

5. Ultimate analysis (moisture, ash, carbon, hydrogen, sulfur, and nitrogen)-----	\$17.00
6. Ultimate analysis and B. t. u.-----	21.00
7. Proximate and ultimate analyses, and B. t. u.-----	22.00
8. Fusibility of ash-----	\$10.00
9. Hardgrove grindability index-----	10.00

(b) Fees for special tests will be computed on the basis of the work involved.
[23 F. R. 7909, Oct. 14, 1958]

SUBCHAPTER B—RESPIRATORY PROTECTIVE APPARATUS; TESTS FOR PERMISSIBILITY; FEES

Part 11—Self-Contained Breathing Apparatus

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AUTHORITY: § 11.1 to 11.12 issued under sec. 5, 36 Stat. 370, as amended, sec. 212, 66 Stat. 709; 30 U. S. C. 7, 482. Interpret or apply secs. 2, 3, 36 Stat. 370, as amended; 30 U. S. C. 3, 5.

SOURCE: §§ 11.1 to 11.12 contained in Schedule 13D, 21 F. R. 7234, Sept. 22, 1956.

§ 11.1 *Definition of "permissible."*
The Bureau of Mines considers a self-contained breathing apparatus to be permissible for use in irrespirable and poisonous gases if all the details of construction and materials are the same in all respects as those of a self-contained breathing apparatus that has passed the tests for safety, practicability, and efficiency in accordance with standards established by the Bureau and described in this part.

§ 11.2 *Conditions under which apparatus will be tested.* The conditions under which the Bureau of Mines will examine and test a self-contained breathing apparatus to establish its permissibility follow:

(a) (1) Application for inspection, examination, and testing shall be made in duplicate to the Central Experiment

Station, Bureau of Mines, 4800 Forbes Street, Pittsburgh 13, Pa., and shall be accompanied by (i) a check, bank draft, or money order (see § 11.3) payable to the order of the United States Bureau of Mines; (ii) a complete written description of the apparatus in duplicate; and (iii) a set of drawings in duplicate showing full details of construction of the apparatus. If an apparatus operates with a regenerator, the application shall be accompanied by a complete written description of the regenerator and a set of drawings showing full details of its construction, all in duplicate. The application shall state, among other things, whether the apparatus is ready to be marketed.

(2) Applicants, manufacturers, or their representatives may visit or communicate with the Central Experiment Station, Bureau of Mines, 4800 Forbes Street, Pittsburgh 13, Pa., to obtain criticism of proposed designs or to discuss the requirements covering the approval of self-contained breathing apparatus. No charge is made for such consultation.

(b) The examination, inspection, and test shall be made at the Central Experiment Station, Bureau of Mines, Pittsburgh, Pa.

(c) The applicant, submitting the self-contained breathing apparatus for inspection, examination, and test, will be required to provide two sets of apparatus, prepaid to the Central Experiment Station, Bureau of Mines, 4800 Forbes Street, Pittsburgh 13, Pa. If the apparatus successfully passes all the tests and requirements specified in this section, one set of the apparatus will be retained by the Bureau of Mines as a laboratory exhibit and the other set will be returned to the applicant. If the apparatus does not pass all of the Bureau's tests or requirements, both sets of apparatus will be returned to the applicant at his expense.

(d) Each self-contained breathing apparatus submitted for test shall have marked on it in a distinct manner the name and address of the manufacturer and the name, letter, or number by which the apparatus is designated for trade purposes.

(e) (1) For tests of self-contained oxygen breathing apparatus utilizing a supply of compressed gaseous oxygen, the oxygen will be supplied by the Bureau of Mines and will be of the purity specified in contracts by the Bureau for use in its own self-contained breathing apparatus, namely, at least 98 percent oxygen and the remainder nitrogen. The applicant shall supply such regenerators or regenerating materials as are necessary to operate the apparatus during the tests as hereinafter described.

(2) For tests of self-contained breathing apparatus utilizing a supply of compressed air, the applicant shall supply the compressed air (in suitable containers) necessary in making the hereafter described tests. The compressed air shall not contain any amount of gaseous, liquid, or solid substance that is harmful to a wearer of the apparatus under any condition of use. The applicant shall furnish a written statement setting forth the method used to compress the air and the controls used to prevent contamination of the compressed air by any gaseous, liquid, or solid substance that is harmful to a human being.

(3) For tests of self-contained breathing apparatus utilizing a supply of oxygen that is generated by a chemical reaction when using the apparatus, the applicant shall supply the oxygen-generating chemicals (in suitable containers) in amounts necessary to conduct the hereafter described tests. The oxygen shall not contain any amount of gaseous, liquid, or solid substance that is harmful to a wearer of the apparatus under any condition of use. The applicant shall furnish a written statement setting forth the method by which the oxygen is generated and the chemical reaction involved for this purpose during the use of the apparatus. Furthermore, this statement shall set forth how the chemicals in the oxygen generator have been manufactured so as to prevent contamination of the oxygen by any gaseous, liquid, or solid substance in amounts or proportions harmful to a human being.

(f) On receipt of the self-contained breathing apparatus for which application has been made for examination, inspection, or test, the applicant will be notified whether the apparatus meets the requirements of these regulations and whether additional spare parts are necessary to facilitate making a proper test of the apparatus. The applicant will be required to provide additional parts, if needed, and also to alter the apparatus, if necessary.

(g) No self-contained breathing apparatus will be tested unless it is in the complete form in which it is to be marketed.

(h) As soon as possible after the formal application for the test and the apparatus to be tested have been received, the applicant will be notified of the date on which the test will begin and if any additional material is required.

(i) Tests will be made in the order of receipt of application, provided that the applicant has furnished the necessary apparatus and material.

(j) Self-contained breathing apparatus in course of development may be submitted by manufacturers and inventors for preliminary test or inspection to ascertain defective construction or misapplication of safety principles. The Bureau will determine the nature of such test or inspection and the fee, if any. If a fee is to be charged, it shall be paid before the test or inspection is undertaken.

(k) No one shall be present during any part of the formal investigation, conducted by the Bureau, that leads to approval except the necessary Government personnel, representatives of the applicant, and such other persons as may be mutually agreed upon by the applicant and the Bureau. When a self-contained breathing apparatus is approved as permissible, the Bureau will announce that such approval has been granted and may thereafter conduct from time to time, in its discretion, public demonstrations of the tests of approved self-contained breathing apparatus. Those who attend any part of the investigation, or any public demonstration, shall be present solely as observers; the conduct of the investigation and of any public demonstration shall be controlled wholly by the Bureau's personnel. The results of chemical analyses and all information contained in the drawings, specifications,

and instructions shall be deemed confidential, and the Bureau will appropriately safeguard them against disclosure.

(1) Breathing apparatus will be tested for manufacturers or accredited agents of manufacturers and for inventors.

(m) The Bureau of Mines will make public from time to time a list of permissible self-contained breathing apparatus and data on tests of such equipment.

§ 11.3 Fees for testing.

	Apparatus with separate regenerator	Oxygen generating apparatus	Demand-type apparatus
Complete 2-hour self-contained breathing apparatus inspection and tests	\$1,500	\$1,500	\$1,500
Complete 1-hour self-contained breathing apparatus inspection and tests	1,390	1,390	1,390
Complete ¾-hour self-contained breathing apparatus inspection and tests	1,390	1,390	1,390
Complete ½-hour self-contained breathing apparatus inspection and tests	1,390	1,390	1,390
Separate preliminary 2-hour apparatus inspection and tests	230	230	230
Separate preliminary 1-hour apparatus inspection and tests	230	230	230
Separate preliminary ¾-hour apparatus inspection and tests	230	230	230
Separate preliminary ½-hour apparatus inspection and tests	230	230	230
Separate supplementary facepiece assembly	230	230	-----
Separate regenerator 2-hour apparatus inspection and tests	165	-----	-----
Separate regenerator 1-hour apparatus inspection and tests	165	-----	-----
Separate regenerator ¾-hour apparatus inspection and tests	165	-----	-----
Separate regenerator ½-hour apparatus inspection and tests	165	-----	-----
Special reducing valve inspection and tests, all models	165	165	165
Separate auxiliary parts inspection and tests, each part	110	110	110

Fees for testing unusually complicated types of self-contained breathing apparatus and for extensions of approval will be based on the actual cost of testing, as determined by the Bureau of Mines in advance; the applicant will be notified and the fees paid before the tests are begun.

§ 11.4 *General requirements.* To receive approval of the Bureau of Mines for any type of self-contained breathing apparatus described under types A, B, C, or D in the following, the apparatus must comply with the requirements specified. Four general types of self-contained breathing apparatus will be tested—type A, ½-hour; type B, ¾-hour; type C, 1-hour; and type D, 2-hour. To be approved each type of breathing apparatus must pass satisfactorily all of the tests specified for the respective type in § 11.7. The Bureau considers that the A, ½-hour, and B, ¾-hour, types are suitable for mine rescue and recovery work as auxiliary equipment only.

(a) The amount of oxygen or air supplied by the apparatus must meet the needs of the wearer at all times.

(b) The apparatus shall be free from mechanical obstructions so that the wearer can breathe freely at all times.

(c) The temperature of the inspired atmosphere shall not exceed 110° F. when the temperature of the atmosphere external to the apparatus does not exceed 85° F. The Bureau will not test self-contained breathing apparatus when the temperature external to the apparatus exceeds 85° F. or is less than 60° F.

(d) The apparatus shall be durable in construction, and all vital parts shall be so protected as to prevent damage or excessive wear during the tests to which it will be subjected.

(e) (1) For an apparatus, equipped with a mouth-breathing device in which the expired atmosphere is recirculated and which utilizes a supply of compressed oxygen and a regenerator, the regenerating material (absorbent) shall absorb carbon dioxide from the expired atmosphere. Samples of the atmosphere within the apparatus shall be taken for analytical determination of carbon dioxide content. The atmosphere within the apparatus shall be sampled as near to the point of inspiration as practicable, only while the wearer is inhaling, over a period covering several inhalations, and at uniform intervals of time. None of the samples so taken shall contain more than 2½ percent of carbon dioxide. The average carbon dioxide content of all atmospheric samples taken from within the apparatus during the test shall not exceed 1 percent.

(2) For an apparatus, equipped with a facepiece, in which the expired atmosphere is recirculated and which utilizes a supply of compressed oxygen and a regenerator, the regenerating material (absorbent) shall absorb carbon dioxide from the expired atmosphere. Samples of the atmosphere within the apparatus shall be taken for analytical determination of carbon dioxide content. The atmosphere within the apparatus shall be sampled only when the wearer is inhaling, over a period covering several inhalations, and at uniform intervals of time. None of the samples so taken shall contain more than 2½ percent of carbon dioxide. Samples of the atmosphere within the apparatus shall be taken from the inhalation side of the apparatus as near as possible to the facepiece; the average carbon dioxide content of such samples shall not exceed 1 percent during the test. Samples of the atmosphere within the apparatus also shall be taken from within the facepiece as near as practicable to the nose and mouth of the wearer; the average carbon dioxide content of such samples shall not exceed 2 percent during the test.

(3) For an oxygen-generating apparatus, equipped with a mouth-breathing device, in which the expired atmosphere is recirculated and in which a chemical change is effected so that carbon dioxide is absorbed concurrently with the generation of oxygen, samples of the atmosphere within the apparatus shall be taken for analytical determination of carbon dioxide content. The atmosphere within the apparatus shall be sampled as near to the point of inspiration as practicable, only while the wearer is inhaling, over a period covering several inhalations, and at uniform intervals of time. None of the samples so taken shall contain more than 2½ percent of carbon dioxide. The average carbon dioxide content of all atmospheric samples taken from within the apparatus during the test shall not exceed 1 percent.

(4) For an oxygen-generating apparatus, equipped with a facepiece, in which the expired atmosphere is recirculated and in which a chemical change is effected so that carbon dioxide is absorbed concurrently with the generation of oxygen, samples of the atmosphere within the apparatus shall be taken for analytical determination of carbon dioxide content. The atmosphere within the appa-

ratus shall be sampled only when the wearer is inhaling, over a period covering several inhalations, and at uniform intervals of time. None of the samples so taken shall contain more than 2½ percent of carbon dioxide. Samples of the atmosphere within the apparatus shall be taken from the inhalation side of the apparatus as near as possible to the facepiece; the average carbon dioxide content of such samples shall not exceed 1 percent during the test. Samples of the atmosphere within the apparatus also shall be taken from within the facepiece as near as practicable to the nose and mouth of the wearer; the average carbon dioxide content of such samples shall not exceed 2 percent during the test.

(5) For an apparatus, equipped with a mouth-breathing device, in which the expired atmosphere is not recirculated, as in open-circuit (demand) apparatus, and which utilizes a supply of compressed oxygen or compressed air, samples of the atmosphere within the apparatus shall be taken for analytical determination of carbon dioxide content. The atmosphere within the apparatus shall be sampled as near to the point of inspiration as practicable, only while the wearer is inhaling, over a period covering several inhalations, and at uniform intervals of time. None of the samples so taken shall contain more than 2½ percent of carbon dioxide. The average carbon dioxide content of all atmospheric samples taken from within the apparatus during the test shall not exceed 1 percent.

(6) For an apparatus, equipped with a facepiece, in which the expired atmosphere is not recirculated, as in open-circuit (demand) apparatus, and which utilizes a supply of compressed oxygen or compressed air, samples of the atmosphere within the apparatus shall be taken for analytical determination of carbon dioxide content. The atmosphere within the apparatus shall be sampled only when the wearer is inhaling, over a period covering several inhalations, and at uniform intervals of time. None of the samples so taken shall contain more than 2½ percent of carbon dioxide. Samples of the atmosphere within the apparatus shall be taken from the inhalation side of the apparatus as near as possible to the facepiece; the average carbon dioxide content of such samples shall not exceed 1 percent during the test. Samples of the atmosphere within

the apparatus also shall be taken from within the facepiece as near as practicable to the nose and mouth of the wearer; the average carbon dioxide content of such samples shall not exceed 2 percent during the test.

(f) All parts of a self-contained breathing apparatus, including the source of the breathed atmosphere, shall be carried on the body of the wearer.

§ 11.5 *Construction.* (a) When worn in irrespirable air, the apparatus shall, without recharging, meet the needs of the wearer for not less than the number of minutes for which it was designed.

(b) The mechanical construction of the apparatus shall be such that every part can be tested, inspected, and repaired by persons that are skilled in such work, and all parts that require sterilizing shall be readily accessible for this purpose.

(c) All parts of the apparatus subject to or liable to be subjected to pressures in excess of 5 pounds per square inch shall be so constructed and equipped with safety devices that the safety of the wearer shall be assured, as determined by the 15 tests described in § 11.7.

(d) In apparatus equipped with a breathing bag or bags, or their equivalent, the inhalation and exhalation compartments shall have a combined capacity of at least 8 liters. If a single breathing bag is used, it shall have a capacity of at least 5 liters.

(e) In apparatus equipped with a breathing bag that is used in conjunction with operation of an oxygen- or air-admission valve, the bag shall have a capacity of at least 3 liters after the admission valve is closed. After 3 liters of oxygen or air is introduced into the breathing bag, the water-gage pressure shall not exceed 3 inches.

(f) All parts enclosing the breathed atmosphere of a self-contained breathing apparatus shall consist of material that will exclude gases external to the apparatus and be impervious to gasoline vapor for at least a 2½-hour period. The material shall be of good strength and be flexible, and the joints or seams shall be either cemented and sewed or vulcanized or bound in such manner that the part or parts will not become separated at the joints or seams when the apparatus is in use. Such part or parts may be made in one piece without joints or seams.

(g) The apparatus shall not have in its circulatory system any zone of constant negative pressure, or a positive pressure at the mouthpiece or facepiece of more than 3 inches water gage after a 2½-liter exhalation.

(h) A self-contained breathing apparatus in which the expired atmosphere is recirculated shall be provided with a release valve that is operated manually or automatically and is placed at some point in the circulatory system of the apparatus. The function of this valve shall be to permit the escape to the outside atmosphere of a part of the atmosphere in the circulatory system of the apparatus. The valve shall be so designed that the outside atmosphere cannot be drawn into the apparatus.

(i) When apparatus is equipped with high-pressure gas container(s) the applicant shall furnish therewith a certificate of test required by the Interstate Commerce Commission under Specifications No. 3-A or equivalent specifications or shall give evidence satisfactory to the Bureau that such high-pressure gas container(s) were tested in accordance with Interstate Commerce Commission Specifications No. 3-A or equivalent specifications.

(j) (1) When an apparatus is equipped with a high-pressure gas container charged with compressed oxygen or compressed air to a pressure 10 percent in excess of its marked service pressure, the container shall be equipped with a perforated safety cap attached to the main closing valve. The perforated safety cap shall contain a frangible disk, without fusible metal backing, and the disk shall have a bursting pressure of 2,650 to 3,000 pounds per square inch.

(2) When an apparatus is equipped with a high-pressure gas container charged with compressed oxygen or compressed air at a pressure not in excess of its marked service pressure, the container shall be equipped with a perforated safety cap attached to the main closing valve. The perforated safety cap shall contain a frangible disk, without fusible metal backing, having a bursting pressure of 2,650 to 3,000 pounds per square inch. As an alternate, when the high-pressure gas container is charged at a pressure not in excess of its marked service pressure, the container may be equipped with a perforated safety cap attached to the main closing valve and the safety cap provided with a plain

copper disk and fiber gasket and filled with a metal (such as Rose's metal) having a fusing temperature of approximately 94° C. Such fusible metal shall not be forced from the perforated safety cap by a pressure less than 2,250 pounds per square inch.

(k) (1) The closing valve of the high-pressure gas container shall be provided with a device to prevent the wearer of the apparatus from screwing the stem entirely out of the valve. The closing valve shall also be provided with a device to enable the wearer to lock the valve stem open when the valve has been opened to the desired point. The valve-closing device shall be operable by hand without use of wrenches or external levers.

(2) Main and bypass valves that control the flow of compressed oxygen or compressed air from the source of supply shall be so located that they can be manipulated readily by the wearer when the apparatus is being worn.

(l) When an apparatus is equipped with a gage for recording time or pressure of compressed-oxygen or compressed-air supply, the Bureau of Mines will test such a gage for accuracy of calibration. A variation of 3 atmospheres (approximately 45 pounds per square inch) will be allowed in comparison with the pressure shown by the Bureau of Mines standard pressure gage.

(m) (1) Apparatus having a separate pressure-gage connection shall be equipped with a valve to shut off the compressed-oxygen or compressed-air supply from the gage. The gage-connection valve shall be so placed that it can be manipulated readily by the wearer without interfering with the flow of compressed oxygen or compressed air from the high-pressure gas container to the circulatory system of the apparatus.

(2) An oxygen-generating, self-contained breathing apparatus shall be equipped with a timing device that will indicate accurately the number of minutes a person may continue to wear the apparatus with safety.

(n) Any pressure gage or timing device shall be so located that it can be read easily by the wearer.

(o) Apparatus equipped with a reducing valve giving a constant or automatic flow of oxygen or air shall be provided with a bypass valve that will permit compressed oxygen or compressed air to flow freely from the high-pressure gas

container to the circulatory system of the apparatus, independent of the reducing valve.

(p) When the compressed-oxygen or compressed-air supply of the apparatus is controlled by automatic devices, such devices shall adjust themselves readily to the needs of the wearer.

(q) Apparatus in which the expired atmosphere is recirculated and which is equipped with either a mouth-breathing device or a facepiece shall be provided with an adequate saliva or moisture trap and release valve at the exhalation side of the inhalation and exhalation valve assembly and shall be so designed that, while the saliva or moisture trap and release valve are functioning, any atmosphere that may be external thereto cannot be drawn into the apparatus.

(r) Apparatus equipped with a mouth-breathing device shall be provided with a suitable nose clip properly attached to the apparatus. The suitability of the nose clip will be determined by the tests to which the apparatus will be subjected.

(s) Self-contained breathing apparatus submitted for testing and approval shall not weigh more than 40 pounds when completely assembled and fully charged.

(t) Apparatus equipped with a facepiece shall meet the following requirements:

(1) The facepiece shall be so constructed as to assure quick, gastight fit on persons of widely varying facial dimensions and contours.

(2) The eyepiece(s) of the facepiece shall be of the nonshatter type and be so designed as to provide a satisfactory field of vision for persons of widely varying facial dimensions and contours. Air or oxygen shall enter the facepiece in such manner as will prevent excessive accumulation of moisture on the eyepiece(s). If fog-preventing solutions or other substances are applied to or furnished for application to the lenses of the eyepiece(s), such solutions or substances shall be nonirritating, odorless, and nonflammable.

(3) A facepiece shall be provided with elastic headbands that are adjustable and replaceable.

(4) If a facepiece is equipped with an exhalation valve, the valve shall be guarded to prevent distortion and injury.

(5) For self-contained breathing apparatus, approved before the effective

date of this part and for which a facepiece is approved as supplemental equipment, the facepiece shall weigh not more than 3 pounds complete with inhalation and exhalation valve assembly, breathing tubes, and fittings.

(6) A facepiece approved as supplemental equipment shall be distinctively and permanently marked to identify it as a supplemental part of a specific type of self-contained breathing apparatus.

§ 11.6 *Character and general description of tests.* (a) After the self-contained breathing apparatus to be tested for permissibility has been thoroughly inspected for adequacy of its mechanical principles, a series of 15 tests will be made, as described in § 11.7. At the beginning of the series of tests, if a high-pressure gas container is used on the apparatus, it shall first be charged with oxygen or air to a pressure of 10 atmospheres (approximately 150 pounds per square inch) and the oxygen or air permitted to escape into the atmosphere. Any high-pressure gas container used in the tests shall be fully charged at the beginning of each test at a pressure prescribed by the applicant or manufacturer of the apparatus.

(b) If an apparatus using compressed oxygen or compressed air is equipped with one or more breathing bags, the breathing bag or bags shall be deflated at the beginning of each test to expel any contained nitrogen.

(c) A single test must be continuous, without removal of the apparatus from the wearer during the test.

(d) Samples of the atmosphere from an apparatus in which the atmosphere is recirculated and which is equipped with a mouth-breathing device or a facepiece shall be taken from the inhalation side of the circulatory system as near as possible to the mouthpiece or facepiece, as the case may be. Samples of the atmosphere from a regenerating- or recirculating-type apparatus equipped with a facepiece also shall be taken from the interior of the facepiece as near as practicable to the nose and mouth of the wearer of the apparatus and shall be taken only when the wearer is inhaling. Samples of the atmosphere from an apparatus in which the atmosphere is not recirculated, such as in open-circuit (demand) equipment, and which is equipped with a mouth-breathing device shall be taken from the inhalation side

of the apparatus as near as possible to the mouthpiece. Samples of the atmosphere from an apparatus in which the atmosphere is not recirculated, such as in open-circuit (demand) equipment, and which is equipped with a facepiece shall be taken from the interior of the facepiece as near as practicable to the nose and mouth of the wearer and shall be taken only when the wearer is inhaling. The first sample shall be taken from the source of supply of compressed oxygen or compressed air immediately before the beginning of the test. The second sample shall be taken after the apparatus has been adjusted to the wearer and compressed oxygen or compressed air has been turned on and after the wearer has inhaled at least three times and has exhaled to the atmosphere outside of the apparatus. Samples shall be taken as indicated in Tables 1-5, inclusive, of § 11.7 for ½-hour, A types; ¾-hour, B types; 1-hour, C types; and 2-hour, D types; respectively. The physiological effects of the apparatus on the wearer will be noted during each test; they include the comfort of the wearer, ease of breathing, and lack of interference with normal body functioning, as determined by questioning the wearer of the apparatus during and after testing.

(e) Not more than 1 test of 2 hours' duration will be made on any day. The tests will be completed within 60 days from date of beginning, unless prevented by conditions that are beyond the control of the Bureau.

All tests of apparatus will be conducted in a specially equipped gallery filled with an irrespirable atmosphere, at the Central Experiment Station, Bureau of Mines, Pittsburgh, Pa.

(f) Before each test is begun, the apparatus shall be examined and tested to make certain that no leakage is present under working conditions.

(g) The apparatus under test will be worn during each and all of the periods of the 15 tests by qualified Bureau of Mines personnel assigned to such test work. Immediately before participation in any of these tests the prospective wearer of the apparatus being tested shall pass, satisfactorily, a physical examination by a qualified physician. If it is impossible to complete any one of these tests solely because of the poor physical condition of the wearer, when such condition has been brought about through no fault of the apparatus being

tested, such test shall be disregarded, and the apparatus shall not be penalized or disqualified thereby.

(h) At the conclusion of each test a record shall be made of the general physical condition of the wearer and of the apparatus and of the amount of compressed oxygen or compressed air, if any, remaining in the container. The schedule of work to be performed by the wearer of the apparatus in each of the 15 tests is described in § 11.7.

§ 11.7 Detailed procedure of tests.

(a) The tests are designed to represent conditions and work to which the wearer of a self-contained breathing apparatus may be subjected while wearing apparatus under actual conditions in a mine or plant.

(b) The distances specified for walking, running, crawling, and carrying material, with the exception of the distance when carrying material over the overcast, are to be over a level, measured course free from obstructions.

(c) Atmospheric samples and temperature readings from within the apparatus and the pulse and respiration of the wearer of the apparatus will be taken during a 2-minute period at the beginning and at the end of each test. In addition, atmospheric samples and read-

(f) Test 5.

ings of temperature, pulse, and respiration will be taken during 2-minute periods, indicated in Tables 1-5, inclusive, as "Sampling and readings," for each type of apparatus.

(d) Test 1.

TABLE 1—DURATION OF SPECIFIC ACTIVITIES FOR TEST 1

Activity	Self-contained breathing apparatus			
	½-hour A type	¾-hour B type	1-hour C type	2-hour D type
Sampling and readings.....	Minutes 2	Minutes 2	Minutes 2	Minutes 2
Wearer walks at 3 miles per hour.....	8	13	18	28
Sampling and readings.....	2	2	2	2
Wearer walks at 3 miles per hour.....	8	12	17	28
Sampling and readings.....	2	2	2	2
Wearer walks at 3 miles per hour.....	6	12	17	28
Sampling and readings.....	2	2	2	2
Wearer walks at 3 miles per hour.....	-----	-----	-----	26
Sampling and readings.....	-----	-----	-----	2
Total.....	30	45	60	120

(e) Tests 2, 3, and 4. The work schedule for Test 1, given in Table 1, is repeated for each of these tests.

TABLE 2—DURATION OF SPECIFIC ACTIVITIES FOR TEST

Activity	Self-contained breathing apparatus			
	½-hour A type	¾-hour B type	1-hour C type	2-hour D type
Sampling and readings.....	2 minutes.....	2 minutes.....	2 minutes.....	2 minutes.....
Wearer walks at 3 miles per hour.....	2 minutes.....	3 minutes.....	6 minutes.....	10 minutes.....
Carries 50-pound weight over overcast.....	2 times in 4 minutes.....	3 times in 6 minutes.....	4 times in 8 minutes.....	5 times in 10 minutes.....
Walks at 3 miles per hour.....	2 minutes.....	4 minutes.....	4 minutes.....	10 minutes.....
Carries 45-pound weight and walks at 3 miles per hour.....	2 minutes.....	2 minutes.....	2 minutes.....	2 minutes.....
Raises 45-pound weight 5 feet vertically.....	2 minutes.....	3 minutes.....	4 minutes.....	8 minutes.....
Walks at 3 miles per hour.....	30 times in 2 minutes.....	45 times in 3 minutes.....	60 times in 4 minutes.....	75 times in 5 minutes.....
Saws wood as indicated.....	2 minutes.....	6 minutes.....	10 minutes.....	15 minutes.....
Sampling and readings.....	2 minutes.....	2 minutes.....	2 minutes.....	2 minutes.....
Carries 50-pound weight over overcast.....	3 times in 6 minutes.....	4 times in 8 minutes.....	5 times in 10 minutes.....	10 times in 20 minutes.....
Walks at 3 miles per hour.....	2 minutes.....	4 minutes.....	6 minutes.....	8 minutes.....
Sampling and readings.....	2 minutes.....	2 minutes.....	2 minutes.....	2 minutes.....
Walks at 3 miles per hour.....	-----	-----	-----	24 minutes.....
Sampling and readings.....	-----	-----	-----	2 minutes.....
Total.....	30 minutes.....	45 minutes.....	60 minutes.....	120 minutes.....

(g) Tests 6, 7, and 8. The work schedule for Test 5, given in Table 2, is repeated for each of these tests.

(h) Test 9.

TABLE 3—DURATION OF SPECIFIC ACTIVITIES FOR TEST 9

Activity	Self-contained breathing apparatus			
	¼-hour A type	¾-hour B type	1-hour C type	2-hour D type
Sampling and readings.....	2 minutes.....	2 minutes.....	2 minutes.....	2 minutes.....
Wearer walks at 3 miles per hour.....	2 minutes.....	3 minutes.....	4 minutes.....	5 minutes.....
Crawls as indicated.....	25 feet in 3 minutes.....	40 feet in 4 minutes.....	60 feet in 6 minutes.....	100 feet in 10 minutes.....
Lies on his side.....	2 minutes.....	4 minutes.....	5 minutes.....	10 minutes.....
Lies on his back.....	1 minute.....	2 minutes.....	3 minutes.....	5 minutes.....
Sampling and readings.....	2 minutes.....	2 minutes.....	2 minutes.....	2 minutes.....
Walks at 3 miles per hour.....	2 minutes.....	6 minutes.....	6 minutes.....	10 minutes.....
Runs at 6 to 8 miles per hour.....	300 feet in 1 minute.....	400 feet in 2 minutes.....	600 feet in 3 minutes.....	600 feet in 3 minutes.....
Walks at 3 miles per hour.....	3 minutes.....	4 minutes.....	7 minutes.....	15 minutes.....
Sampling and readings.....	2 minutes.....	2 minutes.....	2 minutes.....	2 minutes.....
Walks at 3 miles per hour.....	2 minutes.....	3 minutes.....	6 minutes.....	10 minutes.....
Carries 50-pound weight over overcast.....	2 times in 4 minutes.....	3 times in 6 minutes.....	4 times in 8 minutes.....	5 times in 10 minutes.....
Walks at 3 miles per hour.....	2 minutes.....	3 minutes.....	4 minutes.....	8 minutes.....
Sampling and readings.....	2 minutes.....	2 minutes.....	2 minutes.....	2 minutes.....
Walks at 3 miles per hour.....	.....	.....	.....	24 minutes.....
Sampling and readings.....	.....	.....	.....	2 minutes.....
Total.....	30 minutes.....	45 minutes.....	60 minutes.....	120 minutes.....

(i) Tests 10 and 11. The work schedule for Test 9, given in Table 3, is repeated for each of these tests.

(j) Test 12.

TABLE 4—DURATION OF SPECIFIC ACTIVITIES FOR TEST 12

Activity	Self-contained breathing apparatus			
	¼-hour A type	¾-hour B type	1-hour C type	2-hour D type
Sampling and readings.....	2 minutes.....	2 minutes.....	2 minutes.....	2 minutes.....
Wearer walks at 3 miles per hour.....	1 minute.....	2 minutes.....	2 minutes.....	8 minutes.....
Runs at 6 to 8 miles per hour.....	300 feet in 1 minute.....	300 feet in 1 minute.....	600 feet in 2 minutes.....	600 feet in 2 minutes.....
Raises 45-pound weight 5 feet vertically.....	30 times in 2 minutes.....	45 times in 3 minutes.....	60 times in 4 minutes.....	75 times in 5 minutes.....
Carries 45-pound weight as indicated.....	200 feet in 1 minute.....	400 feet in 2 minutes.....	400 feet in 2 minutes.....	1,000 feet in 5 minutes.....
Carries 50-pound weight over overcast.....	2 times in 4 minutes.....	2 times in 4 minutes.....	4 times in 8 minutes.....	5 times in 10 minutes.....
Sampling and readings.....	2 minutes.....	2 minutes.....	2 minutes.....	2 minutes.....
Walks at 3 miles per hour.....	2 minutes.....	2 minutes.....	4 minutes.....	8 minutes.....
Carries 50-pound weight over overcast.....	2 times in 3 minutes.....	6 times in 9 minutes.....	8 times in 12 minutes.....	10 times in 15 minutes.....
Raises 45-pound weight 5 feet vertically.....	30 times in 2 minutes.....	45 times in 3 minutes.....	60 times in 4 minutes.....	75 times in 5 minutes.....
Sampling and readings.....	2 minutes.....	2 minutes.....	2 minutes.....	2 minutes.....
Walks at 3 miles per hour.....	2 minutes.....	3 minutes.....	4 minutes.....	8 minutes.....
Raises 45-pound weight 5 feet vertically.....	30 times in 2 minutes.....	45 times in 3 minutes.....	60 times in 4 minutes.....	75 times in 5 minutes.....
Walks at 3 miles per hour.....	2 minutes.....	5 minutes.....	6 minutes.....	15 minutes.....
Sampling and readings.....	2 minutes.....	2 minutes.....	2 minutes.....	2 minutes.....
Walks at 3 miles per hour.....	.....	.....	.....	24 minutes.....
Sampling and readings.....	.....	.....	.....	2 minutes.....
Total.....	30 minutes.....	45 minutes.....	60 minutes.....	120 minutes.....

(k) Tests 13 and 14. The work schedule for Test 12, given in Table 4, is repeated for each of these tests.

(l) Test 15.

TABLE 5—DURATION OF SPECIFIC ACTIVITIES FOR TEST 15

Activity	Self-contained breathing apparatus			
	¼-hour A type	¾-hour B type	1-hour C type	2-hour D type
Sampling and readings.....	Minutes 2	Minutes 2	Minutes 2	Minutes 2
Wearer sits quietly.....	8	13	18	28
Sampling and readings.....	2	2	2	2
Wearer sits quietly.....	8	13	18	28
Sampling and readings.....	2	2	2	2
	(1)	(1)	(1)	(1)

¹ Continue sitting quietly and take samples and readings at the same listed intervals until the supply of compressed oxygen or compressed air is exhausted; record the time when the supply is exhausted.

(m) Test 15 is made to determine the maximum length of time that the apparatus will supply the needs of the wearer when in a quiescent state. The wearer will remain as far as possible in a sitting posture throughout the test and perform no work. He will be allowed to manipulate the devices controlling the compressed-oxygen or compressed-air supply to conserve such compressed-oxygen or compressed-air supply to the greatest advantage.

§ 11.8 *Approval of regenerators.* (a) The Bureau will, on application, make separate tests, identical with the foregoing tests, of regenerators manufactured for use with any breathing apparatus that it has approved under the regulations of this part.

(b) Regenerators that fulfill the requirements of the foregoing tests will be approved for use only with that particular type of apparatus for which they are designed and that has previously been approved by the Bureau.

§ 11.9 *Notification of approval or disapproval.* (a) After the Bureau has considered the results of the investigation and suitable drawings and specifications have been placed on file, it will supply the applicant with a formal written notification of approval or disapproval of the self-contained breathing apparatus. If the breathing apparatus meets all requirements of this part, the notification will not be accompanied by test data or detailed results of tests. If the

apparatus fails to meet any requirements of this part, the notification will be accompanied by details of the failure, with a view to possible remedying of the defect or defects in self-contained breathing apparatus submitted for testing and approval in the future. Results of tests of self-contained breathing apparatus that fail to meet the requirements will not be made public by the Bureau.

(b) When an application for testing an apparatus is received and within a period not exceeding 10 days one or more additional applications for testing apparatus are received from sources different from the first application, the Bureau will not announce approval of the first apparatus unless approval can be announced for the other apparatus within a period not exceeding the interval of time between receipt of the first and subsequent applications. This exception is contingent upon the apparatus submitted with each application successfully meeting all of the requirements prescribed in this part. If an apparatus does not meet all of the requirements prescribed in this part it will not delay announcement of approval of such apparatus as have met the requirements.

(c) When an applicant or manufacturer receives formal notification of approval, he shall be free to advertise the type of successfully tested self-contained breathing apparatus as "permissible" and to use the approval inscription described in § 11.10.

§ 11.10 *Approval plates and markings for permissible apparatus and for approved supplemental parts.* (a) Manufacturers of self-contained breathing apparatus that has been approved by the Bureau as permissible and is to be offered for sale as such are required to attach to each apparatus a plate or marking bearing the following inscription:

Permissible Breathing Apparatus, United State Bureau of Mines Approval No.

(b) When a supplemental part, such as a facepiece, is approved for use with an approved self-contained breathing apparatus, it shall be plainly and permanently marked to identify the apparatus for which it is a supplemental part, substantially as follows:

U. S. B. M. Approval No. for use with Breathing Apparatus
(Trade name)
U. S. B. M. Approval No.

The inscription shall be stamped, cast, or molded into the supplemental part of the

breathing apparatus or shall be on a plate attached to the supplemental part.

§ 11.11 *Changes subsequent to approval.* All approvals are granted with the understanding that the manufacturer will make the approved self-contained breathing apparatus according to final drawings and specifications submitted to the Bureau. Therefore, before making any change in an approved apparatus, the manufacturer shall first obtain the Bureau's approval of the change. This procedure is as follows:

(a) The manufacturer shall write to the Central Experiment Station, Bureau of Mines, 4800 Forbes Street, Pittsburgh 13, Pa., requesting an extension of the original approval and stating the change or changes desired. He shall send 2 sets of revised drawings and specifications showing the changes in detail, and 1 each of the apparatus parts affected to the Central Experiment Station.

(b) The Bureau will consider the application and inspect the drawings and parts to determine whether it will be necessary to make tests.

(c) If tests are unnecessary, the applicant will be notified formally by the Bureau of the approval or disapproval of the change.

(d) If tests are necessary, the applicant will be notified of the fee and material required.

§ 11.12 *Withdrawal of approval.* The Bureau reserves the right to rescind for cause any approval granted under the regulations of this part.

Part 12—Supplied-Air Respirators

Sec.	
12.1	Definition of a permissible supplied-air respirator.
12.2	Types of supplied-air respirators.
12.3	Purpose of testing for permissibility.
12.4	Conditions under which supplied-air respirators will be tested.
12.5	Requirements for Bureau of Mines approval.
12.6	Changing details of tests.
12.7	Notification of approval or disapproval.
12.8	Approval markings.
12.9	Material required for Bureau of Mines record.
12.10	Changes subsequent to approval.
12.11	Withdrawal of approval.

AUTHORITY: §§ 12.1 to 12.11 issued under sec. 5, 36 Stat. 370, as amended, sec. 212, 66

Stat. 709; 30 U. S. C. 7, 482. Interpret or apply secs. 2, 3, 36 Stat. 370, as amended; 30 U. S. C. 3, 5.

SOURCE: §§ 12.1 to 12.11 contained in Schedule 19B, 20 F. R. 2564, Apr. 19, 1955; 20 F. R. 6552, Sept. 7, 1955.

§ 12.1 *Definition of a permissible supplied-air respirator.* (a) A supplied-air respirator is permissible for use in harmful or objectionable atmospheres encountered in its field of industrial usage if all the materials and details of construction are the same as and its performance in all respects is equal to or better than that required by applicable portions of this part.

(b) Bureau of Mines approval applies only to a complete supplied-air respirator and not to the integral parts thereof.

(c) The devices are designated by names other than the usual trade names. This change provides logical nomenclature for such devices, obviating dependence on a multiplicity of trade names, and provides for the naming of devices developed in this field in the future. The manufacturer, of course, may continue to advertise his device as a hose mask, air-line respirator, or abrasive blasting device.

§ 12.2 *Types of supplied-air respirators.* With regard to design and approval, supplied-air respirators are subdivided into the following types:

(a) *Type A supplied-air respirator.*

(1) The type A supplied-air respirator is commonly called hose mask. This respirator is designed to require the presence of a man (blower operator) in addition to the wearer; to permit the wearer to inspire air through the hose, connections, and air-supply device (blower) by his lungs alone when the blower is not operated; and to permit the wearer to be drawn to safety by a life line or, if necessary, the hose in case of accident. It is the only supplied-air respirator that will be approved for use in immediately harmful atmospheres or those from which the wearer could not escape without the aid of the respirator.

(2) The principal parts of a type A supplied-air respirator are: A hand operated blower that shall permit free entrance of air to the hose when the blower is not operated; a strong, large-diameter hose having a low resistance to flow of air; a strong harness to which the hose and life line are attached; and a tight-fitting facepiece.