed to
permit the interchangeable use of oxygen
and air.

84.81 Compressed breathing gas and

liquefied breathing gas containers;

minimum requirements.

(a) Compressed breathing gas and liquefied
breathing gas containers shall
meet the minimum requirements of the
Department of Transportation for
interstate shipment of such containers
when fully charged.
(b) Such containers shall be permanently
and legibly marked to identify
their contents, e.g., compressed breathing
air, compressed breathing oxygen,
liquefied breathing air, or liquefied
breathing oxygen.
(c) Containers normally removed
from apparatus for refilling shall be
equipped with a dial indicating gage
which shows the pressure in the container.
(d) Compressed breathing gas contained
valves or a separate charging
system or adapter provided with each
apparatus shall be equipped with outlet
threads specified for the service by the
American Standards Association, Compressed
Gas Cylinder Valve Outlet and

Inlet Connections, B57.11965. B57.11965 is incorporated by reference and has been approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from American National Standards Institute, Inc., 1430 Broadway, New York, NY Copies may be inspected at the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202741 6030, or go to: http://www.archives.gov/ federallregister/ codeloflfederallregulations/ ibrllocations.html.
84.82

84.82 Gas pressure gages; minimumrequirements.

(a) Gas pressure gages employed on compressed breathing gas containers shall be calibrated in pounds per square inch.
(b) Liquid-level gages shall be calibrated in fractions of total container capacity, or in units of liquid volume.
(c) Gas pressure gages other than those specified in paragraphs (a) and (b) of this section shall be calibrated in:
(1) Pounds per square inch; or
(2) In fractions of total container capacity; or
(3) Both in pounds per square inch and fractions of total container capacity.
(d)(1) Dial-indicating gages shall be reliable to within 5 percent of full scale when tested both up and down the scale at each of 5 equal intervals.

(2) The full-scale graduation of dial-indicating gages shall not exceed 150

~~percent of the maximum rated cylinder pressures specified for the container in applicable Department of Transportation specifications or permits.~~

~~(e)(1) Stem-type gages shall be readable by sight and by touch and shall have a stem travel distance of not less than one-fourth inch between each graduation.~~

~~(2) A minimum of five graduations shall be engraved on the stem of each gage and these graduations shall include readings for empty, one-quarter, one-half, three-quarters, and full.~~

~~(3) Stem gage readings shall not vary from true readings by more than one-sixteenth inch per inch of stem travel.~~

~~(f) The loss of gas through a broken gage or severed gage connection shall not exceed 70 liters per minute when the cylinder pressure is 6,900 kN/m.2 (1,000 pounds per square inch gage) or when the liquid level is at one-half.~~

~~(g) Where gages are connected to the apparatus through a gage line, the gage and line shall be capable of being isolated from the apparatus except where the failure of the gage or line would not impair the performance or service life of the apparatus.~~

~~(h) Oxygen pressure gages shall have the words Oxygen and Use No Oil marked prominently on the gage.~~

84.83

(i)(1) Apparatus using compressed breathing gas, except apparatus classified for escape only, shall be equipped with gages visible to the wearer which indicate the remaining gas content in the container.

(2) Apparatus using liquefied breathing gas, except apparatus classified for escape only, shall be equipped with gages visible to the wearer which indicate the remaining liquid content in the container; however, where the liquid content cannot be rapidly vented, and the service time of the device begins immediately after filling, a timer shall be provided in place of a visible gage.
84.83 Timers; elapsed time indica

tors; remaining service life indica

tors; minimum requirements.

(a) Elapsed time indicators shall be provided for apparatus with a chemical oxygen source, except:
(1) Apparatus used for escape only; or
(2) Liquefied breathing gas apparatus equipped with gages visible to the wearer which indicate the remaining liquid content in the container.
(b) The timer or other indicator shall be accurately calibrated in minutes of remaining service life.
(c) Timers shall be readable by sight and by touch during use by the wearer.
(d) Timers shall be equipped with automatically preset alarms which will warn the wearer for a period of 7 seconds or more after the preset time has

elapsed.
(e) Remaining service-life indicators or warning devices shall be provided in addition to a pressure gage on compressed gas self-contained breathing apparatus, except apparatus used for escape only, and shall operate automatically without preadjustment by the wearer.
(f) Each remaining service-life indicator or warning device shall give an alarm when the remaining service life of the apparatus is reduced within a range of 20 to 25 percent of its rated service time.
84.84 Hand-operated valves; minimum requirements.

(a) Hand-operated valves shall be designed and constructed to prevent removal of the stem from the valve body
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during normal usage to insure against a sudden release of the full pressure of the container when the valve is opened.

(b) Valves shall be designed or positioned to prevent accidental opening and closing, and damage from external forces.
(c) Valves operated during use of the apparatus shall be installed in locations where they can be readily adjusted by the wearer.
(d) Main-line valves, designed and constructed to conserve gas in the event of a regulator or demand valve failure, shall be provided in addition to gas container valves, except when such failure will not affect performance.
(e) Hand-operated bypass systems designed and constructed to permit the wearer to breathe and to conserve his gas supply in the event of a regulator or demand valve failure, shall be provided

where necessary.
(f) Valves installed on apparatus shall be clearly distinguishable from one another by sight and touch.
(g) The bypass system valve control shall be colored red.
(h) A main-line or bypass valve or system will not be required on apparatus for escape only.
(i) Safety relief valves or systems, designed and constructed to release excess pressure in the breathing circuit, shall be provided on closed-circuit apparatus, and shall meet the following requirements:
(1) The relief valve or system shall operate automatically when the pressure in the breathing circuit on the inhalation side of the breathing bag reaches 13 mm. (one-half inch) water-column height of pressure above the minimum pressure required to fill the breathing bag, within the breathing resistance requirements for the apparatus.
(2) The relief valve or system shall be designed to prevent external atmospheres from entering the breathing circuit.
(3) The relief valve or system shall be designed to permit manual overriding for test purposes and in the event of a failure in the valve or system.
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84.85 Breathing bags; minimum requirements.

(a) Breathing bags shall have sufficient volume to prevent gas waste during exhalation and to provide an adequate reserve for inhalation.
(b) Breathing bags shall be constructed of materials which are flexible and resistant to gasoline vapors.
(c) Breathing bags shall be installed in a location which will protect them from damage or collapse by external forces, except on apparatus classified for escape only.
84.86 Component parts exposed to

oxygen pressures; minimum re

quirements.

Each applicant shall certify that the materials employed in the construction of component parts exposed to oxygen pressures above atmospheric pressure are safe and compatible for their intended use.

84.87 Compressed gas filters; minimum requirements.

All self contained breathing apparatus using compressed gas shall have a filter downstream of the gas source to effectively remove particles from the gas stream.

84.88 Breathing bag test.

(a) Breathing bags will be tested in an air atmosphere saturated with gasoline vapor at room temperature (2430

C./7585 F.) for a continuous period of twice the rated time of the apparatus (except for apparatus for escape only where the test period shall be the rated time of the apparatus).

(b) The bag will be operated during this test by a breathing machine with 24 respirations per minute and a minute-volume of 40 liters.

(c) A breathing machine cam with a work rate of 622 kp.-m./min. will be used. The dimensions of a suitable breathing machine cam are available from the Institute upon request.

(d) The air within the bag(s) shall not contain more than 100 parts per million of gasoline vapor at the end of the test.

84.89 Weight requirement.

(a) The completely assembled and fully charged apparatus shall not weigh more than 16 kg. (35 pounds); however, 84.91

where the weight decreases by more than 25 percent of its initial charge weight during its rated service life, the maximum allowable weight of a completely assembled and fully charged apparatus shall be 18 kg. (40 pounds).

(b) Where an apparatus employs equipment which contributes materially to the wearers comfort, e.g., a cooling system, the completely assembled and fully charged apparatus shall not weigh more than 18 kg. (40 pounds) regardless of the decrease in weight during use.

84.90 Breathing resistance test; inhalation.

(a) Resistance to inhalation airflow will be measured in the facepiece or mouthpiece while the apparatus is operated by a breathing machine as described

in 84.88.
(b) The inhalation resistance of open-circuit apparatus shall not exceed 32 mm. (1.25 inch) water-column height (at a flow rate of 120 liters per minute).
(c) The inhalation resistance of closed-circuit apparatus shall not exceed the difference between exhalation resistance (84.91(e)) and 10 cm. (4 inches) water-column height.
84.91 Breathing resistance test; exhalation.

(a) Resistance to exhalation airflow will be measured in the facepiece or mouthpiece of open-circuit apparatus with air flowing at a continuous rate of 85 liters per minute.
(b) The exhalation resistance of demand apparatus shall not exceed 25 mm. (1 inch) water-column height.
(c) The exhalation resistance of pressure-demand apparatus shall not exceed the static pressure in the face-piece by more than 51 mm. (2 inches) water-column height.
(d) The static pressure (at zero flow) in the facepiece shall not exceed 38 mm. (1.5 inches) water-column height.
(e) Resistance to exhalation airflow will be measured in the facepiece or mouthpiece of closed-circuit apparatus with a breathing machine as described in 84.88, and the exhalation resistance shall not exceed 51 mm. (2 inches) water-column height.

84.92

84.92 Exhalation valve leakage test.

(a) Dry exhalation valves and valve seats will be subjected to a suction of 25 mm. (1 inch) water-column height while in a normal operating position.
(b) Leakage between the valve and the valve seat shall not exceed 30 milliliters per minute.
84.93 Gas flow test; open-circuit apparatus.

(a) A static-flow test will be performed on all open-circuit apparatus.
(b) The flow from the apparatus shall be greater than 200 liters per minute when the pressure in the facepiece of demand-apparatus is lowered by 51 mm. (2 inches) water-column height when full container pressure is applied.
(c) Where pressure demand apparatus are tested, the flow will be measured at zero gage pressure in the facepiece.
(d) Where apparatus with compressed-breathing-gas containers are tested, the flow test shall also be made with 3,450 kN/m.2 (500 p.s.i.g.) container pressure applied.
84.94 Gas flow test; closed-circuit apparatus.

(a) Where oxygen is supplied by a constant-flow device only, the rate of flow shall be at least 3 liters per minute for the entire rated service time of the apparatus.
(b) Where constant flow is used in conjunction with demand flow, the constant flow shall be greater than 1.5 liters per minute for the entire rated service time.
(c) All demand-flow devices shall provide at least 30 liters of oxygen per

minute when in the fully open position.

84.95 Service time test; open-circuit apparatus.

(a) Service time will be measured with a breathing machine as described in 84.88.

(b) The open-circuit apparatus will be classified according to the length of time it supplies air or oxygen to the breathing machine.

(c) The service time obtained on this test will be used to classify the open-circuit apparatus in accordance with 84.53.

84.96 Service time test; closed-circuit apparatus.

(a) The closed-circuit apparatus will be classified according to the length of time it supplies adequate breathing gas to the wearer during man test No. 4 described in Table 4 of this subpart.

(b) The service time obtained on man test No. 4 will be used to classify the closed-circuit apparatus in accordance with 84.53.

84.97 Test for carbon dioxide in inspired gas; open- and closed-circuit apparatus; maximum allowable limits.

(a) Open-circuit apparatus. (1) The concentration of carbon dioxide in inspired gas in open-circuit apparatus will be measured at the mouth while the apparatus mounted on a dummy head is operated by a breathing machine. An acceptable method for measuring the concentration of carbon dioxide is described in Bureau of Mines Report of Investigations 6865, A Machine-Test Method for Measuring Carbon Dioxide in the Inspired Air of Self-Contained

Breathing Apparatus, 1966. Copies of Report of Investigations 6865 may be inspected or obtained from the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV. 265052888.
(2) The breathing rate will be 14.5 respirations per minute with a minute-volume of 10.5 liters.
(3) A sedentary breathing machine cam will be used.
(4) The apparatus will be tested at a temperature of 27 2 C. (80 5 F.).
(5) A concentration of 5 percent carbon dioxide in air will be exhaled into the facepiece.
(b) Closed-circuit apparatus. The concentration of carbon dioxide in inspired gas in closed-circuit apparatus will be measured at the mouth while the parts of the apparatus contributing to dead-air space are mounted on a dummy head and operated by the breathing machine as in paragraphs (a) (1) through (5) of this section.
(c) During the testing required by paragraphs (a) and (b) of this section, the concentration of carbon dioxide in inspired gas at the mouth will be continuously recorded, and the maximum

average concentration during the inhalation portion of the breathing cycle shall not exceed the following limits:

Maximum allowable average concentration of carbon dioxide in inspired air percent by volume	Where the service time is
2.5	Not more than 30 minutes .....
2.0	1 hour .....
1.5	2 hours .....
1.0	3 hours .....
1.0	4 hours .....

(d) In addition to the test requirements for closed-circuit apparatus set forth in paragraph (b) of this section, gas samples will be taken during the course of the man tests described in Tables 1, 2, 3, and 4 of this subpart. These gas samples will be taken from the closed-circuit apparatus at a point downstream of the carbon dioxide sorbent, and they shall not contain more than 0.5 percent carbon dioxide at any time, except on apparatus for escape only, using a mouthpiece only, the sample shall not contain more than 1.5 percent carbon dioxide at any time.

84.98 Tests during low temperature operation.

(a) The applicant shall specify the minimum temperature for safe operation and two persons will perform the tests described in paragraphs (c) and (d) of this section, wearing the apparatus according to applicants directions.
At the specified temperature, the apparatus shall meet all the requirements described in paragraph (e) of this section.
(b) The apparatus will be precooled at the specified minimum temperature for 4 hours.
(c) The apparatus will be worn in the low temperature chamber for 30 minutes, or for the service time of the apparatus, whichever is less.
(d) During the test period, alternate 1-minute periods of exercise and rest will be required with the exercise periods consisting of stepping onto and off a box 21.5 cm. (81/2 inches) high at a rate of 30 cycles per minute.
(e)(1) The apparatus shall function satisfactorily at the specified minimum temperature on duplicate tests.

(2) The wearer shall have sufficient unobscured vision to perform the work.
84.100

(3) The wearer shall not experience undue discomfort because of airflow restriction or other physical or chemical changes in the operation of the apparatus.
(f) Auxiliary low-temperature parts which are commercially available to the user may be used on the apparatus to meet the requirements described in paragraph (e) of this section.
84.99 Man tests; testing conditions; general requirements.

(a) The man tests described in Tables 1, 2, 3, and 4 of this subpart represent the workload performed in the mining,

mineral, or allied industries by a person wearing the apparatus tested.

(b) The apparatus tested will be worn by Institute personnel trained in the use of self-contained breathing apparatus, and the wearer will, before participating in these tests, pass a physical examination conducted by a qualified physician.

(c) All man tests will be conducted by the Institute.

(d) The apparatus will be examined before each man test to ensure that it is in proper working order.

(e) Breathing resistance will be measured within the facepiece or mouthpiece and the wearers pulse and respiration rate will be recorded during each 2 minute sample period prescribed in tests 1, 2, 3, and 4.

(f) Man tests 1, 2, 3, 4, 5, and 6 will be conducted in duplicate.

(g) If man tests are not completed through no fault of the apparatus, the test will be repeated.

84.100 Man tests 1, 2, 3, and 4; requirements.

Man tests 1, 2, 3, and 4, set forth in Tables 1, 2, 3, and 4 of this subpart, respectively, prescribe the duration and sequence of specific activities. These tests will be conducted to

(a) Familiarize the wearer with the apparatus during use;

(b) Provide for a gradual increase in activity;

(c) Evaluate the apparatus under different types of work and physical orientation; and

(d) Provide information on the operating and breathing characteristics of the apparatus during actual use.

84.101

84.101 Man test 5; requirements.

(a) Test 5 will be conducted to determine the maximum length of time the apparatus will supply the respiratory needs of the wearer while he is sitting at rest.
(b) The wearer will manipulate the devices controlling the supply of breathing gas to the advantage of the apparatus.
(c) Samples of inspiration from within the apparatus facepiece or mouthpiece shall be taken once every 15 minutes, and shall meet the minimum requirement for oxygen specified in 84.79(a), and the maximum allowable average concentration of carbon dioxide specified in 84.97(c).
(d) One sample of inspiration will be taken in the case of 3-, 5-, and 10-minute apparatus.
84.102 Man test 6; requirements.

(a) Man test 6 will be conducted with respect to liquefied breathing gas apparatus only.
(b) This test will be conducted to evaluate operation of the apparatus in other than vertical positions.
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(c) The wearer will lie face downward for one-fourth the service life of the apparatus with a full charge of liquefied breathing gas, and then a one-quarter full charge of liquefied breathing gas.
(d) The test will be repeated with the wearer lying on each side and on his back.
(e) The oxygen content of the gas supplied to the wearer by the apparatus will be continuously measured.

84.103 Man tests; performance requirements.

(a) The apparatus shall satisfy the respiratory requirements of the wearer for the classified service time.
(b) Fogging of the eyepiece shall not obscure the wearers vision, and the wearer shall not experience undue discomfort because of fit or other characteristics of the apparatus.
(c) When the ambient temperature during testing is 24 6 C. (75 10 F.), the maximum temperature of inspired air recorded during man tests shall not exceed the following, after correction for deviation from 24 C. (75 F.):
Maximum permissible

Where percent

temperature of inspired air

relative humid-

Where service life of apparatus is ity of inspired shall not exceed
air is F. C.
1/4 hour or
less 0100
135 57
1/4 hour to 3/4
hour 050
125 52
50100 1 110 1 43
1 to 2
hours .....
050 115 46
50100 1105 141
3
hours .....
..... 050 110 43
50100 1100 1 38
4
hours .....
..... 050 105 41
50100 1 95 1 35

1 Where percent relative humidity is 50100 and apparatus is designed for escape only, these maximum permissible temperatures will be increased by 5 C (10 F).

84.104 Gas tightness test; minimum requirements.

(a) Each apparatus will be tested for tightness by persons wearing it in an atmosphere of 1,000 p.p.m. isoamyl acetate.

(b) Six persons will each wear the apparatus in the test concentrations specified in paragraph (a) of this section for 2 minutes and none shall detect the odor or taste of the test vapor.

TABLES TO SUBPART H OF PART 84

TABLE 1DURATION AND SEQUENCE OF SPECIFIC ACTIVITIES FOR TEST 1, IN MINUTES

[42 CFR part 84, subpart H]

Activity
Service time
3 minutes
5 minutes
10 minutes
15 minutes
30 minutes
45 minutes
1 hour 2, 3, and 4 hours
Sampling and readings .... 2 2 2 2 Perform 1 hour
test 2, 3, or 4
times respectively.
Walks at 4.8 km. (3 miles)
per hour.
3 5 3 4 8 12 18
Sampling and readings 2 2 2 2 2
Walks at 4.8 km. (3 miles)
per hour.
.... 3 5 8 12 18
Sampling and readings 2 2 2 2 2
Walks at 4.8 km. (3 miles)
per hour.
.... 6 13 16
Sampling and readings 2 2 2

TABLE 2DURATION AND SEQUENCE OF SPECIFIC ACTIVITIES FOR TEST 2, IN MINUTES

[42 CFR part 84, subpart H]

Activity
Service time
3 minutes
5 minutes
10 minutes

~~15 minutes~~
~~30 minutes~~
~~45 minutes~~
~~1 hour 2, 3 and~~
~~4 hours 1~~
~~Sampling and readings .....~~
~~Walks at 4.8 km. (3 miles) per hour .....~~
~~Carries 23 kg. (50 pound) weight over overcast .....~~
~~Walks at 4.8 km. (3 miles) per hour .....~~
~~Climbs vertical treadmill 2 (or equivalent) .....~~
~~Walks at 4.8 km. (3 miles) per hour .....~~
~~Climbs vertical treadmill (or equivalent) .....~~
~~Sampling and readings .....~~
~~Walks at 4.8 km. (3 miles) per hour .....~~
~~Climbs vertical treadmill (or equivalent) .....~~
~~Carries 23 kg. (50 pound) weight over overcast .....~~
~~Sampling and readings .....~~
~~Walks at 4.8 km. (3 miles) per hour .....~~
~~Climbs vertical treadmill (or equivalent) .....~~
~~Walks at 4.8 km. (3 miles) per hour .....~~
~~Climbs vertical treadmill (or equivalent) .....~~
~~Carries 20 kg. (45 pound) weight and walks at 4.8 km. (3 miles) per hour .....~~
~~Walks at 4.8 km. (3 miles) per hour .....~~
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2
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1
1 time in 2 minutes
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~~2~~
~~1~~
~~1 time in 2 minutes~~
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~~1~~
~~1 time in 2 minutes~~
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~~2~~
~~3~~
~~2 times in 4 minutes~~
~~3~~
~~1~~
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~~2~~
~~2~~
~~1~~
~~3 times in 6 minutes~~
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~~3~~
~~1~~
~~.....~~
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~~.....~~
~~2~~
~~4~~
~~3 times in 6 minutes~~

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~~1~~
~~4 times in~~
~~8 minutes~~
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~~2~~
~~6~~
~~4 times in~~
~~8 minutes~~
~~3~~
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~~1~~
~~2~~
~~5~~
~~1~~
~~5 times in~~
~~10~~
~~minutes~~
~~2~~
~~3~~
~~1~~
~~3~~
~~1~~
~~2~~
~~4~~
~~2~~
~~10.~~
~~5 times in~~
~~10~~
~~minutes.~~
~~5.~~
~~1.~~
~~5~~
~~1.~~

2.
11.
1.
5 times in
10
minutes.
2.
.....
Then
repeat
above
activities
once.
.....
.....
.....

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TABLE 2DURATION AND SEQUENCE OF SPECIFIC ACTIVITIES FOR TEST 2, IN MINUTESContinued
[42 CFR part 84, subpart H]

Activity
Service time
3 minutes
5 minutes
10 minutes
15 minutes
30 minutes
45 minutes
1 hour 2, 3 and
4 hours 1
Sampling and readings .... 2 2 2 2 .....

1 Total test time for Test 2 for 2-hour, 3-hour, and 4-hour apparatus is 2 hours.
2 Treadmill shall be inclined 15 from vertical and operated at a speed of 1 foot per second.

TABLE 3DURATION AND SEQUENCE OF SPECIFIC ACTIVITIES FOR TEST 3, IN MINUTES
[42 CFR part 84, subpart H]

Activity
Service time
3 minutes
5 minutes
10 minutes
15 minutes
30 minutes
45 minutes
1 hour
2, 3 and
4
hours 1
Sampling and readings 2 2 2 2 (2)
Walks at 4.8 km. (3 miles) per hour .... 1 1 2 2 3 .....
Runs at 9.7 km. (6 miles) per hour ..... 1 1 1 1 1 1 1 .....

Pulls 20 kg. (45 pound) weight to 5 feet .... 15 times in 1 minute ..... 30 times in 2 minutes 30 times in 2 minutes 30 times in 2 minutes 60 times in 6 minutes .....

Lies on side ..... 1/2 1 1 2 3 4 5 .....

Lies on back ..... 1/2 1 1 2 2 3 3 .....

Crawls on hands and knees ..... 1 1 1 2 2 2 2 .....

Sampling and readings .... 2 ..... 2 2 2 .....

Runs at 9.7 km. (6 miles) per hour .... 1 1 1 1 .....

Walks at 4.8 km. (3 miles) per hour .... 2 8 10 .....

Pulls 20 kg. (45 pound) weight to 5 feet .... 30 times in 2 minutes ..... 60 times in 6 minutes 60 times in 6 minutes 60 times in 6 minutes .....

Sampling and readings .... 2 ..... 2 2 .....

Walks at 4.8 km. (3 miles) per hour .... 1 ..... 3 4 10 .....

Lies on side .... 2 4 .....

Lies on back .... 2 1 .....
Sampling and readings .... 2 2 2 .....

1 Total test time for Test 3 for 2-hour, 3-hour, and 4-hour apparatus is 2 hours.
2 Perform test No. 3 for 1 hr. apparatus; then perform test No. 1 for 1 hour apparatus.

TABLE 4DURATION AND SEQUENCE OF SPECIFIC ACTIVITIES FOR TEST 4, IN MINUTES
[42 CFR part 84, subpart H]

Activity
Service time
3 minutes
5 minutes
10 minutes
15 minutes
30 minutes
45 minutes
1 hour 2 hours 3 hours 4 hours
Sampling and readings 2 2 2 2 (2) (3) (4)
Walks at 4.8 km. (3 miles) per hour .... 1 2 2 2 ....
Climbs vertical treadmill 1 (or equivalent) ..... 1 1 1 1 1 1 1 ....
Walks at 4.8 km. (3 miles) per hour .... 1 1 1 2 2 2 ....
Pulls 20 kg. (45 pound) weight to 5 feet .... 30 times in 2 minutes
30 times in 2 minutes
30 times in 2 minutes

60 times in 5 minutes 60 times in 5 minutes 60 times in 5 minutes .... Walks at 4.8 km. (3 miles) per hour .... 1 1 1 2 3 ....

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TABLE 4DURATION AND SEQUENCE OF SPECIFIC ACTIVITIES FOR TEST 4, IN MINUTESContinued
[42 CFR part 84, subpart H]

Activity
Service time
3 minutes
5 minutes
10 minutes
15 minutes
30 minutes
45 minutes
1 hour 2 hours 3 hours 4 hours
Carries 23 kg. (50 pound) weight over overcast .....
Sampling and readings .....
Walks at 4.8 km. (3 miles) per hour .....
Runs at 9.7 km. (6 miles) per hour .....
Carries 23 kg. (50 pound) weight over overcast .....
Pulls 20 kg (45 pound) weight to 5 feet .....
Sampling and readings .....
Walks at 4.8 km. (3 miles) per hour .....
Pulls 20 kg. (45 pound) weight to 5 feet .....
Carries 20 kg. (45 pound) weight and

walks at 4.8 km. (3 miles) per hour .....
Sampling and readings .....
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15 times in 1 minute
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1
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1
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2
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1
1 time in 1 minute
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1
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1 time in 1 minute
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1
1

~~1 time in 1 minute~~

~~15 times in 1 minute~~

~~2~~

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~~.....~~

~~1 time in 1 minute~~

~~2~~

~~3~~

~~1~~

~~2 times in 3 minutes~~

~~60 times in 5 minutes~~

~~2~~

~~.....~~

~~.....~~

~~.....~~

~~.....~~

~~2 times in 3 minutes~~

~~2~~

~~3~~

~~1~~

~~4 times in 6 minutes~~

~~30 times in 2 minutes~~

~~2~~

~~2~~

~~60 times in 5 minutes~~

~~3~~

~~2~~

~~4 times~~

~~in 8 minutes~~
~~2~~
~~4~~
~~1~~
~~6 times in 9 minutes~~
~~36 times in 3 minutes~~
~~2~~
~~6~~
~~60 times in 5 minutes~~
~~3~~
~~2~~

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.....

1 Treadmill shall be inclined 15 from vertical and operated at a speed of 30 cm. (1 foot) per second.

2 Perform test No. 1 for 30-minute apparatus; then perform test No. 4 for 1-hour apparatus; then perform test No. 1 for 30-minute apparatus.

3 Perform test No. 1 for 1-hour apparatus; then perform test No. 4 for 1-hour apparatus; then perform test No. 1 for 1-hour apparatus.

4 Perform test No. 1 for 1-hour apparatus; then perform test No. 4 for 1-hour apparatus; then perform test No. 1 for 1-hour apparatus twice (i.e., two one-hour tests).

Subpart lGas Masks

84.110 Gas masks; description.

(a) Gas masks including all completely assembled air purifying masks designed for use as respiratory protection during entry into atmospheres not immediately dangerous to life or health or escape only from hazardous atmospheres containing adequate oxygen to support life are described as follows:

(1) Front-mounted or back-mounted gas mask. A gas mask which consists of a full facepiece, a breathing tube, a canister at the front or back, a canister harness, and associated connections.
(2) Chin-style gas mask. A gas mask which consists of a full facepiece, a canister which is usually attached to the facepiece, and associated connections.

84.111

(3) Escape gas mask. A gas mask designed for use during escape only from hazardous atmospheres which consists of a facepiece or mouthpiece, a canister, and associated connections.
(b) Gas masks shall be further described according to the types of gases or vapors against which they are designed to provide respiratory protection, as follows:
Type of front-mounted or back-mounted gas mask:

Acid gas 1,2,3

Ammonia

Carbon monoxide

Organic Vapor 1,2,3

Other gas(es) and vapor(s) 1,2,3

Combination of two or more of the above gases

and vapors. 1,2,3

Combination of acid gas, ammonia, carbon mon

oxide, and organic vapors. 1,2,3
Type of chin-style gas mask:
Acid gas 1,2,3
Ammonia
Carbon monoxide
Organic vapor 1,2,3
Other gas(es) and vapor 1,2,3
Combination of two or more of the above gases

and vapors. 1,2,3
Type of escape gas mask:

Acid gas 1,2,3,4

Ammonia 4

Carbon monoxide

Organic vapor 1,2,3,4

Other gas(s) and vapor(s) 1,2,3,4

Combination of two or more of the above gases

and vapors. 1,2,3,4

1 Approval may be for acid gases or organic vapors as a class or for specific acid gases or organic vapors.

2 Not for use against gases or vapors with poor warning properties (except where MSHA or Occupational Safety and Health Administration standards permit such use for a specific gas or vapor), or those which generate high heats or reaction with sorbent materials in the canister.

3 Use of the gas mask may be limited by factors such as lower explosive limit, toxicological effects, and facepiece fit. Limitations on gas mask service life and sorbent capacity limitations shall be specified by the applicant in instructions for selection, use and maintenance of the gas mask.

4 Eye protection may be required in certain concentrations of gases and vapors.

(c) Gas masks for respiratory protection against gases and vapors other than those specified in paragraph (b) of this section, may be approved upon submittal of an application in writing for approval to the Certification and Quality Assurance Branch listing the gas or vapor and suggested maximum use concentration for the specific type of gas mask. The Institute will consider the application and accept or reject it on the basis of effect on the wearers health and safety and any field experience in use of gas masks for such exposures. If the application is ac42 CFR Ch. I (10110 Edition)

cepted, the Institute will test such masks in accordance with the requirements of this subpart.

84.111 Gas masks; required components.

(a) Each gas mask described in 84.110 shall, where its design requires, contain the following component parts:
(1) Facepiece or mouthpiece and noseclip;
(2) Canister or cartridge;
(3) Canister harness;
(4) External check valve; and
(5) Breathing tube.
(b) The components of each gas mask shall meet the minimum construction requirements set forth in subpart G of this part.
84.112 Canisters and cartridges in parallel; resistance requirements.

Where two or more canisters or cartridges are used in parallel, their resistance to airflow shall be essentially equal.

84.113 Canisters and cartridges; color and markings; requirements.

The color and markings of all canisters and cartridges or labels shall conform with the requirements of the American National Standards Institute, American National Standard for Identification of Air-Purifying Respirator Canisters and Cartridges, ANSI K13.11973. ANSI K13.1 is incorporated by reference and has been approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from American National Standards Institute, Inc., 1430 Broadway, New York,

NY 10018. Copies may be inspected at the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 2027416030, or go to: http://www.archives.gov/federallregister/codeloflfederallregulations/ibrllocations.html.

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84.114 Filters used with canisters and cartridges; location; replacement.

(a) Particulate matter filters used in conjunction with a canister or cartridge shall be located on the inlet side of the canister or cartridge.
(b) Filters shall be incorporated in or firmly attached to the canister or cartridge and each filter assembly shall, where applicable, be designed to permit its easy removal from and replacement in the canister or cartridge.
84.115 Breathing tubes; minimum requirements.

Flexible breathing tubes used in conjunction with gas masks shall be designed and constructed to prevent:

(a) Restriction of free head movement;
(b) Disturbance of the fit of facepieces or mouthpieces;
(c) Interference with the wearers activities; and
(d) Shutoff of airflow due to kinking, or from chin or arm pressure.
84.116 Harnesses; installation and construction; minimum requirements.

(a) Each gas mask shall, where necessary, be equipped with a suitable harness designed and constructed to hold the components of the gas mask in position against the wearers body.
(b) Harnesses shall be designed and constructed to permit easy removal and replacement of gas mask parts, and where applicable, provide for holding a full facepiece in the ready position when not in use.

84.117 Gas mask containers; minimum requirements.

(a) Gas masks shall be equipped with a substantial, durable container bearing markings which show the applicants name, the type and commercial designation of mask it contains and all appropriate approval labels.
(b) Containers for gas masks shall be designed and constructed to permit easy removal of the mask.
84.120

84.118 Half-mask facepieces, full facepieces, and mouthpieces; fit; minimum requirements.

(a) Half-mask facepieces and full facepieces shall be designed and constructed to fit persons with various facial shapes and sizes either:
(1) By providing more than one face-piece size; or
(2) By providing one facepiece size which will fit varying facial shapes and sizes.
(b) Full facepieces shall provide for optional use of corrective spectacles or lenses, which shall not reduce the respiratory protective qualities of the gas mask.
(c) Half-mask facepieces shall not interfere with the fit of common industrial safety spectacles, as determined by the Institutes facepiece tests in 84.124.
(d) Gas masks with mouthpieces shall be equipped with noseclips which are securely attached to the mouthpiece or gas mask and provide an airtight seal.
(e) Facepieces shall be designed to prevent eyepiece fogging.
84.119 Facepieces; eyepieces; minimum requirements.

(a) Full facepieces shall be designed and constructed to provide adequate vision which is not distorted by the eye.

(b) All eyepieces shall be designed and constructed to be impact and penetration resistant. Federal Specification, Mask, Air Line: and Respirator, Air Filtering, Industrial, GGG-M-125d, October 11, 1965 with interim amendment-1, July 30, 1969, is an example of an appropriate standard for determining impact and penetration resistance. Copies of GGG-M-125d may be obtained from the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888.

84.120 Inhalation and exhalation valves; minimum requirements.

(a) Inhalation and exhalation valves shall be provided where necessary and protected against damage and distortion.

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(b) Inhalation valves shall be designed and constructed to prevent excessive exhaled air from adversely affecting cartridges, canisters, and filters.
(c) Exhalation valves shall be protected against external influence, and designed and constructed to prevent inward leakage of contaminated air.
84.121 Head harnesses; minimum requirements.

(a) Facepieces shall be equipped with adjustable and replaceable head harnesses, designed and constructed to provide adequate tension during use and an even distribution of pressure over the entire area in contact with the face.
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(b) Mouthpieces shall be equipped, where applicable, with adjustable and replaceable harnesses designed and constructed to hold the mouthpiece in place.
84.122 Breathing resistance test; minimum requirements.

(a) Resistance to airflow will be measured in the facepiece or mouthpiece of a gas mask mounted on a breathing machine both before and after each test conducted in accordance with 84.124, 84.125, and 84.126, with air flowing at a continuous rate of 85 liters per minute.
(b) The maximum allowable resistance requirements for gas masks are as follows:
MAXIMUM RESISTANCE

[mm. water column height]

Type of gas mask	Inhalation	Exhalation	Initial Final 1
Front-mounted or back-mounted (without particulate filter)	60	70	40
Front-mounted or back-mounted (with approved particulate filter)	65	60	70
Chin-style (without particulate filter)	75	85	55
Chin-style (with approved particulate filter)	80	75	85
Escape (without particulate filter)	20	20	20
Escape (with approved particulate filter)	20	20	20

1 Measured at end of the service life specified in Tables 5, 6, and 7 of this subpart.

84.123 Exhalation valve leakage test.

(a) Dry exhalation valves and valve seats will be subjected to a suction of 25 mm. water-column height while in a normal operating position.
(b) Leakage between the valve and valve seat shall not exceed 30 milliliters

per minute.

84.124 Facepiece tests; minimum requirements.

(a) The complete gas mask will be fitted to the faces of persons having varying facial shapes and sizes.

(b) Where the applicant specifies a facepiece size or sizes for the gas mask, together with the approximate measurements of faces they are designed to fit, the Institute will insure that test subjects suit such facial measurements.

(c) Any gas mask parts which must be removed to perform the facepiece or mouthpiece fit test shall be replaceable without special tools and without disturbing the facepiece or mouthpiece fit.

(d) The facepiece or mouthpiece fit test, using positive or negative pressure recommended by the applicant and described in his instructions will be used before each test specified in paragraph (e) of this section, and in 84.125.

(e)(1) Each wearer will enter a chamber containing 100 p.p.m. isoamyl acetate vapor for a half-mask facepiece and 1,000 p.p.m. isoamyl acetate vapor for a full facepiece or mouthpiece.

(2) The facepiece or mouthpiece may be adjusted, if necessary, in the test chamber before starting the tests.

(3) Each wearer will remain in the chamber for 8 minutes while performing the following activities:

(i) Two minutes, nodding and turning head;

(ii) Two minutes, calisthenic arm movements;

(iii) Two minutes, running in place; and

(iv) Two minutes, pumping with a tire pump into a 28 liter (1 cubic foot) container.
(4) Each wearer shall not detect the odor of isoamyl acetate during the test.

84.125 Particulate tests; canisters containing particulate filters; minimum requirements.

Gas mask canisters containing filters for protection against particulates (e.g. dusts, fumes, mists, and smokes) in combination with gases, vapors, or gases and vapors, shall also comply with the requirements as prescribed in 84.170 through 84.183, except for the airflow resistance test of 84.181.

84.126 Canister bench tests; minimum requirements.

(a)(1) Bench tests, except for carbon monoxide tests, will be made on an apparatus that allows the test atmosphere at 50 5 percent relative humidity and room temperature (25 2.5 C.) to enter the canister continuously at concentrations and rates of flow specified in Tables 5, 6, and 7 of this subpart.

(2) Three canisters will be removed from containers and tested as received from the applicant.
(3) Two canisters, other than those described in paragraph (a)(2) of this section, will be equilibrated at room temperature by passing 25 percent relative humidity air through them at 64 liters per minute for 6 hours.

(4) Two canisters, other than those described in paragraphs (a) (2) and (3) Pt. 84, Subpt. I, Tables

of this section, will be equilibrated at room temperature by passing 85 percent relative humidity air through them at 64 liters per minute for 6 hours.

(5) The equilibrated canisters will be resealed, kept in an upright position at room temperature, and tested within 18 hours.

(b) Front-mounted and back-mounted gas mask canisters will be tested and shall meet the minimum requirements set forth in Table 5 of this subpart.

(c)(1) Front-mounted, and back-mounted, and chin-style canisters designated as providing respiratory protection against gases, ammonia, organic vapors, carbon monoxide and particulate contaminants shall have a window or other indicator to warn the gas mask wearer when the canister will no longer satisfactorily remove carbon monoxide from the inhaled air.

(2) Other types of front- and back-mounted canisters may also be equipped with a window or other indicator to warn of imminent leakage of other gases or vapors.

(3) The window indicator canisters will be tested as regular canisters, but shall show a satisfactory indicator change or other warning before the allowable canister penetration has occurred.

(d) Chin-style gas mask canisters shall meet the minimum requirements set forth in Table 6 of this subpart.

(e) Escape gas mask canisters shall meet the minimum requirements set forth in Table 7 of this subpart.

TABLES TO SUBPART I OF PART 84

TABLE 5CANISTER BENCH TESTS AND REQUIREMENTS FOR FRONT-MOUNTED AND BACK-MOUNTED GAS MASK CANISTERS [42 CFR part 84, subpart I]

Canister type	Test condition	Test atmosphere	Number of tests	Maximum allowable penetratin (parts per million)	Minimum service life (minutes)	1Gas or vapor	Concentration (parts per million)	Flow rate (liters per minute)
Acid gas	As received	SO2	20,000	64	3	5	12	
	Equilibrated	Cl2	20,000	64	3	5	12	
		SO2	20,000	32	4	5	12	
Organic vapor	As received	Cl2	20,000	32	4	5	12	
		CCl4	20,000	64	4	5	12	
	Equilibrated	CCl4	20,000	32	4	5	12	
Ammonia	As received	NH3	30,000	64	3	50	12	
	Equilibrated	NH3	30,000	32	4	50	12	
Carbon monoxide	As received	CO	20,000	4	64	2 (3)	60	

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TABLE 5CANISTER BENCH TESTS AND REQUIREMENTS FOR FRONT-MOUNTED AND BACK-MOUNTED GAS MASK CANISTERSContinued
[42 CFR part 84, subpart I]

Canister type	Test condition	Test atmosphere	Number of tests	Maximum allowable penetratin (parts per million)	Minimum service life (minutes)	1Gas or vapor	Concentration (parts per million)	Flow rate (liters per minute)
Equilibrated CO	5,000	2	32	3 (3)	60			
CO	3,000	2	32	3 (3)	60			
Combination of 2 or 3 of above types	5							
Combination of all above types	6							

1 Minimum life will be determined at the indicated penetration.
2 Relative humidity of test atmosphere will be 95 3pct; temperature of test atmosphere will be 25 2.5 C.
3 Maximum allowable CO penetration will be 385 cm 3 during the minimum life. The penetration shall not exceed 500 p/m during this time.
4 Relative humidity of test atmosphere will be 95 3pct; temperature of test atmosphere entering the test fixture will be 0 2.5 C0 C.

5 Test conditions and requirements will be applicable as shown in this table.
6 Test conditions and requirements will be applicable as shown in this table, except the minimum service lives for acid gas, or

ganic vapor, and ammonia will be 6 min instead of 12 min.

TABLE 6CANISTER BENCH TESTS AND REQUIREMENTS FOR CHIN-STYLE GAS MASK CANISTERS
[42 CFR part 84, subpart I]

Canister type	Test condition	Test atmosphere	Number of tests	Maximum allowable penetration (parts per million)	Minimum service life (minutes)	1Gas or vapor Concentration (parts per million)	Flow rate (liters per minute)
Acid gas	As received	Equilibrated	SO2	50,000	64	3	5	12
			Cl2	5,000	64	3	5	12
			SO2	5,000	32	4	5	12
			Cl2	5,000	32	4	5	12
Organic vapor	As received	Equilibrated	CCl4	5,000	64	3	5	12
			CCl4	5,000	32	4	5	12
Ammonia	As received	Equilibrated	NH3	5,000	64	3	50	12
	As received	Equilibrated	NH3	5,000	32	4	50	12
Carbon monoxide	As received	CO	20,000	2	64	2 (3)	60
			CO	5,000	4	32	3 (3)	60
Combination of 2 or 3 of above types	5							

Combination of all
above types 6
CO 3,000 2 32 3 (3) 60

1 Minimum life will be determined at the indicated penetration.
2 Relative humidity of test atmosphere will be 95 3pct; temperature of test atmosphere will be 25 2.5 C.
3 Maximum allowable CO penetration will be 385 cm 3 during the minimum life. The penetration shall not exceed 500 p/m dur

ing this time.
4 Relative humidity of test atmosphere will be 95 3pct; temperature of test atmosphere entering the test fixture will be 0 2.5

C0 C.
5 Test conditions and requirements will be applicable as shown in this table.
6 Test conditions and requirements will be applicable as shown in this table, except the minimum service lives for acid gas, or

ganic vapor, and ammonia will be 6 min instead of 12 min.

TABLE 7CANISTER BENCH TESTS AND REQUIREMENTS FOR ESCAPE GAS MASK CANISTERS
[42 CFR part 84, subpart I]

Test atmosphere Maximum
allowable Minimum
Canister type Test condition
Gas or vapor
Concentration
(parts
per million)
Flow rate
(liters per
minute)
Number
of tests
penetration
(parts
per million)
service
life (minutes)
1
Acid gas ..... As received SO2 5,000 64 3 5 12

~~Equilibrated ..... Cl2~~
~~SO2~~
~~5,000~~
~~5,000~~
~~64~~
~~32~~
~~3~~
~~4~~
~~5~~
~~5~~
~~12~~
~~12~~
~~Cl2 5,000 32 4 5 12~~

~~572~~

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TABLE 7CANISTER BENCH TESTS AND REQUIREMENTS FOR ESCAPE GAS MASK CANISTERS
Continued
[42 CFR part 84, subpart I]

Canister type	Test condition Gas or vapor	Test atmosphere Maximum Concentration (parts per million)	Flow rate (liters per minute)	Number of tests	Maximum allowable penetration (parts per million)	Minimum service life (minutes)
1						
Organic vapor						
Ammonia						
As received	CCl4	5,000	64	3	5	
Equilibrated	CCl4	5,000	32	4		
As received	NH3	5,000	64	3	5	

50
12
12
12
Carbon monoxide .....
Equilibrated .....
As received .....
NH3
CO
CO
CO
5,000
10,000
5,000
3,000
32
2 32
5 32
2 32
4
2
3
3
50
(3)
(3)
(3)
12
4 60
60
60

1 Minimum life will be determined at the indicated penetration.

2 Relative humidity of test atmosphere will be 95 3 pct; temperature of test atmosphere will be 25 2.5 C.

3 Maximum allowable CO penetration will be 385 cm 3 during the minimum life. The penetration shall not exceed 500 p/m during this time.

4 If effluent temperature exceeds 100 C during this test, the escape gas mask shall be equipped with an effective heat exchanger.

5 Relative humidity of test atmosphere will be 95 3 pct; temperature of test

atmosphere entering the test fixture will be 0 2.5 C0 C.

Subpart JSupplied-Air Respirators

84.130 Supplied-air respirators; description.

Supplied-air respirators, including all completely assembled respirators designed for use as respiratory protection during entry into and escape from atmospheres not immediately dangerous to life or health are described as follows:

(a) Type A supplied-air respirators. A hose mask respirator, for entry into and escape from atmospheres not immediately dangerous to life or health, which consists of a motor-driven or hand-operated blower that permits the free entrance of air when the blower is not operating, a strong large-diameter hose having a low resistance to airflow, a harness to which the hose and the life-line are attached and a tight-fitting facepiece.
(b) Type AE supplied-air respirators. A Type A supplied-air respirator equipped with additional devices designed to protect the wearers head and neck against impact and abrasion from rebounding abrasive material, and with shielding material such as plastic, glass, woven wire, sheet metal, or other suitable material to protect the window(s) of facepieces, hoods, and helmets which do not unduly interfere with the wearers vision and permit easy access to the external surface of such window(s) for cleaning.

(c) Type B supplied-air respirators. A

hose mask respirator, for entry into and escape from atmospheres not immediately dangerous to life or health, which consists of a strong large-diameter hose with low resistance to airflow through which the user draws inspired air by means of his lungs alone, a harness to which the hose is attached, and a tight-fitting facepiece.

(d) Type BE supplied-air respirators. A type B supplied-air respirator equipped with additional devices designed to protect the wearers head and neck against impact and abrasion from rebounding abrasive material, and with shielding material such as plastic, glass, woven wire, sheet metal, or other suitable material to protect the window(s) of facepieces, hoods, and helmets which do not unduly interfere with the wearers vision and permit easy access to the external surface of such window(s) for cleaning.

(e) Type C supplied-air respirators. An airline respirator, for entry into and escape from atmospheres not immediately dangerous to life or health, which consists of a source of respirable breathing air, a hose, a detachable coupling, a control valve, orifice, a demand valve or pressure demand valve, an arrangement for attaching the hose to the wearer, and a facepiece, hood, or helmet.

84.131

(f) Type CE supplied-air respirators. A type C supplied-air respirator equipped with additional devices designed to protect the wearers head and neck against impact and abrasion from rebounding abrasive material, and with shielding material such as plastic, glass, woven wire, sheet metal, or other suitable material to protect the window(s) of facepieces, hoods, and helmets which do not unduly interfere with the wearers vision and permit easy access to the external surface of such window(s) for cleaning.
84.131 Supplied-air respirators; required components.

(a) Each supplied-air respirator described in 84.130 shall, where its design requires, contain the following component parts:
(1) Facepiece, hood, or helmet;
(2) Air supply valve, orifice, or demand or pressure-demand regulator;
(3) Hand operated or motor driven air blower;
(4) Air supply hose;
(5) Detachable couplings;
(6) Flexible breathing tube; and
(7) Respirator harness.
(b) The component parts of each supplied-air respirator shall meet the minimum construction requirements set forth in subpart G of this part.
84.132 Breathing tubes; minimum requirements.

Flexible breathing tubes used in conjunction with supplied-air respirators shall be designed and constructed to prevent:

(a) Restriction of free head movement;

(b) Disturbance of the fit of facepieces, mouthpieces, hoods, or helmets;
(c) Interference with the wearers activities; and
(d) Shutoff of airflow due to kinking, or from chin or arm pressure.

84.133 Harnesses; installation and construction; minimum requirements.

(a) Each supplied-air respirator shall, where necessary, be equipped with a suitable harness designed and constructed to hold the components of the

respirator in position against the wearers body.

(b) Harnesses shall be designed and constructed to permit easy removal and replacement of respirator parts, and where applicable, provide for holding a full facepiece in the ready position when not in use.

84.134 Respirator containers; minimum requirements.

Supplied-air respirators shall be equipped with a substantial, durable container bearing markings which show the applicants name, the type and commercial designation of the respirator it contains, and all appropriate approval labels.

84.135 Half-mask facepieces, full facepieces, hoods, and helmets; fit; minimum requirements.

(a) Half-mask facepieces and full facepieces shall be designed and constructed to fit persons with various facial shapes and sizes either:
(1) By providing more than one face-piece size; or

(2) By providing one facepiece size which will fit varying facial shapes and sizes.

(b) Full facepieces shall provide for optional use of corrective spectacles or lenses, which shall not reduce the respiratory protective qualities of the respirator.

(c) Hoods and helmets shall be designed and constructed to fit persons with various head sizes, provide for the optional use of corrective spectacles or lenses, and insure against any restriction of movement by the wearer.

(d) Facepieces, hoods, and helmets shall be designed to prevent eyepiece fogging.

84.136 Facepieces, hoods, and helmets; eyepieces; minimum requirements.

(a) Facepieces, hoods, and helmets shall be designed and constructed to provide adequate vision which is not distorted by the eyepiece.

(b) All eyepieces except those on Types B, BE, C, and CE supplied-air respirators shall be designed and constructed to be impact and penetration resistant. Federal Specification, Mask, Air Line: and Respirator, Air Filtering, 574

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Industrial, GGG-M-125d, October 11, 1965 with interim amendment-1, July 30, 1969, is an example of an appropriate standard for determining impact and penetration resistance. Copies of GGG-M-125d may be obtained from the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888.

(c)(1) The eyepieces of AE, BE, and CE type supplied-air respirators shall be shielded by plastic, glass, woven wire, sheet metal, or other suitable material which does not interfere with the vision of the wearer.

(2) Shields shall be mounted and attached to the facepiece to provide easy access to the external surface of the eyepiece for cleaning.

84.137 Inhalation and exhalation valves; check valves; minimum requirements.

(a) Inhalation and exhalation valves shall be provided where necessary and protected against distortion.

(b) Exhalation valves shall be:

(1) Protected against damage and external influence; and

(2) Designed and constructed to prevent inward leakage of contaminated air.

(c) Check valves designed and constructed to allow airflow toward the facepiece only shall be provided in the connections to the facepiece or in the hose fitting near the facepiece of all Type A, AE, B, and BE supplied-air respirators.

84.138 Head harnesses; minimum requirements.

Facepieces shall be equipped with adjustable and replaceable head harnesses which are designed and constructed to provide adequate tension during use, and an even distribution of pressure over the entire area in contact with the face.

84.139 Head and neck protection; supplied-air respirators; minimum requirements.

Type AE, BE, and CE supplied-air respirators shall be designed and constructed to provide protection against impact and abrasion from rebounding abrasive materials to the wearers head and neck.

84.141

84.140 Air velocity and noise levels; hoods and helmets; minimum requirements.

Noise levels generated by the respirator will be measured inside the hood or helmet at maximum airflow obtainable within pressure and hose length requirements and shall not exceed 80 dBA.

84.141 Breathing gas; minimum requirements.

(a) Breathing gas used to supply supplied-air respirators shall be respirable breathing air and contain no less than

19.5 volume-percent of oxygen.
(b) Compressed, gaseous breathing air shall meet the applicable minimum grade requirements for Type I gaseous air set forth in the Compressed Gas Association Commodity Specification for Air, G7.1, 1966 (Grade D or higher quality). G7.1 is incorporated by reference and has been approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018. Copies may be inspected at the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 2027416030, or go to: http://www.archives.gov/federallregister/codeloflfederallregulations/ibrllocations.html.
(c) Compressed, liquefied breathing air shall meet the applicable minimum grade requirements for Type II liquid air set forth in the Compressed Gas Association Commodity Specification for Air, G7.1, 1966 (Grade B or higher quality). G7.1 is incorporated by reference and has been approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018. Copies may be inspected at the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888, or at the National Archives and Records Administration

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(NARA). For information on the availability of this material at NARA, call 2027416030, or go to: http://www.archives.gov/federallregister/codeloflfederallregulations/ibrllocations.html.

84.142 Air supply source; hand-operated or motor driven air blowers; Type A supplied-air respirators; minimum requirements.

(a) Blowers shall be designed and constructed to deliver an adequate amount of air to the wearer with either direction of rotation, unless constructed to permit rotation in one direction only, and to permit the free entrance of air to the hose when the blower is not operated.
(b) No multiple systems, whereby more than one user is supplied by one blower, will be approved, unless each hose line is connected directly to a manifold at the blower.
84.143 Terminal fittings or chambers; Type B supplied-air respirators; minimum requirements.

(a) Blowers or connections to air supplies providing positive pressures shall not be approved for use on Type B supplied-air respirators.
(b) Terminal fittings or chambers employed in Type B supplied-air respirators, shall be:
(1) Installed in the inlet of the hose.
(2) Designed and constructed to provide for the drawing of air through corrosion resistant material arranged so as to be capable of removing material larger than 0.149 mm. in diameter (149 micrometers, 100-mesh, U.S. Standard sieve).

(3) Installed to provide a means for fastening or anchoring the fitting or chamber in a fixed position in a zone of respirable air.

84.144 Hand-operated blower test; minimum requirements.

(a) Hand-operated blowers shall be tested by attaching them to a mechanical drive and operating them 6 to 8 hours daily for a period of 100 hours at a speed necessary to deliver 50 liters of air per minute through each completely assembled respirator. Each respirator shall be equipped with the maximum length of hose with which the device is to be approved and the hose

shall be connected to each blower or manifold outlet designed for hose connections.

(b) The crank speed of the hand-operated blower shall not exceed 50 revolutions per minute in order to deliver the required 50 liters of air per minute to each facepiece.

(c) The power required to deliver 50 liters of air per minute to each wearer through the maximum length of hose shall not exceed one-fiftieth horsepower, and the torque shall not exceed a force of 2.3 kg. (5 pounds) on a 20 cm. (8-inch) crank, as defined in 84.146.

(d) The blower shall operate throughout the period without failure or indication of excessive wear of bearings or other working parts.

84.145 Motor-operated blower test; minimum requirements.

(a) Motor-operated blowers shall be tested by operating them at their specified running speed 6 to 8 hours daily for a period of 100 hours when assembled

with the kind and maximum length of hose for which the device is to be approved and when connected to each blower or manifold outlet designed for hose connections.

(b) The connection between the motor and the blower shall be so constructed that the motor may be disengaged from the blower when the blower is operated by hand.

(c) The blower shall operate throughout the period without failure or indication of excessive wear of bearings or other working parts.

(d) Where a blower, which is ordinarily motor driven, is operated by hand, the power required to deliver 50 liters of air per minute to each wearer through the maximum length of hose shall not exceed one-fiftieth horsepower, and the torque shall not exceed a force of 2.3 kg. (5 pounds) on a 20 cm. (8-inch) crank, as defined in 84.146.

(e) Where the respirator is assembled with the facepiece and 15 m. (50 feet) of the hose for which it is to be approved, and when connected to one outlet with all other outlets closed and operated at a speed not exceeding 50 revolutions of the crank per minute, the amount of air delivered into the respiratory inlet covering shall not exceed 150 liters per minute.

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84.146 Method of measuring the

power and torque required to oper

ate blowers.

As shown in Figure 1 of this section, the blower crank is replaced by a wooden drum, a (13 cm. (5 inches) in diameter is convenient). This drum is wound with about 12 m. (40 feet) of No. 2 picture cord, b. A weight, c, of sufficient mass to rotate the blower at the desired speed is suspended from this wire cord. A mark is made on the cord about 3 to 4.5 m. (10 to 15 feet) from the weight, c. Another mark is placed at a measured distance (69 m./2030 feet is

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convenient) from the first. These are used to facilitate timing. To determine the torque or horsepower required to operate the blower, the drum is started in rotation manually at or slightly above the speed at which the power measurement is to be made. The blower is then permitted to assume constant speed, and then as the first mark on the wire leaves the drum, a stopwatch is started. The watch is stopped when the second mark leaves the drum. From these data the foot-pounds per minute and the torque may be calculated.

FIGURE 1APPARATUS FOR MEASURING POWER REQUIRED TO OPERATE BLOWER. (42 CFR PART 84, SUBPART J, 84.146)

~~84.147 Type B supplied-air respirator; minimum requirements.~~

~~No Type B supplied-air respirator shall be approved for use with a blower or with connection to an air supply device at positive pressures.~~

~~84.148 Type C supplied-air respirator, continuous flow class; minimum requirements.~~

~~(a) Respirators tested under this section shall be approved only when they~~

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supply respirable air at the pressures and quantities required.

(b) The pressure at the inlet of the hose connection shall not exceed 863 kN/m.2 (125 pounds per square inch gage).
(c) Where the pressure at any point in the supply system exceeds 863 kN/m.2 (125 pounds per square inch gage), the respirator shall be equipped with a pressure-release mechanism that will prevent the pressure at the hose connection from exceeding 863 kN/m.2 (125 pounds per square inch gage) under any conditions.
84.149 Type C supplied-air respirator, demand and pressure demand class; minimum requirements.

(a) Respirators tested under this section shall be approved only when used to supply respirable air at the pressures and quantities required.
(b) The manufacturer shall specify the range of air pressure at the point of attachment of the air-supply hose to the air-supply system, and the range of hose length for the respirator. For example, he might specify that the respirator be used with compressed air at pressures ranging from 280550 kN/m.2 (40 to 80 pounds per square inch) with from 6 to 76 m. (15 to 250 feet) of air-supply hose.
(c) The specified air pressure at the point of attachment of the hose to the air-supply system shall not exceed 863 kN/m.2 (125 pounds per square inch gage).
(d)(1) Where the pressure in the air-supply system exceeds 863 kN/m.2 (125

pounds per square inch gage), the respirator shall be equipped with a pressure-release mechanism that will prevent the pressure at the point of attachment of the hose to the air-supply system from exceeding 863 kN/m.2 (125 pounds per square inch gage).

(2) The pressure-release mechanism shall be set to operate at a pressure not more than 20 percent above the manufacturers highest specified pressure. For example, if the highest specified pressure is 863 kN/m.2 (125 pounds per square inch), the pressure-release mechanism would be set to operate at a maximum of 1,035 kN/m.2 (150 pounds per square inch).
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84.150 Air-supply line tests; minimumrequirements.

Air supply lines employed on Type A, Type B, and Type C supplied-air respirators shall meet the minimum test requirements set forth in Table 8 of this subpart.

84.151 Harness test; minimum requirements.

(a)(1) Shoulder straps employed on Type A supplied-air respirators shall be tested for strength of material, joints, and seams and must separately withstand a pull of 113 kg. (250 pounds) for 30 minutes without failure.

(2) Belts, rings, and attachments for life lines must withstand a pull of 136 kg. (300 pounds) for 30 minutes without failure.
(3) The hose shall be firmly attached to the harness so as to withstand a pull of 113 kg. (250 pounds) for 30 minutes without separating, and the hose attachments

shall be arranged so that the pull or drag of the hose behind an advancing wearer does not disarrange the harness or exert pull upon the face-piece.

(4) The arrangement and suitability of all harness accessories and fittings will be considered.

(b)(1) The harness employed on Type B supplied-air respirators shall not be uncomfortable, disturbing, or interfere with the movements of the wearer.

(2) The harness shall be easily adjustable to various sizes.

(3) The hose shall be attached to the harness in a manner that will withstand a pull of 45 kg. (100 pounds) for 30 minutes without separating or showing signs of failure.

(4) The design of the harness and attachment of the line shall permit dragging the maximum length of hose considered for approval over a concrete floor without disarranging the harness or exerting a pull on the facepiece.

(5) The arrangement and suitability of all harness accessories and fittings will be considered.

(c) The harness employed on Type C respirators shall be similar to that required on the Type B respirator, or, it may consist of a simple arrangement for attaching the hose to a part of the wearers clothing in a practical manner

that prevents a pull equivalent to dragging the maximum length of the hose over a concrete floor from exerting pull upon the respiratory-inlet covering.

(d) Where supplied-air respirators have a rigid or partly rigid head covering, a suitable harness shall be required to assist in holding this covering in place.

84.152 Breathing tube test; minimum requirements.

(a)(1) Type A and Type B supplied-air respirators shall employ one or two flexible breathing tubes of the nonkinking type which extend from the facepiece to a connecting hose coupling attached to the belt or harness.

(2) The breathing tubes employed shall permit free head movement, insure against closing off by kinking or by chin or arm pressure, and they shall not create a pull that will loosen the facepiece or disturb the wearer.

(b) Breathing tubes employed on Type C supplied-air respirators of the continuous flow class shall meet the minimum requirements set forth in paragraph (a) of this section, however, an extension of the connecting hose may be employed in lieu of the breathing tubes required.

(c)(1) A flexible, nonkinking type breathing tube shall:

(i) Be employed on Type C supplied-air respirators of the demand and pressure-demand class; and

(ii) Extend from the facepiece to the demand or pressure-demand valve, except where the valve is attached directly

to the facepiece.
(2) The breathing tube shall permit free head movement, insure against closing off by kinking or by chin or arm pressure, and shall not create a pull that will loosen the facepiece or disturb the wearer.
84.153 Airflow resistance test, Type A and Type AE supplied-air respirators; minimum requirements.

(a) Airflow resistance will be determined when the respirator is completely assembled with the respiratory inlet covering, the air-supply device, and the maximum length of air-supply hose coiled for one-half its length in loops 1.5 to 2.1 m. (5 to 7 feet) in diameter.
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(b) The inhalation resistance, drawn at the rate of 85 liters (3 cubic feet) per minute when the blower is not operating or under any practical condition of blower operation shall not exceed the following amounts:
Maximum length of hose for which respirator is approved

Maximum resistance, water column height

Feet

Meters

Inches

Millimeters

75

~~23~~

~~1.5~~

~~38~~

~~150~~

~~46~~

~~2.5~~

~~64~~

~~250~~

~~76~~

~~3.5~~

~~89~~

~~300~~

~~91~~

~~4.0~~

~~102~~

~~(c) The exhalation resistance shall not exceed 25 mm. (1 inch) of water column height at a flow rate of 85 liters (3 cubic feet) per minute when the blower is not operating or under any practical condition of blower operation.~~

~~84.154 Airflow resistance test; Type Band Type BE supplied-air respirators; minimum requirements.~~

~~(a) Airflow resistance shall be determined when the respirator is completely assembled with the respiratory inlet covering and the hose in the maximum length to be considered for approval, coiled in loops 1.5 to 2.1 m. (5 to~~

7 feet) in diameter.
(b) Airflow resistance shall not exceed 38 mm. (1.5 inches) of water-column height to air drawn at the flow rate of 85 liters (3 cubic feet) per minute.
(c) The exhalation resistance shall not exceed 25 mm. (1 inch) of water-column height at this flow rate.
84.155 Airflow resistance test; Type Csupplied-air respirator, continuous flow class and Type CE supplied-air respirator; minimum requirements.

The resistance to air flowing from the respirator shall not exceed 25 mm. (1 inch) of water-column height when the air flow into the respiratory inlet covering is 115 liters (4 cubic feet) per minute.

84.156 Airflow resistance test; Type Csupplied-air respirator, demand class; minimum requirements.

(a) Inhalation resistance shall not exceed 50 millimeters (2 inches) of water at an air flow of 115 liters (4 cubic feet) per minute.
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(b) The exhalation resistance to a flow of air at a rate of 85 liters (3 cubic feet) per minute shall not exceed 25 millimeters (1 inch) of water.

84.157 Airflow resistance test; Type C supplied-air respirator, pressure-demand class; minimum requirements.

(a) The static pressure in the face-piece shall not exceed 38 mm. (1.5 inches) of water-column height.

(b) The pressure in the facepiece shall not fall below atmospheric at inhalation airflows less than 115 liters (4 cubic feet) per minute.

(c) The exhalation resistance to a flow of air at a rate of 85 liters (3 cubic feet) per minute shall not exceed the static pressure in the facepiece by more than 51 mm. (2 inches) of water-column height.

84.158 Exhalation valve leakage test.

(a) Dry exhalation valves and valve seats will be subjected to a suction of 25 mm. water-column height while in a normal operating position.

(b) Leakage between the valve and valve seat shall not exceed 30 milliliters per minute.

84.159 Man tests for gases and vapors; supplied-air respirators; general performance requirements.

(a) Wearers will enter a chamber containing a gas or vapor as prescribed in 84.160, 84.161, 84.162, and 84.163.

(b) Each wearer will spend 10 minutes in work to provide observations on freedom of the device from leakage. The freedom and comfort allowed the wearer will also be considered.

(c) Time during the test period will be divided as follows:
(1) Five minutes. Walking, turning head, dipping chin; and
(2) Five minutes. Pumping air with a tire pump into a 28-liter (1 cubic foot) container, or equivalent work.
(d) No odor of the test gas or vapor shall be detected by the wearer in the air breathed during any such test, and the wearer shall not be subjected to any undue discomfort or encumbrance because of the fit, air delivery, or other features of the respirator during the testing period.
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84.160 Man test for gases and vapors; Type A and Type AE respirators; test requirements.

(a) The completely assembled respirator will be worn in a chamber containing 0.1 0.025 percent isoamyl acetate vapor, and the blower, the intake of the hose, and not more than 25 percent of the hose length will be located in isoamyl acetate-free air.
(b) The man in the isoamyl acetate atmosphere will draw his inspired air through the hose, connections, and all parts of the air device by means of his lungs alone (blower not operating).
(c) The 10-minute work test will be repeated with the blower in operation at any practical speed up to 50 revolutions of the crank per minute.
84.161 Man test for gases and vapors; Type B and Type BE respirators; test requirements.

(a) The completely assembled respirator will be worn in a chamber containing 0.1 0.025 percent isoamyl acetate vapor, and the intake of the hose, and not more than 25 percent of the

hose length will be located in isoamyl acetate-free air.

(b) The man in the isoamyl acetate atmosphere will draw his inspired air through the hose and connections by means of his lungs alone.

84.162 Man test for gases and vapors; Type C respirators, continuous-flow class and Type CE supplied-air respirators; test requirements.

(a) The completely assembled respirator will be worn in a chamber containing 0.1 0.025 percent isoamyl acetate vapor, the intake of the hose will be connected to a suitable source of respirable air, and not more than 25 percent of the hose length will be located in isoamyl acetate-free air.

(b) The minimum flow of air required to maintain a positive pressure in the respiratory-inlet covering throughout the entire breathing cycle will be supplied to the wearer, provided however, that airflow shall not be less than 115 liters per minute for tight-fitting and not less than 170 liters per minute for loose-fitting respiratory inlet coverings.

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(c) The test will be repeated with the maximum rate of flow attainable within specified operating pressures.
84.163 Man test for gases and vapors; Type C supplied-air respirators, demand and pressure-demand classes; test requirements.

(a) The completely assembled respirator will be worn in a chamber containing 0.1 0.025 percent isoamyl ace-
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tate vapor, the intake of the hose will be connected to a suitable source of respirable air, and not more than 25 percent of the hose length will be located in isoamyl acetate-free air.

(b) The test will be conducted at the minimum pressure with the maximum hose length and will be repeated at the maximum pressure with the minimum hose length.
TABLE TO SUBPART J OF PART 84

TABLE 8AIR-SUPPLY LINE REQUIREMENTS AND TESTS

[42 CFR part 84, subpart J]

Specific requirements
Requirements for the air-supply lines of the indicated type of supplied-air respirators
Type A Type B Type C
Length of hose ..... Maximum of 91 m. (300 feet), in multiples of 7.6 m. (25 feet).
Maximum of 23 m. (75 feet) in multiples of 7.6 m. (25 feet).
Maximum of 91 m. (300 feet) in multiples of 7.6 m. (25 feet). It will be permissible for the applicant to supply hose of the approved type of

shorter length than 7.6 m. (25 feet) provided it meets the requirements of the part.

Air flow ..... None ..... None .....

The air-supply hose with air regulating valve or orifice shall permit a flow of not less than 115 liters (4 cubic feet) per minute to tight-fitting and 170 liters (6 cubic feet) per minute to loose-fitting respiratory-inlet coverings through the maximum length of hose for which approval is granted and at the minimum specified air-supply pressure. The maximum flow shall not exceed 425 liters (15 cubic feet) per minute at the maximum specified air-supply pressure with the minimum length of hose for which approval is granted.

Air flow ....do ....do .....

The air-supply hose, detachable coupling, and demand valve of the demand class or pressure-demand valve of the pressure-demand class for Type C supplied-air respirators, demand and pressure-demand classes, shall be capable of delivering respirable air at a rate of not less than 115 liters (4 cubic feet) per minute to the respiratory-inlet covering at an inhalation resistance not exceeding 50 millimeters (2 inches) of water-column height measured in the respiratory-inlet covering with any combination of air-supply pressure and length of hose within the applicants specified range of pressure and hose length. The air-flow rate and resistance to inhalation shall be measured while the demand or pressure-demand valve is actuated 20 times per minute by a source of intermittent suction. The maximum rate of flow to the respiratory-inlet covering shall not exceed 425 liters (15 cubic feet) per minute under the specified operating conditions.

TABLE 8AIR-SUPPLY LINE REQUIREMENTS AND TESTSContinued
[42 CFR part 84, subpart J]

Specific requirements	Requirements for the air-supply lines of the indicated type of supplied-air respirators	
	Type A	Type B	Type C
Air-regulating valve	.....	.....	If an air-regulating valve is provided, it shall be so designed that it will remain at a specific adjustment, which will not be affected by the ordinary movement of the wearer. The valve must be so constructed that the air supply with the maximum length of hose and at the minimum specified air-supply pressure will not be less than 115 liters (4 cubic feet) of air per minute to tight-fitting and 170 liters (6 cubic feet) of air per minute of loose-fitting respiratory
Noncollapsibility	.....	.....	.....
Nonkinkability	.....	.....	.....
Strength of hose and couplings.	.....	.....	.....
	.....do	.....	.....
	The hose shall not collapse or exhibit permanent deformation when a force of 90 kg. (200 pounds) is applied for 5 minutes between 2 planes 7.6 cm. (3 inches) wide on opposite sides of the hose.	.....	.....
	None	.....	.....
	Hose and couplings shall not separate or fail when tested with a pull of 113 kg. (250 pounds) for 5 minutes.	.....	.....
	.....do	.....	.....
	Same as Type A	.....	.....
	None	.....	.....
	Same as Type A	.....	.....

inlet coverings for any adjustment of the valve. If a demand or pressure-demand valve replaces the air-regulating valve, it shall be connected to the air-supply at the maximum air pressure for which approval is sought by means of the minimum length of air-supply hose for which approval is sought. The outlet of the demand or pressure-demand valve shall be connected to a source of intermittent suction so that the demand or pressure-demand valve is actuated approximately 20 times per minute for a total of 100,000 inhalations. To expedite this test, the rate of actuation may be increased if mutually agreeable to the applicant and NIOSH. During this test the valve shall function without failure and without excessive wear of the moving parts. The demand or pressure-demand valve shall not be damaged in any way when subjected at the outlet to a pressure or suction of 25 cm. (10 inches) of water gage for 2 minutes.

None.

A 7.6 m. (25 foot) section of the hose will be placed on a horizontal-plane surface and shaped into a one-loop coil with one end of the hose connected to an airflow meter and the other end of the hose supplied with air at the minimum specified supply pressure. The connection shall be in the plane of the loop. The other end of the hose will be pulled tangentially to the loop and in the plane of the loop until the hose straightens. To meet the requirements of this test the loop shall maintain a uniform near-circular shape and ultimately unfold as a spiral, without any localized deformation that decreases the flow of air to less than 90 percent of the flow when the hose is tested while remaining in a straight line.

Hose and couplings shall not exhibit any separation or failure when tested with a pull of 45 kg. (100 pounds) for 5 minutes and when tested by subjecting them to an internal air pressure of 2 times the maximum respirator supply pressure that is specified by the applicant or at 173 kN/m. 2 (25 pounds per square

~~inch) gage, whichever is higher.~~

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TABLE 8AIR SUPPLY LINE REQUIREMENTS AND TESTSContinued
[42 CFR part 84, subpart J]

Specific requirements	Requirements for the air-supply lines of the indicated type of supplied-air respirators
Type A Type B Type C	
Tightness	Permeation of hose by gasoline.
Detachable coupling	No air leakage shall occur when the hose and couplings are joined and the joint(s) are immersed in water and subjected to an internal air pressure of 35 kN/m. 2 (5 pounds per square inch) gage.
The permeation of the hose by gasoline will be tested by immersing 7.6 m. (25 feet) of hose and one coupling in gasoline, with air flowing through the hose at the rate of 8 liters per minute for 6 hours. The air from the hose shall not contain more than 0.01 percent by volume of gasoline vapor at the end of the test.	
None	
None	
Same as for Type A	
None	
Leakage of air exceeding 50 cc. per minute at each coupling shall not be permitted when the	

hose and couplings are joined and are immersed in water, with air flowing through the respirator under a pressure of 173 kN/m. 2 (25 pounds per square inch) gage applied to the inlet end of the air-supply hose, or at twice the maximum respirator-supply pressure that is specified by the applicant, whichever is higher.
Same as for Type A, except the test period shall be 1 hour.
A hand-operated detachable coupling by which the wearer can readily attach or detach the connecting hose shall be provided at a convenient location. This coupling shall be durable, remain connected under all conditions of normal respirator use, and meet the prescribed tests for strength and tightness of hose and couplings.

Subpart KNon-Powered Air-Purifying Particulate Respirators

84.170 Non-powered air-purifying particulate respirators; description.

(a) Non-powered air-purifying particulate respirators utilize the wearers negative inhalation pressure to draw the ambient air through the air-purifying filter elements (filters) to remove particulates from the ambient air.
They are designed for use as respiratory protection against atmospheres with particulate contaminants (e.g., dusts, fumes, mists) that are not immediately dangerous to life or health and that contain adequate oxygen to support life.
(b) Non-powered air-purifying particulate respirators are classified into three series, N-, R-, and P-series. The N-series filters are restricted to use in those workplaces free of oil aerosols. The R- and P-series filters are intended for removal of any particulate that includes

~~oil-based liquid particulates.~~

~~(c) Non-powered air-purifying particulate respirators are classified according to the efficiency level of the filter(s) as tested according to the requirements of this part.~~
~~(1) N100, R100, and P100 filters shall demonstrate a minimum efficiency level of 99.97 percent.~~
~~(2) N99, R99, and P99 filters shall demonstrate a minimum efficiency level of 99 percent.~~
~~(3) N95, R95, and P95 filters shall demonstrate a minimum efficiency level of 95 percent.~~
~~84.171 Non-powered air-purifying particulate respirators; required components.~~

~~(a) Each non-powered air-purifying particulate respirator described in 84.170 shall, where its design requires, contain the following component parts:~~
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(1) Facepiece, mouthpiece with nose clip, hood, or helmet;
(2) Filter unit;
(3) Harness;
(4) Attached blower; and
(5) Breathing tube.
(b) The components of each non-powered air-purifying particulate respirator shall meet the minimum construction requirements set forth in subpart G of this part.
84.172 Breathing tubes; minimum requirements.

Flexible breathing tubes used in conjunction with respirators shall be designed and constructed to prevent:

(a) Restriction of free head movement;
(b) Disturbance of the fit of facepieces, mouthpieces, hoods, or helmets;
(c) Interference with the wearers activities; and
(d) Shutoff of airflow due to kinking, or from chin or arm pressure.
84.173 Harnesses; installation and construction; minimum requirements.

(a) Each respirator shall, where necessary, be equipped with a suitable harness designed and constructed to hold the components of the respirator in position against the wearers body.
(b) Harnesses shall be designed and constructed to permit easy removal and replacement of respirator parts, and, where applicable, provide for holding a full facepiece in the ready position when not in use.
84.174 Respirator containers; minimum requirements.

(a) Except as provided in paragraph (b) of this section each respirator shall be equipped with a substantial, durable container bearing markings which show the applicants name, the type of respirator it contains, and all appropriate approval labels.
(b) Containers for single-use respirators may provide for storage of more than one respirator, however, such containers shall be designed and constructed to prevent contamination of respirators which are not removed, and to prevent damage to respirators during transit.

84.175 Half-mask facepieces, full facepieces, hoods, helmets, and mouthpieces; fit; minimum requirements.

(a) Half-mask facepieces and full facepieces shall be designed and constructed to fit persons with various facial shapes and sizes either:
(1) By providing more than one face-piece size; or
(2) By providing one facepiece size which will fit varying facial shapes and sizes.
(b) Full facepieces shall provide for optional use of corrective spectacles or lenses, which shall not reduce the respiratory protective qualities of the respirator.
(c) Hoods and helmets shall be designed and constructed to fit persons with various head sizes, provide for the optional use of corrective spectacles or lenses, and insure against any restriction of movement by the wearer.
(d) Mouthpieces shall be equipped with noseclips which are securely attached to the mouthpiece or respirator and provide an airtight seal.
(e) Facepieces, hoods, and helmets

shall be designed to prevent eyepiece fogging.

(f) Half-mask facepieces shall not interfere with the fit of common industrial safety corrective spectacles.

84.176 Facepieces, hoods, and helmets; eyepieces; minimum requirements.

Facepieces, hoods, and helmets shall be designed and constructed to provide adequate vision which is not distorted by the eyepieces.

84.177 Inhalation and exhalation valves; minimum requirements.

(a) Inhalation and exhalation valves shall be protected against distortion.

(b) Inhalation valves shall be designed and constructed and provided where necessary to prevent excessive exhaled air from adversely affecting filters, except where filters are specifically designed to resist moisture.

(c) Exhalation valves shall be:

(1) Provided where necessary;

(2) Protected against damage and external influence; and

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(3) Designed and constructed to prevent inward leakage of contaminated air.

84.178 Head harnesses; minimum requirements.

(a) All facepieces shall be equipped with head harnesses designed and constructed to provide adequate tension during use and an even distribution of pressure over the entire area in contact with the face.

(b) Facepiece head harnesses, except those employed on single-use respirators, shall be adjustable and replaceable.

(c) Mouthpieces shall be equipped, where applicable, with adjustable and replaceable harnesses, designed and constructed to hold the mouthpiece in place.

84.179 Non-powered air-purifying particulate respirators; filter identification.

(a) The respirator manufacturer, as part of the application for certification, shall specify the filter series and the filter efficiency level (i.e., N95, R95, P95, N99, R99, P99, N100, R100, or P100) for which certification is being sought.

(b) Filters shall be prominently labeled as follows:

(1) N100 filters shall be labeled N100 Particulate Filter (99.97% filter efficiency level) and shall be a color other than magenta.

(2) R100 filters shall be labeled R100 Particulate Filter (99.97% filter efficiency level) and shall be a color other than magenta.

(3) P100 filters shall be labeled P100 Particulate Filter (99.97% filter efficiency

level) and shall be color coded magenta.

(4) N99 filters shall be labeled N99 Particulate Filter (99% filter efficiency level) and shall be a color other than magenta.

(5) R99 filters shall be labeled R99 Particulate Filter (99% filter efficiency level) and shall be a color other than magenta.

(6) P99 filters shall be labeled P99 Particulate Filter (99% filter efficiency level) and shall be a color other than magenta.

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(7) N95 filters shall be labeled as N95 Particulate Filter (95% filter efficiency level) and shall be a color other than magenta.

(8) R95 filters shall be labeled as R95 Particulate Filter (95% filter efficiency level) and shall be a color other than magenta.

(9) P95 filters shall be labeled as P95 Particulate Filter (95% filter efficiency level) and shall be a color other than magenta.

84.180 Airflow resistance tests.

(a) Resistance to airflow will be measured in the facepiece, mouthpiece, hood, or helmet of a particulate respirator (complete respirator) mounted on a test fixture with air flowing at continuous rate of 85 2 liters per minute, before each test conducted in accordance with 84.182.

(b) The resistances for particulate respirators upon initial inhalation shall not exceed 35 mm water column height pressure and upon initial exhalation shall not exceed 25 mm water column height pressure.

84.181 Non-powered air-purifyingparticulate filter efficiency level determination.

(a) Twenty filters of each non-powered air-purifying particulate respirator model shall be tested for filter efficiency against:
(1) A solid sodium chloride particulate aerosol as per this section, if N-series certification is requested by the applicant.
(2) A dioctyl phthalate or equivalent liquid particulate aerosol as per this section, if R-series or P-series certification is requested by the applicant.
(b) Filters including holders and gaskets; when separable, shall be tested for filter efficiency level, as mounted on a test fixture in the manner as used on the respirator.
(c) Prior to filter efficiency testing of 20 N-series filters, the 20 to be tested shall be taken out of their packaging and placed in an environment of 85 5 percent relative humidity at 38 2.5 C for 25 1 hours. Following the pre-conditioning, filters shall be sealed in a gas-tight container and tested within 10 hours.
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~~(d) When the filters do not have separable holders and gaskets, the exhalation valves shall be blocked so as to ensure that leakage, if present, is not included in the filter efficiency level evaluation.~~
~~(e) For non-powered air-purifying particulate respirators with a single filter, filters shall be tested at a continuous airflow rate of 85 4 liters per minute. Where filters are to be used in pairs, the test-aerosol airflow rate shall be 42.5 2 liters per minute through each filter.~~
~~(f) Filter efficiency test aerosols. (1) When testing N-series filters, a sodium chloride or equivalent solid aerosol at 25 5 C and relative humidity of 30 10 percent that has been neutralized to the Boltzmann equilibrium state shall be used. Each filter shall be challenged with a concentration not exceeding 200 mg/m3.~~
~~(2) When testing R-series and P-series filters, a neat cold-nebulized dioctyl phthalate (DOP) or equivalent aerosol at 25 5 C that has been neutralized to the Boltzmann equilibrium state shall be used. Each filter shall be challenged with a concentration not exceeding 200 mg/m3.~~
~~(3) The test shall continue until minimum efficiency is achieved or until an aerosol mass of at least 200 5 mg has contacted the filter. For P-series filters, if the filter efficiency is decreasing when the 200 5 mg challenge point is reached, the test shall be continued until there is no further decrease in efficiency.~~
~~(g) The sodium chloride test aerosol shall have a particle size distribution with count median diameter of 0.075 0.020 micrometer and a standard geometric~~

deviation not exceeding 1.86 at
the specified test conditions as determined
with a scanning mobility particle
sizer or equivalent. The DOP aerosol
shall have a particle size distribution
with count median diameter of
0.185 0.020 micrometer and a standard
geometric deviation not exceeding 1.60
at the specified test conditions as determined
with a scanning mobility particle
sizer or equivalent.
(h) The efficiency of the filter shall
be monitored and recorded throughout
the test period by a suitable forward-

light-scattering photometer or equivalent
instrumentation.

(i) The minimum efficiency for each
of the 20 filters shall be determined and
recorded and be equal to or greater
than the filter efficiency criterion listed
for each level as follows:
P100, R100 and N100: Efficiency =99.97%
P99, R99 and N99: Efficiency =99%
P95, R95 and N95: Efficiency =95%

84.182 Exhalation valve leakage test;
minimum requirements.

(a) Dry exhalation valves and valve
seats will be subjected to a suction of
25 mm. water-column height while in a
normal operating position.
(b) Leakage between the valve and
valve seat shall not exceed 30 milliliters
per minute.
Subpart LChemical CartridgeRespirators

84.190 Chemical cartridge respirators:
description.

(a) Chemical cartridge respirators including
all completely assembled respirators

which are designed for use as respiratory protection during entry into or escape from atmospheres not immediately dangerous to life and health, are described according to the specific gases or vapors against which they are designed to provide respiratory protection, as follows:

Type of chemical cartridge respirator 1	Maximum use concentration, parts per million
Ammonia	300
Chlorine	10
Hydrogen chloride	50
Methyl amine	100
Organic vapor	2 1,000
Sulfur dioxide	50
Vinyl chloride	10

1 Not for use against gases or vapors with poor warning properties (except where MSHA or Occupational Safety and Health Administration standards may permit such use for a specific gas or vapor) or those which generate high heats of reaction with sorbent material in the cartridge.

2 Maximum use concentrations are lower for organic vapors

~~which produce atmospheres immediately hazardous to life or health at concentrations equal to or lower than this concentration.~~

~~(b) Chemical cartridge respirators for respiratory protection against gases or vapors, which are not specifically listed with their maximum use concentration, may be approved if the applicant~~
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submits a request for such approval, in writing, to the Institute. The Institute shall consider each such application and accept or reject the application after a review of the effects on the wearers health and safety and in the light of any field experience in use of chemical cartridge respirators as protection against such hazards.

84.191 Chemical cartridge respirators; required components.

(a) Each chemical cartridge respirator described in 84.190 shall, where its design requires, contain the following component parts:
(1) Facepiece, mouthpiece, and nose-clip, hood, or helmet;
(2) Cartridge;
(3) Cartridge with filter;
(4) Harness;
(5) Breathing tube; and
(6) Attached blower.
(b) The components of each chemical cartridge respirator shall meet the minimum construction requirements set forth in subpart G of this part.
84.192 Cartridges in parallel; resistance requirements.

Where two or more cartridges are used in parallel, their resistance to airflow shall be essentially equal.

84.193 Cartridges; color and markings; requirements.

The color and markings of all cartridges or labels shall conform with the requirements of the American National Standards Institute, American National Standard for Identification of

Air-Purifying Respirator Canisters and Cartridges, ANSI K13.11973. ANSI K13.1 is incorporated by reference and has been approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018. Copies may be inspected at the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 2027416030, or go to: http://www.archives.gov/federallregister/

84.197

codeloflfederallregulations/ ibrllocations.html.

84.194 Filters used with chemical cartridges; location; replacement.

(a) Particulate matter filters used in conjunction with a chemical cartridge shall be located on the inlet side of the cartridge.
(b) Filters shall be incorporated in or firmly attached to the cartridge and each filter assembly shall, where applicable, be designed to permit its easy removal from and replacement on the cartridge.
84.195 Breathing tubes; minimum requirements.

Flexible breathing tubes used in conjunction with respirators shall be designed and constructed to prevent:

(a) Restriction of free head movement;
(b) Disturbance of the fit of

facepieces, mouthpieces, hoods, or helmets;
(c) Interference with the wearers activities; and
(d) Shutoff of airflow due to kinking, or from chin or arm pressure.

84.196 Harnesses; installation and construction; minimum requirements.

(a) Each respirator shall, where necessary, be equipped with a suitable harness designed and constructed to hold the components of the respirator in position against the wearers body.
(b) Harnesses shall be designed and constructed to permit easy removal and replacement of respirator parts and, where applicable, provide for holding a full facepiece in the ready position when not in use.

84.197 Respirator containers; minimum requirements.

Respirators shall be equipped with a substantial, durable container bearing markings which show the applicants name, the type and commercial designation of the respirator it contains and all appropriate approval labels.

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84.198 Half-mask facepieces, full facepieces, mouthpieces, hoods, and helmets; fit; minimum requirements.

(a) Half-mask facepieces and full facepieces shall be designed and constructed to fit persons with various facial shapes and sizes either:
(1) By providing more than one face-piece size; or
(2) By providing one facepiece size which will fit varying facial shapes and sizes.
(b) Hoods and helmets shall be designed and constructed to fit persons with various head sizes, provide for the optional use of corrective spectacles or lenses, and insure against any restriction of movement by the wearer.
(c) Mouthpieces shall be equipped with noseclips which are securely attached to the mouthpiece or respirator and provide an airtight fit.
(d) Full facepieces shall provide for optional use of corrective spectacles or lenses which shall not reduce the respiratory protective qualities of the respirator.
(e) Facepieces, hoods, and helmets shall be designed to prevent eyepiece fogging.
84.199 Facepieces, hoods, and helmets; eyepieces; minimum requirements.

Facepieces, hoods, and helmets shall be designed and constructed to provide adequate vision which is not distorted by the eyepieces.

84.200 Inhalation and exhalation valves; minimum requirements.

(a) Inhalation and exhalation valves shall be provided where necessary and protected against distortion.
(b) Inhalation valves shall be designed and constructed to prevent excessive exhaled air from entering cartridges or adversely affecting canisters.
(c) Exhalation valves shall be

(1) Protected against damage and external influence; and
(2) Designed and constructed to prevent inward leakage of contaminated air.

84.201 Head harnesses; minimum requirements.

(a)(1) Facepieces for chemical cartridge respirators other than single-use vinyl chloride shall be equipped with adjustable and replaceable head harnesses designed and constructed to provide adequate tension during use and an even distribution of pressure over the entire area in contact with the face.

(2) Facepieces for single-use vinyl chloride respirators shall be equipped with adjustable head harnesses designed and constructed to provide adequate tension during use and an even distribution of pressure over the entire area in contact with the face.
(b) Mouthpieces shall be equipped where applicable, with an adjustable and replaceable harness designed and constructed to hold the mouthpiece in place.

84.202 Air velocity and noise levels; hoods and helmets; minimum requirements.

Noise levels generated by the respirator will be measured inside the hood or helmet at maximum airflow obtainable and shall not exceed 80 dBA.

84.203 Breathing resistance test; minimum requirements.

(a) Resistance to airflow will be measured in the facepiece, mouthpiece, hood, or helmet of a chemical cartridge respirator mounted on a test fixture with air flowing at a continuous rate of 85 liters per minute, both before and after each test conducted in accordance with 84.206 through 84.207.
(b) The maximum allowable resistance requirements for chemical cartridge respirators are as follows:
MAXIMUM RESISTANCE

[Millimeter water column height]

Type of chemical-cartridge respirator
Inhalation
Exhalation
Initial Final 1
Other than single-use vinyl chloride respirators:
For gases, vapors, or gases and vapors .....
40 45 20

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MAXIMUM RESISTANCEContinued
[Millimeter water column height]

Type of chemical-cartridge respirator	Inhalation	Exhalation
	Initial	Final 1
For gases, vapors, or gases and vapors, and particulates	50	30
Single-use respirator with valves:		
For vinyl chloride	20	15
For vinyl chloride and particulates	30	25
Single-use respirator without valves:		
For vinyl chloride	70	45
For vinyl chloride and particulates	25	20
	40	20
	20	20
	2	(2)
	(2)	

1 Measured at end of service life specified in Table 11 of this subpart.
2 Same as inhalation.

84.204 Exhalation valve leakage test; minimum requirements.

(a) Dry exhalation valves and valve seats will be subjected to a suction of 25 mm. water-column height while in a normal operating position.
(b) Leakage between the valve and valve seat shall not exceed 30 milliliters per minute.

84.205 Facepiece test; minimum requirements.

(a) The complete chemical cartridge respirator will be fitted to the faces of persons having varying facial shapes and sizes.
(b) Where the applicant specifies a facepiece size or sizes for the respirator together with the approximate measurement of faces they are designed to fit, the Institute will provide test subjects to suit such facial measurements.
(c) Any chemical cartridge respirator part which must be removed to perform the facepiece or mouthpiece fit test shall be replaceable without special tools and without disturbing facepiece or mouthpiece fit.
(d) The facepiece or mouthpiece fit test using the positive or negative pressure recommended by the applicant and described in his instructions will be used before each test.
(e)(1) Each wearer will enter a chamber containing 100 p.p.m. isoamyl acetate vapor for half-mask facepieces, and 1,000 p.p.m. for full facepieces, mouthpieces, hoods, and helmets.

(2) The facepiece or mouthpiece may be adjusted, if necessary, in the test chamber before starting the test.
(3) Each wearer will remain in the chamber for 8 minutes while performing the following activities:
(i) Two minutes, nodding and turning head;
(ii) Two minutes, calisthenic arm movements;
(iii) Two minutes, running in place; and
(iv) Two minutes, pumping with a tire pump into a 28-liter (1-cubic-foot) container.
(4) Each wearer shall not detect the

odor of isoamyl acetate vapor during the test.

84.206 Particulate tests; respirators with filters; minimum requirements; general.

(a) Three respirators with cartridges containing, or having attached to them, filters for protection against particulates will be tested in accordance with the provisions of 84.207.

(b) In addition to the test requirements set forth in paragraph (a) of this section, three such respirators will be tested, as appropriate, in accordance with the provisions of 84.179 through 84.183; however, the maximum allowable resistance of complete particulate, and gas, vapor, or gas and vapor chemical cartridge respirators shall not exceed the maximum allowable limits set forth in 84.203.

84.207 Bench tests; gas and vapor tests; minimum requirements; general.

(a) Bench tests will be made on an apparatus that allows the test atmosphere at 50 5 percent relative humidity and room temperature, approximately 25 C, to enter the cartridges continuously at predetermined concentrations and rates of flow, and that

has means for determining the test life of the cartridges.

(b) Where two cartridges are used in parallel on a chemical cartridge respirator, the bench test will be performed with the cartridges arranged in parallel, and the test requirements will apply to the combination rather than to the individual cartridges.
(c) Three cartridges or pairs of cartridges will be removed from containers and tested as received from the applicant.
(d) Two air purifying cartridges or pairs of cartridges will be equilibrated at room temperature by passing 25 per

cent relative humidity air through them at the flow rate of 25 liters per minute (l.p.m.) for 6 hours.

(e) Two air purifying cartridges or pairs of cartridges will be equilibrated by passing 85 percent relative humidity air through them at the flow rate of 25 l.p.m.
(f) All cartridges will be resealed, kept in an upright position, at room temperatures, and tested within 18 hours.
(g) Cartridges will be tested and shall meet the minimum requirements set forth in Table 11 of this subpart.
TABLES TO SUBPART L OF PART 84

TABLES 910 [RESERVED]
TABLE 11CARTRIDGE BENCH TESTS AND REQUIREMENTS
[42 CFR part 84, subpart L]

Cartridge Test condition

Test atmosphere
Flowrate
(l.p.m.)
Number of
tests
Penetration
1
(p.p.m.)
Minimum
life 2 (min.)Gas or vapor Concentration
(p.p.m.)
Ammonia ..... As received NH3 1000 64 3 50 50
Ammonia ..... Equilibrated NH3 1000 32 4 50 50
Chlorine ..... As received Cl2 500 64 3 5 35
Chlorine ..... Equilibrated Cl2 500 32 4 5 35
Hydrogen chlo-As received ..... HCl 500 64 3 5 50
ride.
Hydrogen chlo-Equilibrated ..... HCl 500 32 4 5 50
ride.
Methylamine ..... As received CH3 NH2 1000 64 3 10 25
Methylamine ..... Equilibrated CH3 NH2 1000 32 4 10 25
Organic vapors .. As received CCl4 1000 64 3 5 50
Organic vapors .. Equilibrated CCl4 1000 32 4 5 50
Sulfur dioxide ..... As received SO2 500 64 3 5 30
Sulfur dioxide ..... Equilibrated SO2 500 32 4 5 30

1 Minimum life will be determined at the indicated penetration.

2 Where a respirator is designed for respiratory protection against more than one type of gas or vapor, as for use in ammonia
and in chlorine, the minimum life shall be one-half that shown for each type of gas or vapor. Where a respirator is designed for
respiratory protection against more than one gas of a type, as for use in chlorine and sulfur dioxide, the stated minimal life shall

apply.

Subpart M [Reserved]

Subpart NSpecial Use
Respirators

84.250 Vinyl chloride respirators; description.

~~Vinyl chloride respirators, including all completely assembled respirators which are designed for use as respiratory protection during entry into and escape from vinyl chloride atmospheres containing adequate oxygen to support life, are described ac~~

~~cording to their construction as follows:~~

~~(a) Front-mounted or back-mounted gas masks;~~
~~(b) Chin-style gas masks;~~
~~(c) Chemical-cartridge respirators;~~
~~(d) Powered air-purifying respirators; and~~
~~(e) Other devices, including combination respirators.~~
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84.251 Required components.

(a) Each vinyl chloride respirator described in 84.250 shall, where its design requires, contain the following component parts:
(1) Facepiece;
(2) Canister with end-of-service-life indicator;
(3) Cartridge with end-of-service-life indicator;
(4) Harness;
(5) Attached blower; and
(6) Breathing tube.
(b) The components of each vinyl chloride respirator shall meet the minimum construction requirements set forth in Subpart G of this part.
84.252 Gas masks; requirements and tests.

(a) Except for the tests prescribed in 84.126, the minimum requirements and performance tests for gas masks, prescribed in Subpart I of this part, are applicable to vinyl chloride gas masks.
(b) The following bench tests are applicable to canisters designed for use with gas masks for entry into and escape from vinyl chloride atmospheres containing adequate oxygen to support life:
(1) Four canisters will be equilibrated at 25 5 C by passing 85 5 percent relative humidity air through them at 64 liters per minute for six hours.
(2) The equilibrated canisters will be resealed, kept in an upright position at room temperature, and tested according to paragraph (b)(3) of this section within 18 hours.
(3) The canisters equilibrated and stored as described in paragraphs (b) (1)

and (2) of this section will be tested on an apparatus that allows the test atmosphere at 85 5 percent relative humidity and 25 5 C to enter the canister continuously at a concentration of 25 ppm vinyl chloride monomer at a total flow rate of 64 liters per minute.
(4) The maximum allowable penetration after six hours of testing according to paragraph (b)(3) of this section shall not exceed 1 ppm vinyl chloride.
(c) Where canisters are submitted for testing and approval with a service life of more than four hours, the period of time for testing for vinyl chloride penetration will be performed at 150% of the service life specified in the manu 84.253

facturers application. (Example: If a manufacturer requests approval of a respirator for six hours use against exposure to vinyl chloride, the maximum allowable penetration after nine hours of testing shall not exceed 1 ppm vinyl chloride.)

84.253 Chemical-cartridge respirators; requirements and tests.

(a) Except for the tests prescribed in 84.206 and 84.207, the minimum requirements and performance tests for chemical-cartridge respirators prescribed in Subpart L of this part are applicable to replaceable-cartridge and single-use vinyl chloride chemical-cartridge respirators.
(b) The following bench tests are applicable to cartridges designed for use with chemical-cartridge respirators for entry into and escape from vinyl chloride atmospheres containing adequate oxygen to support life:
(1) Where two cartridges are used in parallel on a chemical-cartridge respirator,

the bench test requirements
will apply to the combination rather
than the individual cartridges.
(2) Four cartridges or pairs of cartridges
will be equilibrated at 25 5 C
by passing 85 5 percent relative humidity
air through them at 25 liters
per minute for six hours.
(3) The equilibrated cartridges will be
resealed, kept in an upright position,
at room temperature, and tested according
to paragraphs (b)(4) and (b)(5)
of this section for other than single-use
respirators or according to paragraphs
(b)(6) and (b)(7) of this section for sin-
gle-use respirators within 18 hours.
(4) The cartridges or pairs of cartridges
for other than single-use respirators,
equilibrated and stored as described
in paragraphs (b)(1), (b)(2), and
(b)(3) of this section, will be tested on
an apparatus that allows the test atmosphere
at 85 5 percent relative humidity
and 25 5 C, to enter the cartridges
or pairs of cartridges continuously
at a concentration of 10 ppm
vinyl chloride monomer at a total
flowrate of 64 liters per minute.
(5) The maximum allowable penetration
after 90 minutes testing of cartridges
or pairs of cartridges for other
than single-use respirators, according
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to paragraph (b)(4) of this section shall not exceed 1 ppm vinyl chloride.

(6) The single-use respirators, equilibrated and stored as described in paragraphs (b)(2) and (b)(3) of this section, will be tested on an apparatus that allows a test atmosphere at 85 5 percent relative humidity and 25 5 C to be cycled through the respirator by a breathing machine at a concentration of 10 ppm vinyl chloride monomer at the rate of 24 respirations per minute at a minute volume of 40 0.6 liters. Air exhaled through the respirator will be 35 2 C with 94 3 percent relative humidity.
(7) The maximum allowable penetration after 144 minutes testing of respirators, according to paragraph (b)(6) of this section, shall not exceed 1 ppm vinyl chloride.
84.254 Powered air-purifying respirators; requirements and tests.

(a) Except for the tests prescribed in 84.207, the minimum requirements and performance tests for powered air-purifying respirators prescribed in subpart L of this part are applicable to vinyl chloride-powered air-purifying respirators.
(b) The following bench tests are applicable to cartridges designed for use with powered air-purifying respirators for entry into and escape from vinyl chloride atmospheres containing adequate oxygen to support life:
(1) Four cartridges will be equilibrated at 25 C by passing 85 5 percent relative humidity air through them at 115 liters per minute for tight-fitting facepieces and 170 liters per minute for loose-fitting hoods and helmets, for six hours.

(2) The equilibrated cartridges will be resealed, kept in an upright position at room temperature and tested according to paragraph (b)(3) of this section within 18 hours.
(3) The cartridges equilibrated and stored as described in paragraphs (b) (1) and (2) of this section will be tested on an apparatus that allows the test atmosphere at 85 5 percent relative humidity and 25 5 C to enter the cartridge continuously at a concentration of 25 ppm vinyl chloride monomer at a total flow rate of 115 liters per minute for tight-fitting facepieces and 170 li

ters per minute for loose-fitting hoods and helmets.

(4) The maximum allowable penetration after six hours of testing according to paragraph (b)(3) of this section shall not exceed 1 ppm vinyl chloride.
84.255 Requirements for end-of-service-life indicator.

(a) Each canister or cartridge submitted for testing and approval in accordance with 84.252, 84.253, and 84.254 shall be equipped with a canister or cartridge end-of-service-life indicator which shows a satisfactory indicator change or other obvious warning before 1 ppm vinyl chloride penetration occurs. The indicator shall show such change or afford such warning at 80 10 percent of the total service life to 1 ppm leakage, as determined by continuing each test described in 84.252(b), 84.253(b), and 84.254(b) until a 1 ppm leakage of vinyl chloride occurs.
(b) The applicant shall provide sufficient pretest data to verify the performance of the end-of-service-life indicator required in paragraph (a) of this

section.

84.256 Quality control requirements.

(a) In addition to the construction and performance requirements specified in 84.251, 84.252, 84.253, 84.254, and 84.255, the quality control requirements in paragraphs (b), (c), and (d) of this section apply to approval of gas masks, chemical cartridge respirators, and powered air-purifying respirators for entry into and escape from vinyl chloride atmospheres containing adequate oxygen to support life.

(b) The respirators submitted for approval as described in paragraph (a) of this section shall be accompanied by a complete quality control plan meeting the requirements of subpart E of this part.

(c)(1) The applicant shall specify in the plan that a sufficient number of samples will be drawn from each bulk container of sorbent material and that where activated carbon is used, the following specific tests will be performed:

(i) Apparent density;

(ii) Iodine number;

(iii) Moisture content;

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(iv) Carbon tetrachloride number; and
(v) Mesh size.
(2) The tests in paragraph (c)(1) of this section shall be performed in a quantity necessary to assure continued satisfactory conformance of the canisters and cartridges to the requirements of this subpart.
(d) Final performance quality control tests on the complete canisters and cartridges shall be accomplished using the bench tests and procedures prescribed in 84.252, 84.253, 84.254, and 84.255.

84.257 Labeling requirements.

(a) A warning shall be placed on the label of each gas mask, chemical-cartridge respirator, and powered air-purifying respirator, and on the label of each canister and cartridge, alerting the wearer to the need for a fitting test in accordance with the manufacturers facepiece fitting instructions, providing service life information, providing specific instructions for disposal, and advising that the wearer may communicate to NIOSH any difficulties that may be experienced in the design and performance of any gas mask, chemical-cartridge respirator, or powered air-purifying respirator approved under the requirements of this subpart. The service lives of respirators meeting the test requirements of this subpart shall be specified as follows:
Chemical-cartridge respirator .....1 hour.
Gas mask.....4 hours.
Powered air-purifying respirator .....4 hours.

(b) Where the service life of a respirator is approved for more than four hours, the service life for which the respirator has been approved will be specified.

84.258 Fees.

The following fees shall be charged for the examination, inspection, and testing of complete assemblies and components of respirators described in 84.250 and 84.251:

Complete gas mask $1,100
Complete chemical-cartridge res

pirator..... 1,150
Complete powered air-purifying res

pirator..... 1,500
Canister or cartridge only 750

84.1100

Subparts OJJ [Reserved]

Subpart KKDust, Fume, and Mist; Pesticide; Paint Spray; Powered Air-Purifying High Efficiency Respirators and Combination Gas Masks

84.1100 Scope and effective dates.

The purpose of this subpart KK is to establish procedures and requirements for issuing extensions of approval of particulate respirators certified prior to July 10, 1995 under the provisions of 30 CFR part 11 (See 30 CFR part 11 edition, as revised July 1, 1994.), new approvals and extensions of approval of particulate respirators for applications

~~that are in NIOSH receipt on July 10, 1995, and approval of powered air-purifying respirators.~~

~~(a) Air-purifying respirators with particulate filters approved under the provisions of this subpart after July 10, 1995 will have a 30 CFR part 11 approval label.~~

~~(b) Only changes or modifications of non-powered air-purifying respirators with particulate filters approved under the provisions of subparts I, K, L, or M of 30 CFR part 11 or paragraph (a) of this section and deemed necessary by NIOSH to ensure the health and safety of the wearer will be approved until July 10, 1998 and will have a 30 CFR part 11 approval label.~~

~~(c) Only changes or modifications of powered air-purifying respirators with particulate filters approved under the provisions of subparts I, K, L, or M of 30 CFR part 11 or paragraph (a) of this section and deemed necessary by NIOSH to ensure the health and safety of the wearer will be approved under this subpart until July 10, 1998 and will have a 30 CFR part 11 label.~~

~~(d) Approval of powered air-purifying respirators will be issued under this subpart. Particulate filters for powered air-purifying respirators approved under the provisions of this subpart shall be only high-efficiency (HEPA) as described in 84.1130(a)(4) and will carry a 42 CFR part 84 approval label. In addition, changes or modifications of powered HEPA air-purifying respirators approved under the provisions of this subpart KK will be approved~~

84.1101

under this subpart and will have a 42 CFR part 84 approval label.

84.1101 Definitions.

As used in this subpart

(a) Air Contamination Level means the standards of contaminant levels prescribed by the Secretary of Labor in accordance with the provisions of the Occupational Safety and Health Act of 1970 (Pub. L. 91596; 84 Stat. 1590).
(b) DOP means a homogenous liquid aerosol, having a particle diameter of 0.3 micrometer, which is generated by vaporization and condensation of dioctyl phthalate.
(c) Pesticide means:
(1) Any substance or mixture of substances (including solvents and impurities) intended to prevent, destroy, repel, or mitigate any insect, rodent, nematode, fungus, weed, or other form of plant or animal life or virus; and
(2) Any substance or mixture of substances (including solvents and impurities) intended for use as a plant regulator, defoliant, or desiccant, as defined in the Federal Insecticide, Fungicide, and Rodenticide Act of 1947, as amended (7 U.S.C. 135135k), excluding fumigants which are applied as gases or vapors or in a solid or liquid form as pellets or poured liquids for subsequent release as gases or vapors.
(d) Radionuclide means an atom identified by the constitution of its nucleus (specified by the number of protons Z, number of neutrons N, and energy, or, alternatively, by the atomic number Z, mass number A=(N+Z), and atomic mass) which exists for a measurable

time; decays or disintegrates spontaneously, emits radiation, and results in the formation of new nuclides.
(e) Smoke means the products of incomplete combustion of organic substances in the form of solid and liquid particles and gaseous products in air, usually of sufficient concentration to perceptibility obscure vision.
84.1102 Examination, inspection and testing of complete respirator assemblies; fees.

The following fees shall be charged by the Institute for the examination, inspection and testing of complete respirator assemblies approved under this subpart:

(a) Gas masks with particulate filter, including pesticide gas masks
(1) Single hazard$1,100.
(2) Type N$4,100.
(b) Dust, fume and mist respirators
(1) Single particulate hazard having an Air Contamination Level more than 0.05 mg./m.3 or 2 million particles per cubic foot$500.
(2) Combination particulate hazards having an Air Contamination Level more than 0.05 mg./m.3 or 2 million particles per cubic foot$750.
(3) Particulate hazards having an Air Contamination Level less than 0.05 mg./m.3 or 2 million particles per cubic foot, radon daughters$1,250.
(4) All dusts, fumes and mists$2,000.
(c) Paint spray respirators$1,600.
(d) Pesticide respirators$1,600.
(e) Chemical cartridge respirators with particulate filter$1,150.
84.1103 Approval labels and markings; approval of contents; use.

(a) Full-scale reproductions of approval labels and markings, and a sketch or description of the method of application and position on the harness, container, canister, cartridge, filter, or other component, together with instructions for the use and maintenance of the respirator shall be submitted to MSHA and the Institute for approval.

(b) Approval labels for non-powered and powered air-purifying dust, fume, mist respirators approved prior to July 10, 1995 under the provisions of subpart K of 30 CFR part 11 (See 30 CFR Part 11 edition, revised as of July 1, 1994.) shall bear the emblem of the Mine Safety and Health Administration and the seal of the Department of Health and Human Services, the applicants name and address, an approval number assigned by the Institute, a statement that the respirator was tested and approved under subpart K of 30 CFR part 11 and, where appropriate, restrictions or limitations placed upon the use of the respirator by the Institute. The approval number assigned by the Institute shall be designated by the prefix TC and a serial number.

(c) Approval labels for powered air-purifying respirators approved under the provisions of this subpart shall

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bear the emblem of the National Institute
for Occupational Safety and
Health and the seal of the Department
of Health and Human Services, the applicants
name and address, an approval
number assigned by the Institute,
a statement stating the respirator
was tested under the provisions
of this subpart, and, where appropriate,
restrictions or limitations placed upon
the use of the respirator by the Institute.
The approval number assigned by
the Institute shall be designated by the
prefix TC and a serial number.

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(c) The Institute shall, where necessary,
notify the applicant when additional
labels, markings, or instructions
will be required.
(d) Approval labels and markings
shall only be used by the applicant to
whom they were issued.
(e) Legible reproductions or abbreviated
forms of the label approved by
the Institute for use on each respirator
shall be attached to or printed at the
following locations:
Respirator type Label type Location
Gas mask with a particulate filter, including pesticide
gas mask.
Dust, fume, and mist respirators .....
Chemical cartridge respirator with a particulate filter,
including paint spray respirator.
Pesticide respirator .....
Entire .....
Entire .....
Abbreviated .....
Entire .....
Abbreviated .....
Entire .....
Abbreviated .....

~~Mask and container.~~
~~Respirator container and filter container.~~
~~Filters.~~
~~Respirator container, cartridge container, and filter containers (where applicable).~~
~~Cartridges and filters and filter containers.~~
~~Respirator container, and cartridge and filter containers.~~
~~Cartridges and filters.~~

~~(f) The use of any MSHA and Institute approval label obligates the applicant to whom it is issued to maintain or cause to be maintained the approved quality control sampling schedule and the acceptable quality level for each characteristic tested, and to assure that it is manufactured according to the drawings and specifications upon which the certificate of approval is based.~~
~~(g) Each respirator, respirator component, and respirator container shall, as required by the Institute to assure quality control and proper use of the respirator, be labeled distinctly to show the name of the applicant, and the name and letters or numbers by which the respirator or respirator component is designated for trade purposes, and the lot number, serial number, or approximate date of manufacture.~~
~~EDITORIAL NOTE: At 60 FR 30388, June 8, 1995, 84.1103 was added with two paragraph~~

~~(c) designations.~~
~~84.1130 Respirators; description.~~

~~(a) Dust, fume, and mist respirators, including all completely assembled respirators designed for use as respiratory protection during entry into and escape from atmospheres which contain adequate oxygen to support life and hazardous particulates, are described as follows:~~

(1) Air-purifying respirators, either with replaceable or reusable filters, designed as respiratory protection against dusts:
(i) Having an air contamination level not less than 0.05 milligram per cubic meter of air, including but not limited to coal, arsenic, cadmium, chromium, lead, and manganese; or
(ii) Having an air contamination level not less than 2 million particles per cubic foot of air, including but not limited to aluminum, flour, iron ore, and free silica, resulting principally from the disintegration of a solid, e.g., dust clouds produced in mining, quarrying, and tunneling, and in dusts produced during industrial operations, such as grinding, crushing, and the general processing of minerals and other materials.
(2) Air-purifying respirators, with replaceable filters, designed as respiratory protection against fumes of various metals having an air contamination level not less than 0.05 milligram per cubic meter, including but not limited to aluminum, antimony, arsenic, cadmium, chromium, copper,

iron, lead, magnesium, manganese, mercury (except mercury vapor), and zinc, which result from the sublimation or condensation of their respective vapors, or from the chemical reaction between their respective vapors and gases.

(3) Air-purifying respirators, with replaceable filters, designed as respiratory protection against mists of materials having an air contamination level not less than 0.05 milligram per cubic meter or 2 million particles per cubic foot, e.g., mists produced by spray coating with vitreous enamels, chromic acid mist produced during chromium plating, and other mists of materials whose liquid vehicle does not produce harmful gases or vapors.
(4) Air-purifying respirators, with replaceable filters, designed as respiratory protection against dusts, fumes, and mists having an air contamination level less than 0.05 milligram per cubic meter, including but not limited to lithium hydride and beryllium, and against radionuclides.
(5) Air-purifying respirators, with replaceable filters, designed as respiratory protection against radon daughters, and radon daughters attached to dusts, fumes, and mists.
(6) Air-purifying respirators, with replaceable filters, designed as respiratory protection against asbestos containing dusts and mists.
(7) Air-purifying respirators, with replaceable filters, designed as protection against various combinations of particulate matter.
(8) Air-purifying dust respirators designed as respiratory protection

against pneumoconiosis- and fibrosis-producing dusts, or dusts and mists, including but not limited to aluminum, asbestos, coal, flour, iron ore, and free silica.

(b) Gas masks containing filters for protection against dusts, fumes, mists, and smokes in combination with gases, vapors, or gases and vapors. These respirators are not for use against gases or vapors with poor warning properties (except where MSHA or Occupational Safety and Health Administration standards may permit such use for a specific gas or vapor) or those which generate high heats of reaction with sorbent material in the canister.

(c) Pesticide respirators, including all completely assembled respirators which are designed for use as respiratory protection during entry into and escape from atmospheres which contain pesticide hazards, are described according to their construction as follows:

(1) Front-mounted or back-mounted gas masks;

(2) Chin-style gas mask;

(3) Chemical cartridge;

(4) Air-purifying respirator with attached blower; and,

(5) Other devices, including combination respirators.

(d) Respirators with cartridges containing or having attached to them, filters for protection against mists of paints, lacquers, and enamels. These respirators are not for use against gases or vapors with poor warning properties (except where MSHA or Occupational Safety and Health Administration standards may permit such use for a specific gas or vapor) or those which generate high heats of reaction

with sorbent material in the cartridge.
(e) Respirators with cartridges containing or having attached to them filters for protection against dusts, fumes, and mists, except the mists of paints, lacquers, and enamels. These respirators are not for use against gases or vapors with poor warning properties (except where MSHA or Occupational Safety and Health Administration standards may permit such use for a specific gas or vapor) or those which generate high heats of reaction with sorbent material in the cartridge.
84.1131 Respirators; required components.

(a) Each respirator described in 84.1130 shall, where its design requires, contain the following component parts:
(1) Facepiece, mouthpiece with nose clip, hood, or helmet;
(2) Filter unit, canister with filter, or cartridge with filter;
(3) Harness;
(4) Attached blower; and
(5) Breathing tube.
(b) The components of each respirator shall meet the minimum construction requirements set forth in Subpart G of this part.

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84.1132 Breathing tubes; minimum requirements.

(a) Flexible breathing tubes used in conjunction with respirators shall be designed and constructed to prevent:
(1) Restriction of free head movement;
(2) Disturbance of the fit of facepieces, mouthpieces, hoods, or helmets;
(3) Interference with the wearers activities; and
(4) Shutoff of airflow due to kinking, or from chin or arm pressure.

84.1133 Harnesses; installation and construction; minimum requirements.

(a) Each respirator shall, where necessary, be equipped with a suitable harness designed and constructed to hold the components of the respirator in position against the wearers body.
(b) Harnesses shall be designed and constructed to permit easy removal and replacement of respirator parts, and, where applicable, provide for holding a full facepiece in the ready position when not in use.

84.1134 Respirator containers; minimum requirements.

(a) Except as provided in paragraph (b) of this section each respirator shall be equipped with a substantial, durable container bearing markings which show the applicants name, the type of respirator it contains, and all appropriate approval labels. Except for dust, fume, and mist respirators, the commercial designation of the respirator it contains shall be shown.
(b) Containers for single-use respirators may provide for storage of

more than one respirator, however, such containers shall be designed and constructed to prevent contamination of respirators which are not removed, and to prevent damage to respirators during transit.
(c) Containers for gas masks combinations shall be designed and constructed to permit easy removal of the mask.
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84.1135 Half-mask facepieces, full facepieces, hoods, helmets, and mouthpieces; fit; minimum requirements.

(a) Half-mask facepieces and full facepieces shall be designed and constructed to fit persons with various facial shapes and sizes either:
(1) By providing more than one face-piece size; or
(2) By providing one facepiece size which will fit varying facial shapes and sizes.
(b) Full facepieces shall provide for optional use of corrective spectacles or lenses, which shall not reduce the respiratory protective qualities of the respirator.
(c) Hoods and helmets shall be designed and constructed to fit persons with various head sizes, provide for the optional use of corrective spectacles or lenses, and insure against any restriction of movement by the wearer.
(d) Mouthpieces shall be equipped with noseclips which are securely attached to the mouthpiece or respirator and provide an airtight seal.
(e) Facepieces, hoods, and helmets shall be designed to prevent eyepiece fogging.
(f) Half-mask facepieces shall not interfere with the fit of common industrial safety corrective spectacles, as

determined by the Institutes facepiece tests in 84.1141, 84.1142, and 84.1156(b).

84.1136 Facepieces, hoods, and helmets; eyepieces; minimum requirements.

(a) Facepieces, hoods, and helmets shall be designed and constructed to provide adequate vision which is not distorted by the eyepieces.

(b) All eyepieces of gas masks combinations shall be designed and constructed to be impact and penetration resistant. Federal Specification, Mask, Air Line: and Respirator, Air Filtering, Industrial, GGG-M-125d, October 11, 1965, with interim amendment-1, July 30, 1969, is an example of an appropriate standard for determining impact and penetration resistance. Copies of GGG-M-125d may be obtained from the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888.

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84.1137 Inhalation and exhalation valves; minimum requirements.

(a) Inhalation and exhalation valves shall be protected against distortion.
(b) Inhalation valves shall be designed and constructed and provided where necessary to prevent excessive exhaled air from adversely affecting filters, cartridges, and canisters, except where filters of dust, fume, and mist respirators are specifically designed to resist moisture as prescribed in 84.1145.
(c) Exhalation valves shall be:
(1) Provided where necessary;
(2) Protected against damage and external influence; and
(3) Designed and constructed to prevent inward leakage of contaminated air.
84.1138 Head harnesses; minimum requirements.

(a) All facepieces shall be equipped with head harnesses designed and constructed to provide adequate tension during use and an even distribution of pressure over the entire area in contact with the face.
(b) Facepiece head harnesses, except those employed on single-use dust, fume, and mist respirators, shall be adjustable and replaceable.
(c) Mouthpieces shall be equipped, where applicable, with adjustable and replaceable harnesses, designed and constructed to hold the mouthpiece in place.
84.1139 Air velocity and noise levels;

hoods and helmets; minimum re-

quirements.

Noise levels generated by the respirator will be measured inside the hood or helmet at maximum airflow obtainable and shall not exceed 80 dBA.

84.1140 Dust, fume, and mist respirators; performance requirements; general.

Dust, fume, and mist respirators and the individual components of each such device shall, as appropriate, meet the requirements for performance and protection specified in the tests described in 84.1141 through 84.1152 and prescribed in Tables 12 and 13.

84.1141 Isoamyl acetate tightness test; dust, fume, and mist respirators designed for respiratory protection against fumes of various metals having an air contamination level not less than 0.05 milligram per cubic meter; minimum requirements.

(a) The respirator will be modified in such a manner that all of the air that normally would be inhaled through the inhalation port(s) is drawn through an efficient activated charcoal-filled canister, or cartridge(s), without interference with the face-contacting portion of the facepiece.
(b) The modified respirator will be worn by persons for at least 2 minutes each in a test chamber containing 100

parts (by volume) of isoamyl-acetate vapor per million parts of air.

(c) The odor of isoamyl-acetate shall not be detected by the wearers of the modified respirator while in the test atmosphere.

84.1142 Isoamyl acetate tightnesstest; respirators designed for respiratory protection against dusts, fumes, and mists having an air contamination level less than 0.05 milligram per cubic meter, or against radionuclides; minimum requirements.

(a) The applicant shall provide a charcoal-filled canister or cartridge of a size and resistance similar to the filter unit with connectors which can be attached to the facepiece in the same manner as the filter unit.

(b)(1) The canister or cartridge will be used in place of the filter unit, and persons will each wear a modified half-mask facepiece for 5 minutes in a test chamber containing 100 parts (by volume) of isoamyl-acetate vapor per million parts of air.

(2) The following work schedule will be performed by each wearer in the test chamber:

(i) Two minutes walking, nodding, and shaking head in normal movements; and

(ii) Three minutes exercising and running in place.

(3) The facepiece shall be capable of adjustment, according to the applicants instructions, to each wearers face, and the odor of isoamyl-acetate

shall not be detectable by any wearer during the test.

(c) Where the respirator is equipped with a full facepiece, hood, helmet, or mouthpiece, the canister or cartridge will be used in place of the filter unit, and persons will each wear the modified respiratory-inlet covering for 5 minutes in a test chamber containing 1,000 parts (by volume) of isoamyl-acetate vapor per million parts of air, performing the work schedule specified in paragraph (b)(2) of this section.

84.1143 Dust, fume, and mist air-purifying filter tests; performance requirements; general.

Dust, fume, and mist respirators will be tested in accordance with the schedule set forth in Table 13 of this subpart to determine their effectiveness as protection against the particulate hazards specified in Table 13.

84.1144 Silica dust test for dust, fume, and mist respirators; single-use or reusable filters; minimum requirements.

(a) Three non-powered respirators with single-use filters will be tested for periods of 90 minutes each at a continuous airflow rate of 32 liters per minute.

(b) The relative humidity in the test chamber will be 2080 percent, and the room temperature approximately 25 C.

(c) The test suspension in the chamber will not be less than 50 nor more than 60 milligrams of flint (99+ percent free silica) per cubic meter of air.

(d) The flint in suspension will be

ground to pass 99+ percent through a 270-mesh sieve.
(e) The particle-size distribution of the test suspension will have a geometric mean of 0.4 to 0.6 micrometer, and the standard geometric deviation will not exceed 2.
(f) The total amount of unretained test suspension in samples taken during testing shall not exceed 1.5 milligrams for a non-powered air-purifying respirator.
(g) Three non-powered respirators with reusable filters will be tested and shall meet the requirements specified in paragraphs (a) through (f) of this section; each filter shall be tested three times: Once as received; once after cleaning; and once after re- 84.1147

cleaning. The applicants instructions shall be followed for each cleaning.

84.1145 Silica dust test; non-poweredsingle-use dust respirators; minimum requirements.

(a) Three respirators will be tested.
(b) As described in 84.1144, airflow will be cycled through the respirator by a breathing machine at the rate of 24 respirations per minute with a minute volume of 40 liters; a breathing machine cam with a work rate of 622 kg. m.2/minute shall be used.
(c) Air exhaled through the respirator will be 35 2 C. with 94 3 percent relative humidity. #
(d) Air inhaled through the respirator will be sampled and analyzed for respirator leakage.
(e) The total amount of unretained test suspension, after drying, in samples taken during testing, shall not exceed 1.8 milligrams for any single test.
84.1146 Lead fume test for dust,

~~fume, and mist respirators; minimum requirements.~~

~~(a) Three non-powered respirators will be tested for a period of 312 minutes each at a continuous airflow rate of 32 liters per minute.~~
~~(b) The relative humidity in the test chamber will be 2080 percent, and the room temperature approximately 25 C.~~
~~(c) The test suspension in the test chamber will not be less than 15 nor more than 20 milligrams of freshly generated lead-oxide fume, calculated as lead (Pb), per cubic meter of air.~~
~~(d) The fume will be generated by impinging an oxygen-gas flame on molten lead.~~
~~(e) Samples of the test suspension will be taken during each test period for analysis.~~
~~(f) The total amount of unretained test suspension in the samples taken during testing, which is analyzed and calculated as lead (Pb), shall not exceed 1.5 milligrams of lead for a non-powered air-purifying respirator.~~
~~84.1147 Silica mist test for dust, fume, and mist respirators; minimum requirements.~~

~~(a) Three non-powered respirators will be tested for a period of 312 minutes each at a continuous airflow rate of 32 liters per minute.~~
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(b) The room temperature in the test chamber will be approximately 25C.
(c) The test suspension in the test chamber will not be less than 20 nor more than 25 milligrams of silica mist, weighed as silica dust, per cubic meter of air.
(d) Mist will be produced by spraying an aqueous suspension of flint (99+ percent free silica), and the flint shall be ground to pass 99+ percent through a 270-mesh sieve.
(e) Samples of the test suspension will be taken during each test period for analysis.
(f) The total amount of silica mist unretained in the samples taken during testing, weighed as silica dust, shall not exceed 2.5 milligrams for a non-powered air-purifying respirator.
42 CFR Ch. I (10110 Edition)

84.1148 Tests for respirators designed for respiratory protection against more than one type of dispersoid; minimum requirements.

Respirators designed as respiratory protection against more than one particulate hazard (dust, fume, or mist) shall comply with all the requirements of this part, with respect to each of the specific hazards involved.

84.1149 Airflow resistance tests; all dust, fume, and mist respirators; minimum requirements.

(a) Resistance to airflow will be measured in the facepiece, mouthpiece, hood, or helmet of a dust, fume, or mist respirator mounted on a test fixture with air flowing at a continuous

rate of 85 liters per minute, both before and after each test conducted in accordance with 84.1144 through 84.1147.

(b) The maximum allowable resistance requirements for dust, fume, and mist respirators are as follows:

MAXIMUM RESISTANCE

[mm. water column height]

Type of respirator	Initial inhalation	Final inhalation	Exhalation
Pneumoconiosis- and fibrosis-producing dusts, or dusts and mists	12	30	20
Dust, fume, and mist, with single-use filter	18	18	15
Dust, fume, and mist, with reusable filter	50	40	1 25
Radon daughter	25	15	20
Asbestos dust and mist	20	20	15
	15		

1 Measured after silica dust test described in 84.1144.

84.1150 Exhalation valve leakage test; minimum requirements.

(a) Dry exhalation valves and valve

~~seats will be subjected to a suction of 25 mm. water-column height while in a normal operating position.~~

~~(b) Leakage between the valve and valve seat shall not exceed 30 milliliters per minute.~~

~~84.1151 DOP filter test; respirators designed as respiratory protection against dusts, fumes, and mists having an air contamination level less than 0.05 milligram per cubic meter and against radionuclides; minimum requirements.~~

~~(a) All single air-purifying respirator filter units will be tested in an atmosphere concentration of 100 micrograms of DOP per liter of air at continuous flow rates of 32 and 85 liters per minute for a period of 5 to 10 seconds.~~

~~(b) Where filters are to be used in pairs, the flow rates will be 16 and 42.5 liters per minute, respectively, through each filter.~~

~~(c) The filter will be mounted on a connector in the same manner as used on the respirator, and the total leakage for the connector and filter shall not exceed 0.03 percent of the ambient DOP concentration at either flow rate.~~

~~84.1152 Silica dust loading test; respirators designed as protection against dusts, fumes, and mists having an air contamination level less than 0.05 milligram per cubic meter and against radionuclides; minimum requirements.~~

~~(a) Three non-powered respirators will be tested in accordance with the 600~~

provisions of 84.1144, or equivalent, and shall meet the minimum requirements of 84.1144 and 84.1149.

(b) Three powered air-purifying respirators will be tested in accordance with the provisions of 84.1144 except they will be tested for a period of 4 hours each at a flowrate not less than 115 liters per minute to tight-fitting facepieces, and not less than 170 liters per minute to loose-fitting hoods and helmets. The total amount of unretained test suspension in samples taken during testing shall not exceed 14.4 milligrams for a powered air-purifying respirator with tight-fitting face-piece, and 21.3 milligrams for a powered air-purifying respirator with loose-fitting hood or helmet. They shall meet the minimum requirements of 84.1149.

84.1153 Dust, fume, mist, and smoke tests; canister bench tests; gas masks canisters containing filters; minimum requirements.

(a) Gas mask canisters containing filters for protection against dusts, fumes, mists, and smokes in combination with gases, vapors, or gases and vapors, will be tested as prescribed in 84.1140 except for the breathing resistance which will be in accordance with 84.122.

(b) Gas mask canisters designed for protection against smokes will be tested in an atmospheric concentration of 100 micrograms of dioctyl phthalate per liter of air at continuous flow rates of 32 liters per minute and 85 liters per minute for a period of 5 to 10 seconds, and the DOP leakage through the canister shall not exceed 0.03 percent of

the test concentration.
(c) Gas mask canisters containing filters for protection against dusts, fumes, mists, and smokes in combination with gases, vapors, or gases and vapors, will be tested as prescribed in 84.126.
84.1154 Canister and cartridge requirements.

(a) Where two or more canisters or cartridges are used in parallel, their resistance to airflow shall be essentially equal.
(b) The color and markings of all canisters and cartridges or labels shall conform with the requirements of the 84.1156

American National Standards Institute, American National Standard for Identification of Air-Purifying Respirator Canisters and Cartridges, ANSI K13.11973. ANSI K13.1 is incorporated by reference and has been approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be obtained from American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018. Copies may be inspected at the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 2027416030, or go to: http://www.archives.gov/federallregister/codeloflfederallregulations/ibrllocations.html.

84.1155 Filters used with canisters

and cartridges; location; replace

ment.

(a) Particulate matter filters used in conjunction with a canister or cartridge shall be located on the inlet side of the canister or cartridge.
(b) Filters shall be incorporated into or firmly attached to the canister or cartridge and each filter assembly shall, where applicable, be designed to permit its easy removal from and replacement on the canister or cartridge.
84.1156 Pesticide respirators; performance requirements; general.

Pesticide respirators and the individual components of each such device shall, as appropriate, meet the following minimum requirements for performance and protection:

(a) Breathing resistance test. (1) Airflow resistance will be measured in the facepiece, mouthpiece, hood, or helmet of a pesticide respirator mounted on a test fixture with air flowing at a continuous rate of 85 liters per minute, both before and after each test conducted in accordance with paragraphs (c) and (f) of this section.
(2) The maximum allowable resistance requirements for pesticide respirators are as follows:

MAXIMUM RESISTANCE

[mm. water-column height]

Type of pesticide respirator	Inhalation	Exhalation	Initial	Final 1
Front- or back-mounted gas mask	70	65	2 50	50
Chin-style gas mask	85	80	2 70	7020
Powered air-purifying 2	20	20	20	
Chemical Cartridge				

1 Measured at end of the service life specified in Table 14 of this subpart.
2 Resistance of filter(s), cartridge(s), and breathing tube(s) only with blower not operating.

(b) Facepiece test. (1) The complete pesticide respirator will be fitted to the faces of persons having varying facial shapes and sizes.
(2) Where the applicant specifies a facepiece size or sizes for his respirator together with the approximate measurements of faces they are designed to fit, the Institute will provide test subjects to suit such facial measurements.

(3) Any pesticide respirator part which must be removed to perform the facepiece fit test shall be replaceable without special tools and without disturbing facepiece fit.
(4) The facepiece or mouthpiece fit test using positive or negative pressure recommended by the applicant and described in his instructions will be used during each test.
(5)(i) Each wearer will enter a chamber containing 1,000 p.p.m. isoamyl-acetate vapor for a respirator equipped with a full facepiece, mouthpiece, hood, or helmet and 100 p.p.m. isoamyl-acetate vapor for a respirator equipped with a half-mask facepiece.

(ii) The facepiece, mouthpiece, hood, or helmet may be adjusted, if necessary, in the test chamber before starting the test.
(iii) Each wearer will remain in the chamber while performing the following activities:
(A) Two minutes, nodding and turning head;
(B) Two minutes, calisthenic arm movements;
(C) Two minutes, running in place; and
(D) Two minutes, pumping with a tire pump into a 28-liter (1 cubic foot) container.
(iv) Each wearer shall not detect the odor of isoamyl-acetate during the test.
(c) Silica dust test. Three completely assembled pesticide respirators will be tested with a mechanical-testing apparatus as follows:
(1) Temperature in the test chamber will be approximately 25 C.
(2) Continuous airflow through the respirator will be 32 liters per minute for front-mounted, back-mounted, and

chin-style gas mask pesticide respirators and chemical cartridge pesticide respirators, and not less than 115 (4 cubic feet) liters per minute to tight-fitting facepieces and 170 liters (6 cubic feet) per minute to loose-fitting hoods and helmets of powered air-purifying respirators.

(3) The test aerosol will contain 5060 milligrams of 99+ percent free silica per cubic meter of air.

(4) The particle size distribution of the test suspension will have a geometric mean diameter of 0.4 to 0.6 micrometer, with a standard geometric deviation less than 2.

(5) Front-mounted, back-mounted, and chin-style gas mask pesticide respirators and chemical cartridge pesticide respirators will be tested for 90 minutes and powered air-purifying respirators will be tested for 4 hours.

(d) Lead fume test. Three completely assembled pesticide respirators will be tested with a mechanical testing apparatus as follows:

(1) Continuous airflow through the respirator will be 32 liters per minute for front-mounted, back-mounted, and chin-style gas mask pesticide respirators and chemical cartridge pesticide respirators and not less than 115 liters (4 cubic feet) per minute, for powered air-purifying respirators with tight-fitting facepieces, and not less than 170 liters (6 cubic feet) per minute for powered air-purifying respirators with loose-fitting hoods and helmets.

(2) The test aerosol will contain 1520 milligrams of freshly generated lead-oxide fume, calculated as lead, per cubic meter of air.
(3) The fume will be generated by impinging an oxygen-gas flame on molten lead.
(4) Front-mounted, back-mounted, and chin-style gas mask pesticide respirators and chemical cartridge pesticide respirators will be tested for 90 minutes and powered air-purifying pesticide respirators will be tested for 4 hours.
(5) The total amount of unretained test suspension, which is analyzed and calculated as lead, shall not exceed:
(i) 0.43 milligram for any 90-minute test;
(ii) 4.8 milligrams for any 4-hour test made at 115 liters (4 cubic feet) per minute; or
(iii) 6.2 milligrams for any 4-hour test made at 170 liters (6 cubic feet) per minute.
(e) Dioctyl-phthalate test. (1) All canisters submitted for use with front-mounted and back-mounted gas mask pesticide respirators will be tested in an atmospheric concentration of 100 micrograms of dioctyl-phthalate per liter of air at continuous flow rates of 32 and 85 liters per minute for a test period of 5 to 10 seconds.
(2) The DOP leakage through the canister shall not exceed 0.03 percent of the ambient DOP concentration.
(f) Bench tests for pesticide respirators.
(1)(i) Bench tests will be made on an apparatus that allows the test atmosphere at 50 5 percent relative humidity and at room temperature (252.5 C.) to enter the canister or cartridge

at predetermined concentrations and rates of flow, and that has a means for determining the test life of the canister or cartridge against carbon tetrachloride.

(ii) Canisters and cartridges will be tested as they are used on each pesticide respirator, either singly or in pairs.

(iii) Three canisters or cartridges or pairs of cartridges will be removed from containers and tested as received from the applicant.

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(iv) Two canisters, cartridges, or pairs of cartridges will be equilibrated at room temperature by passing 25 percent relative humidity air through them at the following flow rates (expressed as liters per minute (l.p.m.)) for 6 hours:

Type of canister or cartridge	Airflow rate, l.p.m.
Air-purifying canister	64
Air-purifying cartridge	25
Powered air-purifying with tight-fitting facepiece	115
Powered air-purifying with loose-fitting hood or helmet	170

(v) Two canisters, cartridges, or pairs of cartridges will be equilibrated at room temperature by passing 85 percent relative humidity air through

them at the flow rates stated in paragraph (f)(1)(iv) of this section for 6 hours.
(vi) The equilibrated canisters or cartridges will be resealed, kept in an upright position at room temperature, and tested within 18 hours.
(2) Canisters and cartridges tested in accordance with the provisions of this section shall meet the requirements specified in Table 14 of this subpart.
84.1157 Chemical cartridge respirators with particulate filters; performance requirements; general.

Chemical cartridge respirators with particulate filters and the individual components of each such device shall, as appropriate, meet the following minimum requirements for performance and protection:

(a) Breathing resistance test. (1) Resistance to airflow will be measured in the facepiece, mouthpiece, hood, or helmet of a chemical cartridge respirator mounted on a test fixture with air flowing at a continuous rate of 85 liters per minute, both before and after each test conducted in accordance with paragraphs (d) through (f) of this section.
(2) The maximum allowable resistance requirements for chemical cartridge respirators are as follows:

MAXIMUM RESISTANCE

[mm. water-column height]

Type of chemical cartridge respirator	Inhalation	Exhalation
	Initial	Final 1
For gases, vapors, or gases and vapors, and dusts, fumes, and mists	50	50
For gases, vapors, or gases and vapors, and mists of paints, lacquers, and enamels	70	70
	20	20

1 Measured at end of service life specified in Table 11 in subpart L of this part.

(b) Facepiece test. The facepiece test will be conducted as specified in 84.205.

(c) Lacquer and enamel mist tests; general.

(1) Three respirators with cartridges containing or having attached to them, filters for protection against mists of paints, lacquers, and enamels shall be tested in accordance with the provisions of paragraph (f) of this section.

(2) In addition to the test requirements set forth in paragraph (c)(1) of this section, three such respirators will be tested against each aerosol in accordance with the provisions of paragraphs (d) and (e) of this section.

(d) Lacquer mist test. (1) Temperature in the test chamber will be approximately 25 C.

(2) Continuous airflow through the respirator will be 32 liters per minute

~~for air-purifying respirators, and not less than 115 liters per minute to tight-fitting facepieces and 170 liters per minute to loose-fitting hoods and helmets of powered air-purifying respirators.~~
~~(3) Airflow through the chamber will be 2025 air changes per minute.~~
~~(4) The atomizer employed will be a No. 645 nozzle with setup 3, or equivalent, operating at 69 kN/m.2 (10 pounds per square inch gage).~~
~~(5) The test aerosol will be prepared by atomizing a mixture of one volume of clear cellulose nitrate lacquer and one volume of lacquer thinner. The lacquer described in Federal Specification TT-L-31, October 7, 1953, is an example of an acceptable lacquer. Copies of TT-L-31 may be inspected or obtained from the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888.~~
~~(6) The concentration of cellulose nitrate in the test aerosol will be 95125 milligrams per cubic meter.~~
~~(7) The test aerosol will be drawn to each respirator for a total of 156 minutes for air-purifying respirators and 240 minutes for powered air-purifying respirators.~~
~~(8) The total amount of unretained mist in the samples taken during testing, weighed as cellulose nitrate, shall not exceed 5 milligrams for an air-purifying respirator, 28 milligrams for a powered air-purifying respirator with tight-fitting facepiece, and 41 milligrams for a powered air-purifying respirator with loose-fitting hood or helmet.~~
~~(e) Enamel mist test. (1) Temperature in the test chamber will be approximately 25 C.~~
~~(2) Continuous airflow through the respirator will be 32 liters per minute for air-purifying respirators, and not less than 115 liters per minute to tight-~~

fitting facepieces and 170 liters per minute to loose-fitting hoods and helmets of powered air-purifying respirators.

(3) Airflow through the chamber will be 2025 air changes per minute.

(4) The atomizer employed will be a No. 64 nozzle with setup 1A, or equivalent, operating at 69 kN/m.2 (10 pounds per square inch gage).

(5) The test aerosol will be prepared by atomizing a mixture of 1 volume of white enamel and 1 volume of turpentine. The enamel described in Federal Specification TT-E489b, May 12, 1953, with amendment-1 of 9 November 1955 is an example of an acceptable enamel. Copies of TT-E489b may be inspected or obtained from the NIOSH, Certification and Quality Assurance Branch, 1095 Willowdale Road, Morgantown, WV 265052888.

(6) The concentration of pigment in the test aerosol, weighed as ash, will be 95125 milligrams per cubic meter.

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(7) The test aerosol will be drawn to each respirator for a total of 156 minutes for air-purifying respirators and 240 minutes for power air-purifying respirators.
(8) The total amount of unretained mist in the samples taken during testing, weighed as ash, shall not exceed 1.5 milligrams for any air-purifying respirator, 8.3 milligrams for a powered air-purifying respirator with tight-fitting facepiece, and 12.3 milligrams for a powered air-purifying respirator with loose-fitting hood or helmet.
(f) Bench tests; gas and vapor tests. (1) Bench tests will be made in accordance with 84.207 and tested cartridges shall meet the minimum requirements set forth in Table 11 of subpart L of this part. Cartridges will be equilibrated in accordance with paragraph (f)(2) of this section.
(2)(i) Two powered air-purifying cartridges or pairs of cartridges will be equilibrated at room temperature by passing 25 percent relative humidity air through them at the following flow rates (expressed in liters per minute (l.p.m.)) for 6 hours:

Type of cartridge	Airflow rate, l.p.m.
Powered air purifying with tight-fitting facepiece	115
Powered air purifying with loose-fitting hood or helmet	170

(ii) Two powered air-purifying cartridges or pairs of cartridges will be equilibrated by passing 85 percent relative humidity air through them at the flow rates stated in paragraph (f)(2)(i) of this section.
(iii) All cartridges will be resealed,

kept in an upright position, at room temperatures, and tested within 18 hours.

84.1158 Dust, fume, and mist tests; respirators with filters; minimum requirements; general.

(a) Three respirators with cartridges containing, or having attached to them, filters for protection against dusts, fumes, and mists, except the mists of paints, lacquers, and enamels, will be tested in accordance with the provisions of 84.1157(f).

(b) In addition to the test requirements set forth in paragraph (a) of this section, three such respirators will be tested, as appropriate, in accordance with the provisions of 84.1141 through 84.1152; however, the maximum allowable resistance of complete dust, fume, and mist, and gas, vapor, or gas and vapor chemical cartridge respirators shall not exceed the maximum allowable limits set forth in 84.1157(a)(2).

TABLES TO SUBPART KK OF PART 84

TABLE 12FACEPIECE TEST REQUIREMENTS

[42 CFR Part 84, Subpart KK]

Respirator types

Pressure tightness test 1

Isoamyl acetate test 84.1141 84.1142

Dusts: Air Contamination Level not less than 0.05 mg/M3 or 2 mppcf .....

Fumes: Air Contamination Level not less than 0.05 mg/M3 .....

Mists: Air Contamination Level not less than 0.05 mg/M3 or 2 mppcf .....

Dusts, Fumes, and Mists: Air Contamination Level less than 0.05 mg/M3 or 2 mppcf, and

radionuclides .....
Radon
daughters .....
Asbestos-containing dusts and
mists .....
X
X
X
X
X
X
X
X
X

1 Test is required only where applicable.

TABLE 13AIR-PURIFYING AND POWERED AIR-PURIFYING RESPIRATOR FILTER TESTS REQUIRED FOR APPROVAL
[42 CFR Part 84, Subpart KK]

Respirator types Silica dust tests Lead fume test 84.1146 Silica mist test 84.1147 DOP test 84.115184.1144 84.1145 84.1152
Dusts: Air Contamination Level not less than 0.05 mg/M3 or 2 mppcf X
Fumes: Air Contamination Level not less than 0.05 mg/M3 X
Mists: Air Contamination Level not less than 0.05 mg/M3 or 2 mppcf X
Dusts, Fumes, and Mists: Air Contamination Level less than 0.05 mg/M3 or 2 mppcf, and radionuclides ..... X X
Radon daughters ..... 1 X 2 X
Asbestos-containing dusts and mists ... 2 X 3 X
Single use dust and mist respirators .... 3 X 3 X

1 For resistance only.
2 For penetration only.
3 Test required only where applicable.

TABLE 14CARBON TETRACHLORIDE BENCH TESTS AND REQUIREMENTS FOR CANISTERS AND CARTRIDGES
[42 CFR part 84, Subpart KK]

Type of pesticide respirator	Test concentration p.p.m. CCl4	Flow rate l.p.m.

~~Number of tests~~
~~Minimum life minutes~~
~~1~~
~~Chest-mounted or back-mounted gas mask (as received) .....~~
~~Chest-mounted or back-mounted gas mask (equilibrated) .....~~
~~Chin-style gas mask (as received) .....~~
~~Chin-style gas mask (equilibrated) .....~~
~~Chemical Cartridge respirator (as received) .....~~
~~Chemical cartridge respirator (equilibrated) .....~~
~~Powered air-purifying respirator (tight-fitting facepiece, as received) ..~~
~~Powered air-purifying respirator (tight-fitting facepiece, equilibrated) ..~~
~~Powered air-purifying respirator (loose-fitting hood or helmet, as received) .....~~
~~Powered air-purifying respirator (loose-fitting hood or helmet, equilibrated) .....~~
~~20,000~~
~~20,000~~
~~5,000~~
~~5,000~~
~~1,000~~
~~1,000~~
~~1,000~~
~~1,000~~
~~1,000~~
~~1,000~~
~~64~~
~~32~~
~~64~~
~~32~~
~~64~~
~~32~~
~~2 115~~
~~2 115~~
~~3 170~~
~~3 170~~
~~3~~
~~4~~
~~3~~
~~4~~
~~3~~
~~4~~
~~3~~
~~4~~
~~3~~

4
12
12
12
12
50
50
50
25
50
25

1 Minimum life will be determined at 5 p.p.m. leakage.
2 The flow rate shall be the effective flow rate of the device, but shall be not less than 115 l.p.m.
3 The flow rate shall be the effective flow rate of the device, but shall be not less than 170 l.p.m.

PART 85REQUESTS FOR HEALTH HAZARD EVALUATIONS

Sec.

85.1 Applicability.
85.2 Definitions.
85.3 Procedures for requesting health hazard evaluations.
85.31 Contents of a request for health hazard evaluations.
85.4 Acting on requests.
85.5 Authority for investigations.
85.6 Advance notice of visits.
85.7 Conduct of investigations.
85.8 Provision of suitable space for employee interviews and examinations; identification of employees.
85.9 Representatives of employers and employees; employee requests.
85.10 Imminent dangers.

85.11
Notification of determination to employers, affected employees, and Department of Labor.
85.12
Subsequent requests for health hazard evaluations.
AUTHORITY: Sec. 8(g), 84 Stat. 1600; 29 U.S.C. 657(g) and sec. 508, 83 Stat. 803; 30 U.S.C. 957.
SOURCE: 37 FR 23640, Nov. 7, 1972, unless otherwise noted.

85.1 Applicability.

This part 85 applies to health hazard evaluations requested by any employer or authorized representative of employees under section 20(a)(6) of the Occupational Safety and Health Act of 1970 or section 501(a)(11) of the Federal Mine Safety and Health Act of 1977.