

DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS

DIRECTOR'S OFFICE

GENERAL INDUSTRY SAFETY STANDARDS

Proposed Draft January 28, 2015

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These rules become effective immediately upon filing with the Secretary of State unless adopted under section 33, 44, or 45a(6) of 1969 PA 306.

Rules adopted under these sections become effective 7 days after filing with the Secretary of State.

(By authority conferred on the director of the department of licensing and regulatory affairs by sections 16 and 21 of 1974 PA 154, MCL 408.1016 and 408.1021, and Executive Reorganization Order Nos. 1996-2, 2003-1, 2008-4, and 2011-4, MCL 445.2001, 445.2011, 445.2025, and 445.2030)

R 408.13301a, R 408.13385, R 408.13387, and R 408.13387a of the Michigan Administrative Code are amended and R 408.13388 and R 408.13389 of the Code are added, as follows:

### **PART 33. PERSONAL PROTECTIVE EQUIPMENT**

R 408.13301a **Adopted and referenced standards.** ~~Adoption of standards by reference; access to other MIOSHA rules; appendices.~~

Rule 3301a. (1) The following standards are adopted by reference in these rules and are available from IHS Global, 15 Inverness Way East, Englewood, Colorado, 80112, USA, telephone number: 1-800-854-7179 or via the internet at website: [www.global.ihs.com](http://www.global.ihs.com), at a cost of the time of adoption of these rules, as stated in this subrule.

(a) American National Standards Institute Standard (ANSI) Z-41, "American National Standard for Personal Protection -- Protective Footwear," 1999 edition. Cost \$25.00.

(b) ANSI Z-87.1 "American National Standard Practice for Occupational and Educational Eye and Face Protection," 2003 edition. Cost \$82.00.

(c) ANSI Z-87.1 "American National Standard Practice for Occupational and Educational Eye and Face Protection," 1989 edition, revised 1998. Cost \$148.00.

(d) ANSI Z-87.1 "American National Standard Practice for Occupational and Educational Eye and Face Protection," 1989 edition. Cost: \$148.00.

(e) American Society of Testing Materials Standard (ASTM) D-120, "Standard Specification for Rubber Insulating Gloves," ~~1987-2009~~ edition. Cost: **\$58.00.** ~~\$49.00.~~

(f) ASTM D-178, "Standard Specification for Rubber Insulating Matting," **2001** ~~1988~~ edition **with 2010 supplement.** Cost **\$47.00.** ~~\$49.00.~~

(g) ASTM D-178, "Standard Specification for Rubber Insulating Matting," 1993 edition. Cost \$56.00.

(h) ASTM D-1048, "Standard Specification for Rubber Insulating Blankets," ~~1988a~~ **2012** edition. Cost **\$47.00.** ~~\$49.00.~~

~~(i) ASTM D-1048, "Standard Specification for Rubber Insulating Blankets," 1993 edition. Cost \$56.00.~~

**(j) (i) ASTM D-1049, "Standard Specification for Rubber Insulating Covers," 1998** ~~1988~~ edition **with 2010 supplement.** Cost **\$47.00.** ~~\$49.00.~~

~~(k) ASTM D-1049, "Standard Specification for Rubber Insulating Covers," 1993 edition. Cost \$56.00.~~

**(j) (k) ASTM D-1050 "Standard Specification for Rubber Insulating Line Hose," 2005** ~~1990~~ edition **with 2011 supplement.** Cost **\$47.00.** ~~\$56.00.~~

**(k) (m) ASTM D-1051 "Standard Specification for Rubber Insulating Sleeves," 1987** **2008** edition. Cost **\$58.00.** ~~\$49.00.~~

**(l) (n) ASTM F-478 "Standard Specification for In-Service Care of Insulating Line Hose and Covers," 1992** **2009** edition. Cost **\$52.00.** ~~\$49.00~~

**(m) (o) ASTM F-479 "Standard Specification for In-Service Care of Insulating Blankets," 2006** ~~1988~~ edition **with 2011 supplement.** Cost: **\$47.00.** ~~\$49.00.~~

**(n) (p) ASTM F-496 "Standard Specification for In-Service Care of Insulating Gloves and Sleeves," 1994** **2008** edition. Cost **\$58.00.** ~~\$49.00.~~

**(o) (q) ASTM F-2412, "Standard Test Methods for Foot Protection," 2005 edition. Cost \$64.00.**

**(p) (r) ASTM F-2413, "Standard Specification For Performance Requirements For Protective Footwear," 2005 edition. Cost \$56.00.**

**(q) ASTM F-819 "Standard Terminology Relating to Electrical Protective Equipment for Workers," 2010 edition. Cost \$41.00.**

(r) ASTM F-1236 "Standard Guide for Visual Inspection of Electrical Protective Rubber Products," 1996 edition with 2012 supplement. Cost: \$47.00.

(s) Institute of Electrical and Electronics Engineers IEEE Standard 516 "Guide for Maintenance Methods on Energized Power Lines," 2009 edition. Cost: \$135.00.

(2) The following standards are adopted by reference in these rules and are available from Document Center, Inc., Customer Service, 121 Industrial Road, Suite 8, Belmont, CA 94002, USA, telephone: (650) 591-7600 or via the internet at website: [www.document-center.com](http://www.document-center.com); at a cost as of the time of adoption of these rules, as stated in this subrule.

(a) ANSI Z-89.1 "American National Standard for Industrial Head Protection," 2009 edition. Cost \$61.25.

(b) ANSI Z-89.1, "American National Standard for Industrial Head Protection," 2003 edition. Cost: \$20.00.

(c) ANSI Z-89.1 "American National Standard for Personnel Protection—Protective Headwear for Industrial Workers--Requirements," 1997 edition. Cost: \$20.00.

(3) The standards adopted in **these rules** ~~subrules (1) and (2) of this rule~~ are also available for inspection at the Department of Licensing and Regulatory Affairs, MIOSHA **Regulatory Services Standards** Section, 7150 Harris Drive, P.O. Box 30643, Lansing, Michigan, 48909-8143.

(4) Copies of the standards adopted in **these rules** ~~subrules (1) and (2) of this rule~~ may be obtained from the publisher or may also be obtained from the Department of Licensing and Regulatory Affairs, MIOSHA **Regulatory Services Standards** Section, 7150 Harris Drive, P.O. Box 30643, Lansing, Michigan, 48909-8143, at the cost charged in this rule, plus \$20.00 for shipping and handling.

(5) The following Michigan occupational safety and health standards (MIOSHA) are referenced in these rules. Up to 5 copies of these standards may be obtained at no charge from the Michigan Department of licensing and regulatory affairs, MIOSHA **Regulatory Services standards** section, 7150 Harris Drive, P.O. Box 30643, Lansing, MI, 48909-8143 or via the internet at website: [www.michigan.gov/mioshastandards](http://www.michigan.gov/mioshastandards). For quantities greater than 5, the cost, at the time of adoption of these rules, is 4 cents per page.

(a) Construction Safety Standard Part 45 "Fall Protection," R 408.44501 to R 408.44502.

(b) Occupational Health Standard Part 380 "Occupational Noise Exposure" R 325.60101 to R 325.30128.

(c) Occupational Health Standard Part 451 "Respiratory Protection," R 325.60051 to R 325.60052.

(d) **General Industry Safety Standard Part 86 "Electric Power Generation, Transmission, and Distribution," R 408.18601 to R 408.18605.**

~~(6)~~(5) The appendices are informational only and are not intended to create any additional obligations or requirements not otherwise imposed or to detract from any established obligations or requirements.

R 408.13385. Use of foot protection.

Rule 3385. (1) An employer shall ensure that each affected employee shall wear protective footwear when working in areas where any of the following occur:

(a) **When the use of protective footwear will protect the affected employee from an electrical hazard, such as a static-discharge or electric-shock hazard, that remains after the employer takes other necessary protective measures.** ~~An employee's feet are exposed to electrical hazards.~~

(b) There is a danger of foot injuries due to falling or rolling objects.

(c) There is a danger of objects piercing the sole of the shoe.

(2) **An employer shall ensure that safety shoes and boots that which are not worn over shoes and that which are worn by more than 1 employee are shall be maintained, cleaned, and sanitized inside and out before being issued to another employee**

## ELECTRICAL PROTECTIVE EQUIPMENT

R 408.13387 **Design requirements for specific types of electrical protective equipment.** ~~Electrical protective equipment; design; certification.~~

Rule 3387. (1) **Rubber insulating** ~~insulating~~ blankets, **rubber insulating** matting, **rubber insulating** covers, **rubber insulating** line hose, **rubber insulating** gloves, and **rubber insulating** sleeves ~~made of rubber~~ shall **meet the requirements of this rule.** ~~be in compliance with all of the following requirements: as applicable:~~

~~(a) Blankets, gloves, and sleeves shall be produced by a seamless process.~~

~~(b) Each item shall be clearly marked as follows:~~

~~(i) Class 0 equipment shall be marked class 0.~~

~~(ii) Class 1 equipment shall be marked class 1.~~

~~(iii) Class 2 equipment shall be marked class 2.~~

~~(iv) Class 3 equipment shall be marked class 3.~~

~~(v) Class 4 equipment shall be marked class 4.~~

~~(vi) Non-ozone-resistant equipment other than matting shall be marked type 1.~~

~~(vii) Ozone-resistant equipment other than matting shall be marked type II.~~

~~(viii) Other relevant markings, such as the manufacturer's identification and the size of the equipment, may also be provided.~~

~~(c) Markings shall be nonconducting and shall be applied in a manner that does not impair the insulating qualities of the equipment.~~

~~(d) Markings on gloves shall be confined to the cuff portion of the glove.~~

~~(2) **Manufacture and marking of rubber insulating equipment shall be as follows:** Equipment shall be capable of withstanding the alternating current proof test voltage specified in Table 3 or the direct current proof test voltage specified in Table 4. The proof test shall reliably indicate that the equipment can withstand the voltage involved. The test voltage shall be applied continuously for 3 minutes for equipment other than matting and shall be applied continuously for 1 minute for matting.~~

~~(a) Blankets, gloves, and sleeves shall be produced by a seamless process.~~

~~(b) Each item shall be clearly marked as follows:~~

~~(i) Class 00 equipment shall be marked class 00.~~

~~(ii) Class 0 equipment shall be marked class 0.~~

~~(iii) Class 1 equipment shall be marked class 1.~~

~~(iv) Class 2 equipment shall be marked class 2.~~

~~(v) Class 3 equipment shall be marked class 3.~~

~~(vi) Class 4 equipment shall be marked class 4.~~

~~(vii) Non-ozone-resistant equipment shall be marked type I.~~

~~(viii) Ozone-resistant equipment shall be marked type II.~~

~~(ix) Other relevant markings, such as the manufacturer's identification and the size of the equipment, may also be provided.~~

~~(c) Markings shall be nonconducting and shall be applied in such a manner as not to impair the insulating qualities of the equipment.~~

~~(d) Markings on gloves shall be confined to the cuff portion of the glove.~~

~~(3) **Electrical requirements shall be all of the following:** Gloves shall also be capable of withstanding the alternating current proof test voltage specified in Table 3 after a 16-hour water soak. When the alternating current proof test is used on gloves, the 60-hertz proof test current may not be more than the values specified in Table 3 at any time during the test period. If the alternating current test is made at a frequency other than 60 hertz, the permissible proof test current shall be computed from the direct ratio of the frequencies. For the test, gloves (right side out) shall be filled with tap water and immersed in water to a depth that is in accordance with Table 5. Water shall be added to or removed from the glove, as necessary, so that the water level is the same inside and outside the glove. After the 16-hour water soak specified in this subrule, the 60-hertz proof test current may exceed the values specified in Table 3 by not more than 2 milliamperes.~~

~~(a) Equipment shall be capable of withstanding the alternating current proof-test voltage specified in Table A or the direct current proof-test voltage specified in Table B. All of the following apply:~~

~~(i) The proof test shall reliably indicate that the equipment can withstand the voltage involved.~~

~~(ii) The test voltage shall be applied continuously for 3 minutes for equipment other than matting and shall be applied continuously for 1 minute for matting.~~

~~(iii) Gloves shall also be capable of separately withstanding the alternating current proof-test voltage specified in Table A after a 16-hour water soak.~~

~~(b) When the alternating current proof test is used on gloves, the 60-hertz proof-test current shall not exceed the values specified in Table A at any time during the test period. All of the following apply:~~

~~(i) If the alternating current proof test is made at a frequency other than 60 hertz, the permissible proof-test current shall be computed from the direct ratio of the frequencies.~~

~~(ii) For the test, gloves (right side out) shall be filled with tap water and immersed in water to a depth that is in accordance with Table C. Water shall be added to or removed from the glove, as necessary, so that the water level is the same inside and outside the glove.~~

~~(iii) After the 16-hour water soak specified in this subrule, the 60-hertz proof-test current shall not exceed the values given in Table A by more than 2 milliamperes.~~

~~(c) Equipment that has been subjected to a minimum breakdown voltage test shall not be used for electrical protection. See subrule (3) of this rule.~~

~~(d) Material used for Type II insulating equipment shall be capable of withstanding an ozone test, with no visible effects. The ozone test shall reliably indicate that the material will resist ozone exposure in actual use. Any visible signs of ozone deterioration of the material, such as checking, cracking, breaks, or pitting, is evidence of failure to meet the requirements for ozone-resistant material. See subrule (3) of this rule.~~

~~(4) **Workmanship and finish shall comply with both of the following:** Equipment that has been subjected to a minimum breakdown voltage test may not be used for electrical protection. See subrule (3) of this rule.~~

~~(a) Equipment shall be free of physical irregularities that can adversely affect the insulating properties of the equipment and that can be detected by the tests or inspections required by these rules.~~

~~(b) Surface irregularities that may be present on all rubber goods, because of imperfections on forms or molds or because of inherent difficulties in the manufacturing process, and that may appear as indentations, protuberances, or imbedded foreign material are acceptable under the following conditions:~~

~~(i) The indentation or protuberance blends into a smooth slope when the material is stretched.~~

(ii) Foreign material remains in place when the insulating material is folded and stretches with the insulating material surrounding it.

(5) Rubber insulating equipment meeting the national consensus standards in Table 4 is considered to be in compliance with the performance requirements of these rules. Material used for type II insulating equipment shall be capable of withstanding an ozone test without visible effects. The ozone test shall reliably indicate that the material will resist ozone exposure in actual use. Any visible signs of ozone deterioration of the material, such as checking, cracking, breaks, or pitting, is evidence of failure to meet the requirements for ozone-resistant material. See subrule (3) of this rule.

(6) Equipment shall be free of harmful physical irregularities that can be detected by the tests or inspections required under this rule. Surface irregularities that may be present on all rubber goods because of imperfections on forms or molds or because of inherent difficulties in the manufacturing process and that may appear as indentations, protuberances, or imbedded foreign material are acceptable if both of the following conditions are satisfied:

(a) The indentation or protuberance blends into a smooth slope when the material is stretched.

(b) Foreign material remains in place when the insulating material is folded and stretches with the insulating material surrounding it.

(7) The standards listed in Table 2 are adopted by reference in R 408.13301a.

TABLE 2  
AMERICAN SOCIETY OF TESTING MATERIALS STANDARDS

STANDARD TITLE	ASTM NUMBER	EDITION	SUPPLEMENT
<b>Standard Specification for Rubber Insulating Gloves</b>	D-120	<b>2009</b> 1987	-
<b>Standard Specification for Rubber Insulating Matting</b>	D-178	<b>2001</b> 1993 or 1988	<b>2010</b>
<b>Standard Specification for Rubber Insulating Blankets</b>	D-1048	<b>2012</b> 1993 or 1988a	-
<b>Standard Specification for Rubber Insulating Covers</b>	D-1049	<b>1998</b> 1993 or 1988	<b>2010</b>
<b>Standard Specification for Rubber Insulating Line Hose</b>	D-1050	<b>2005</b> 1990	<b>2011</b>
<b>Standard Specification for Rubber Insulating Sleeves</b>	D-1051	<b>2008</b> 1987	-
<del>In-Service Care of Insulating Line Hose and Covers</del>	F-478	1992	
<del>In-Service Care of Insulating Blankets</del>	F-479	1988	
<del>In-Service Care of Insulating Gloves And Sleeves</del>	F-496	1994	
These standards contain specifications for conducting the various tests required in <b>these rules</b> . subrules (1) to (6) of this rule. <b>For example, the alternating current and direct current proof tests, the breakdown test, the water-soak procedure, and the ozone test described in this rule are described in detail in these ASTM standards.</b>			
<b>ASTM F-1236 "Standard Guide for Visual Inspection of Electrical Protective Rubber Products," 1996 Edition with 2012 supplement, as adopted in R 408.13301a, presents methods and techniques for the visual inspection of electrical protective equipment made of rubber. This guide also contains descriptions and photographs of irregularities that can be found in this equipment</b>			
<b>ASTM F-819 "Standard Terminology Relating to Electrical Protective Equipment for Workers," 2010 edition, as adopted in R 408.13301a, includes definitions of terms relating to the electrical protective equipment covered in these rules.</b>			

R 408.13387a. Electrical protective equipment. use and storage.

Rule 3387a. (1) **Material other than rubber that offers protection equivalent to or greater than rubber may be used if the material is certified to meet the appropriate ASTM standard tests.** ~~Electrical protective equipment shall be maintained in a safe, reliable condition.~~

(2) **An insulated blanket, glove, or sleeve shall be capable of withstanding the voltage to which it may be subjected.** All of the following specific requirements apply to insulating blankets, covers, line hose, gloves, and sleeves made of rubber as applicable:

~~(a) Maximum use voltages shall conform to the voltages listed in Table 6.~~

~~(b) Insulating equipment shall be inspected for damage before each day's use and immediately following any incident that can reasonably be suspected of having caused damage. Insulating gloves shall be given an air test in addition to being inspected.~~

~~(c) Insulating equipment that has any of the following defects shall not be used:~~

~~(i) A hole, tear, puncture, or cut.~~

~~(ii) Ozone cutting or ozone checking, the cutting action produced by ozone on rubber under mechanical stress into a series of interlacing cracks.~~

~~(iii) An embedded foreign object.~~

~~(iv) Any of the following texture changes:~~

~~(A) Swelling.~~

~~(B) Softening.~~

~~(C) Hardening.~~

~~(D) Becoming sticky or inelastic.~~

~~(v) Any other defect that damages the insulating properties.~~

~~(d) Insulating equipment found to have other defects that might affect its insulating properties shall be removed from service and returned for testing under subdivisions (h) and (j) of this subrule.~~

~~(e) Insulating equipment shall be cleaned as needed to remove foreign substances.~~

~~(f) Insulating equipment shall be stored in a location and in a manner to protect it from all of the following:~~

~~(i) Light.~~

~~(ii) Temperature extremes.~~

~~(iii) Excessive humidity.~~

~~(iv) Ozone.~~

~~(v) Other injurious substances and conditions.~~

~~(g) Protector gloves shall be worn over insulating gloves, except that protector gloves need not be used with class 0 gloves under limited use conditions or where small equipment and parts manipulation necessitate unusually high finger dexterity. Any other class of glove may be used for similar work without protector gloves if the employer can demonstrate that the possibility of physical damage to the gloves is small and if the class of glove is 1 class higher than that required for the voltage involved. Insulating gloves that have been used without protector gloves shall not be used at a higher voltage until they have been tested under the provisions of subdivisions (h) and (i) of this subrule. Extra care shall be taken when visually examining gloves and to avoid handling sharp objects.~~

~~(h) Electrical protective equipment shall be subjected to periodic electrical tests. Test voltages and the maximum intervals between tests shall be in accordance with Table 6 and Table 7.~~

~~(i) The test method used in this subrule shall reliably indicate whether the insulating equipment can withstand the voltages involved. The standard electrical test methods considered as meeting this requirement are listed in Table 2.~~

~~(j) Only insulating equipment that passes inspection or electrical tests may be used by employees, except that rubber insulating line hose may be used in shorter lengths if the defective portion is cut off. Rubber insulating blankets may be repaired using a compatible patch that results in physical and electrical properties equal to those of the blanket. Rubber insulating blankets may be salvaged by severing the defective area from the undamaged portion of the blanket. The resulting undamaged area may not be less than 22 inches by 22 inches (560mm by 560mm) for class 1, 2, 3, and 4 blankets. Rubber insulating gloves and sleeves that have minor physical defects, such as small cuts, tears, or punctures, may be repaired by applying a compatible patch. Rubber insulating gloves and sleeves that have minor surface blemishes may be repaired with a compatible liquid compound. The patched area shall have electrical and physical properties equal to those of the surrounding material. Repairs to gloves are permitted only in the area between the wrist and the reinforced edge of the opening.~~

~~(k) Repaired insulating equipment shall be retested before use by employees.~~

~~(l) An employer shall certify that equipment has been tested in accordance with the requirements of subrule (2)(h),(i), and (k) of this rule. The certification shall identify the equipment that passed the test and the date it was tested. The employer may mark equipment and enter the results of the tests and the dates of testing, logs are acceptable means of equipment identification.~~

**(3) Exposed conductors or equipment, or both, except for conductors or equipment being directly worked on, that is energized from 750 volts to 28,000 volts phase to ground and that an employee may reach into or touch shall be isolated or covered with at least 1 of the following:** ~~Material other than rubber that offers protection equivalent to or greater than rubber may be used if the material is certified to meet the appropriate ASTM standard tests.~~

- (a) An insulating blanket.**
- (b) An insulating hood.**
- (c) An insulating line hose.**
- (d) An insulating barrier.**

**(4) An employee shall use insulating gloves and sleeves capable of withstanding the imposed voltage when performing any of the following activities:** ~~An insulated blanket, glove, or sleeve shall be capable of withstanding the voltage to which it may be subjected.~~

**(a) Working directly on, or within reaching distance of, a conductor or equipment at a nominal 750 volts or more phase to ground, except when using barehanded techniques or a hot stick. Sleeves are not required for an employee who performs routine switching operations in a substation or powerhouse. An employee who uses gloves and sleeves and works directly on or within reaching distance of a conductor or equipment energized at more than 5,000 volts phase to ground shall do so from an insulated platform or board or an aerial device that has an insulated basket.**

**(b) Connecting or disconnecting primary neutrals, pole ground wires, or other conductors normally connected to static wires or energized equipment, except that gloves and sleeves shall not be worn while connecting and disconnecting a service neutral or secondary neutral.**

**(c) Working on a de-energized conductor that extends into an area in which contact may be made with an energized conductor or exposed parts of energized equipment, unless the conductor is grounded or isolated. Insulating sleeves are optional at voltages of less than 750 volts phase to ground.**

**(5) An employee shall use insulating gloves capable of withstanding the imposed voltage when performing either of the following activities:** ~~Exposed conductors or equipment, or both, except for conductors or equipment being directly worked on, that is energized from 750 volts to 28,000 volts phase to ground and that an employee may reach into or touch shall be isolated or covered with at least 1 of the following:~~

**(a) When working with a powered or manual hole digger while using booms or using winch lines to install or remove poles or equipment where the hole digger may contact conductors or equipment energized at a voltage of 300 volts or more phase to ground. An employee shall not use the gloves while in the enclosed cab of the equipment. An insulating blanket.**

**(b) When working directly on a conductor or equipment energized at a voltage of more than 240 volts phase to ground. This does not include the use of test equipment. An insulating hood.**

~~(c) An insulating line hose.~~

~~(d) An insulating barrier.~~

~~(6) An employee shall use insulating gloves and sleeves capable of withstanding the imposed voltage when performing any of the following activities:~~

~~(a) Working directly on, or within reaching distance of, a conductor or equipment at a nominal 750 volts or more phase to ground, except when using barehanded techniques or a hot stick. Sleeves are not required for an employee who performs routine switching operations in a substation or powerhouse. An employee who uses gloves and sleeves and works directly on or within reaching distance of a conductor or equipment energized at more than 5,000 volts phase to ground shall do so from an insulated platform or board or an aerial device that has an insulated basket.~~

~~(b) Connecting or disconnecting primary neutrals, pole ground wires, or other conductors normally connected to static wires or energized equipment, except that gloves and sleeves need not be worn while connecting and disconnecting a service neutral or secondary neutral.~~

~~(c) Working on a de-energized conductor that extends into an area in which contact may be made with an energized conductor or exposed parts of energized equipment, unless the conductor is grounded or isolated. Insulating sleeves are optional at voltages of less than 750 volts phase to ground.~~

~~(7) An employee shall use insulating gloves capable of withstanding the imposed voltage when performing either of the following activities:~~

~~(a) When working with a powered or manual hole digger while using booms or using winch lines to install or remove poles or equipment where the hole digger may contact conductors or equipment energized at a voltage of 300 volts or more phase to ground. An employee need not use the gloves while in the enclosed cab of the equipment.~~

~~(b) When working directly on a conductor or equipment energized at a voltage of more than 240 volts phase to ground. This does not include the use of test equipment.~~

**TABLE 3  
ALTERNATING CURRENT PROOF-TEST REQUIREMENTS**

CLASS OF EQUIPMENT	PROOFTEST VOLTAGE RMS V	MAXIMUM PROOF-TEST CURRENT, Ma (Globes Only)			
		267 mm 10.5 in.) Glove	356 mm (14 in.) Glove	406 mm (16 in.) Glove	457 mm (18 in.) Glove
0	5,000	8	12	14	16
1	10,000	-	14	16	18
2	20,000	-	16	18	20
3	30,000	-	18	20	22
4	40,000	-	-	22	24

**TABLE 4  
DIRECT CURRENT PROOF-TEST REQUIREMENTS**

CLASS OF EQUIPMENT	PROOF-TEST VOLTAGE
0	20,000
1	40,000
2	50,000
3	60,000
4	70,000

~~NOTE: The direct current voltages listed in this table are not appropriate for proof-testing rubber insulating line hose or covers. For this equipment, direct current proof tests shall use a voltage high enough to indicate that the equipment can be safely used to the voltages listed in Table 5.~~

See ASTM D-1050 "Rubber Insulating Line Hose," 1990 edition and ASTM D-1049 "Rubber Insulating Covers," 1993 or 1988 edition as adopted in R 408.13301a, for further information on proof tests for rubber insulating line hose and covers.

**TABLE 5  
GLOVE TESTS — WATER LEVEL 1, 2**

CLASS OF GLOVE	ALTERNATING CURRENT PROOF TEST		DIRECT CURRENT PROOF TEST	
	mm.	Inches	mm.	Inches
0	38	1.5	38	1.5
1	38	1.5	51	2.0
2	64	2.5	76	3.0
3	89	3.5	102	4.0
4	127	5.0	153	6.0

1. The water level is given as the clearance from the cuff of the glove to the waterline, with a tolerance of  $\pm 13$ mm. ( $\pm 0.5$  inches).

2. If atmospheric conditions make the specified clearances impractical, the clearances may be increased by a maximum of 25mm. (1 inch).

TABLE 6  
RUBBER INSULATING EQUIPMENT,  
VOLTAGE REQUIREMENTS

CLASS OF EQUIPMENT	MAXIMUM USE VOLTAGE	RETEST VOLTAGE ALTERNATING CURRENT ROOT MEAN SQUARE	RETEST VOLTAGE DIRECT CURRENT AVERAGE
0	1,000	5,000	20,000
1	7,500	10,000	40,000
2	17,000	20,000	50,000
3	26,500	30,000	60,000
4	36,000	40,000	70,000

1. The maximum use voltage is the alternating current voltage (root mean square) classification of the protective equipment that designates the maximum nominal design voltage of the energized system that may be safely worked. The nominal voltage is equal to the phase-to-phase voltage on multiphase circuits. However, the phase-to-ground potential is considered to be the nominal design voltage in either of the following situations:
  - (a) If there is no multiphase exposure in a system area and if the voltage exposure is limited to the phase-to-ground potential.
  - (b) If the electrical equipment and devices are insulated or isolated, or both, so that the multiphase exposure on a grounded wye circuit is removed.
2. The proof test voltage shall be applied continuously for not less than 1 minute, but not more than 3 minutes.

TABLE 7  
RUBBER INSULATING EQUIPMENT TEST INTERVALS

TYPE OF EQUIPMENT	WHEN TO TEST
Rubber insulating line hose	Upon indication that insulating value is suspect.
Rubber insulating covers	Upon indication that insulating value is suspect.
Rubber insulating blankets	Before first issue and every 12 months.
Rubber insulating gloves	Before first issue and every 6 months.
Rubber insulating sleeves	Before first issue and every 12 months.

If the insulating equipment has been electrically tested, but not issued for service, the equipment may not be placed into service unless it has been electrically tested within the previous 12 months.

**R 408.13388 Design requirements for other types of electrical protective equipment.**

**Rule 3388. (1) The following requirements apply to the design and manufacture of electrical protective equipment that is not covered by R 408.40650:**

**(2) Insulating equipment used for the protection of employees shall be capable of withstanding, without failure, the voltages that may be imposed upon it.**

**Note 1 to subrule (2): These voltages include transient over-voltages, such as switching surges, as well as nominal line voltage. See General Industry Safety Standard Part 86 "Electric Power Generation, Transmission, and Distribution," Appendix B, as referenced in R 408.13301a, for a discussion of transient over-voltages on electric power transmission and distribution systems.**

**Note 2 to subrule (2): See IEEE 516 "Guide for Maintenance Methods on Energized Power Lines," 2009 edition, as adopted in R 408.13301a, for methods of determining the magnitude of transient over-voltages on an electrical system and for a discussion comparing the ability of insulation equipment to withstand a transient overvoltage based on its ability to withstand alternating current voltage testing.**

**(3) Equipment current shall comply with both of the following:**

**(a) Protective equipment used for the primary insulation of employees from energized circuit parts shall be capable of passing a current test when subjected to the highest nominal voltage on which the equipment is to be used.**

**(b) When insulating equipment is tested pursuant to these rules, the equipment current may not exceed 1 microampere per kilovolt of phase-to-phase applied voltage.**

**Note 1 to subrule (3): This rule shall apply to equipment that provides primary insulation of employees from energized parts. It does not apply to equipment used for secondary insulation or equipment used for brush contact only.**

**Note 2 to subrule (3): For alternating current excitation, this current consists of the following three components:**

**(a) Capacitive current because of the dielectric properties of the insulating material itself.**

**(b) Conduction current through the volume of the insulating equipment.**

**(c) Leakage current along the surface of the tool or equipment.**

**The conduction current shall be normally negligible. For clean, dry insulating equipment, the leakage current shall be small, and the capacitive current shall predominate.**

**Note 3 to subrule (3): Plastic guard equipment is considered to conform to the performance requirements of this rule, if it meets, and is used in accordance with ASTM F-712 "Standard Test Methods and Specifications for Electrically Insulating Plastic Guard Equipment for Protection of Workers," 2006 edition with 2011 supplement, as adopted in R 408.13301a.**

**R 408.13389 In-service care and use of electrical protective equipment.**

**Rule 3389. (1) Electrical protective equipment shall be maintained in a safe, reliable condition.**

**(2) The following specific requirements apply to rubber insulating blankets, rubber insulating covers, rubber insulating line hose, rubber insulating gloves, and rubber insulating sleeves.**

**(3) Maximum use voltages shall conform to those listed in Table D.**

**(4) An employer shall ensure that insulating equipment is inspected for damage before each day's use and immediately following any incident that can reasonably be suspected of causing damage. Insulating gloves shall be given an air test, along with the inspection.**

**Note to subrule (4): ASTM F-1236 "Standard Guide for Visual Inspection of Electrical Protective Rubber Products," 1996 Edition with 2012 supplement, as adopted in R 408.13301a, presents methods and techniques for the visual inspection of electrical protective equipment made of rubber. This guide also contains descriptions and photographs of irregularities that can be found in this equipment.**

**(5) Insulating equipment with any of the following defects shall not be used.**

**(a) A hole, tear, puncture, or cut.**

**(b) Ozone cutting or ozone checking, that is, a series of interlacing cracks produced by ozone on rubber under mechanical stress.**

**(c) An embedded foreign object.**

**(d) Any of the following texture changes:**

**(i) Swelling.**

**(ii) Softening.**

**(iii) Hardening.**

**(iv) Becoming sticky or inelastic.**

**(v) Any other defect that damages the insulating properties.**

**(6) An employer shall ensure that insulating equipment found to have other defects that might affect its insulating properties is removed from service and returned for testing under subrules (10) and (11) of this rule.**

**(7) An employer shall ensure that insulating equipment is cleaned as needed to remove foreign substances.**

**(8) Insulating equipment shall be stored in a location and in a manner as to protect it from all of the following:**

**(a) Light.**

**(b) Temperature extremes.**

**(c) Excessive humidity.**

**(d) Ozone.**

**(e) Other damaging substances and conditions.**

**(9) Protector gloves shall be worn over insulating gloves, except under the following conditions:**

**(a) Protector gloves need not be used with class 0 gloves, under limited-use conditions, when small equipment and parts manipulation necessitate unusually high finger dexterity.**

**Note to subrule (9)(a):** Persons inspecting rubber insulating gloves used under these conditions shall take extra care in visually examining them. Employees using rubber insulating gloves under these conditions shall take extra care to avoid handling sharp objects.

**(b) If the voltage does not exceed 250 volts, ac, or 375 volts, direct current, protector gloves shall not be used with class 00 gloves, under limited-use conditions, when small equipment and parts manipulation necessitate unusually high finger dexterity.**

**Note to subrule (9)(b):** Persons inspecting rubber insulating gloves used under these conditions shall take extra care in visually examining them. Employees using rubber insulating gloves under these conditions shall take extra care to avoid handling sharp objects.

**(c) Any other class of glove may be used without protector gloves, under limited-use conditions, when small equipment and parts manipulation necessitate unusually high finger dexterity but only if the employer can demonstrate that the possibility of physical damage to the gloves is small and if the class of glove is 1 class higher than that required for the voltage involved.**

**(d) Insulating gloves that have been used without protector gloves may not be reused until they have been tested under the provisions of this rule.**

**(10) Electrical protective equipment shall be subjected to periodic electrical tests. Test voltages and the maximum intervals between tests shall be pursuant to Table D and Table E.**

**(11) The test method used in this rule shall reliably indicate whether the insulating equipment can withstand the voltages involved.**

**Note to subrule (11):** The standard electrical test methods considered as meeting this requirement are listed in Table 3.

**(12) Insulating equipment failing to pass inspections or electrical tests shall not be used by employees, except as follows:**

**(a) Rubber insulating line hose may be used in shorter lengths with the defective portion cut off.**

**(b) Rubber insulating blankets may be salvaged by severing the defective area from the undamaged portion of the blanket. The resulting undamaged area shall not be smaller than 560 millimeters by 560 millimeters (22 inches by 22 inches) for class 1, 2, 3, and 4 blankets.**

**(c) Rubber insulating blankets shall be repaired using a compatible patch that results in physical and electrical properties equal to those of the blanket.**

**(d) Rubber insulating gloves and sleeves with minor physical defects, such as small cuts, tears, or punctures, shall be repaired by the application of a compatible patch. Also, rubber insulating gloves and sleeves with minor surface blemishes shall be repaired with a compatible liquid compound. The repaired area shall have electrical and physical properties equal to those of the surrounding material. Repairs to gloves shall be permitted only in the area between the wrist and the reinforced edge of the opening.**

**(13) An employer shall ensure that repaired insulating equipment is retested before it is used by employees.**

**(14) The employer shall certify that equipment has been tested pursuant to the requirements of this rule. The certification shall identify the equipment that passed the test and the date it was tested and shall be made available upon request to the department of licensing and regulatory affairs director and to MIOSHA employees or their authorized representatives.**

**Note to subrule (14):** Marking equipment with, and entering onto logs, the results of the tests and the dates of testing are acceptable means of meeting the certification requirement.

**TABLE 3  
AMERICAN SOCIETY OF TESTING MATERIALS STANDARDS**

STANDARD TITLE	ASTM NUMBER	EDITION	SUPPLEMENT
Standard Specification for Rubber Insulating Gloves	D-120	2009	-
Standard Specification for Rubber Insulating Matting	D-178	2001	2010
Standard Specification for Rubber Insulating Blankets	D-1048	2012	
Standard Specification for Rubber Insulating Covers	D-1049	1998	2010
Standard Specification for Rubber Insulating Line Hose	D-1050	2005	2011
Standard Specification for Rubber Insulating Sleeves	D-1051	2008	-
Standard Specification for In-Service Care of Insulating Line Hose and Covers	F-478	2009	-
Standard Specification for In-Service Care of Insulating Blankets	F-479	2006	2011
Standard Specification for In-Service Care of Insulating Gloves And Sleeves	F-496	2008	-

**TABLE A  
ALTERNATING CURRENT PROOF-TEST REQUIREMENTS**

CLASS OF EQUIPMENT	PROOF-TEST VOLTAGE RMS V	Maximum Proof-Test Current, mA (Globes Only)			
		280-mm (11 in.) Glove	360-mm (14 in.) Glove	410-mm (16 in.) Glove	460-mm (18 in.) Glove
00	2,500	8	12	-	-
0	5,000	8	12	14	16
1	10,000	-	14	16	18
2	20,000	-	16	18	20
3	30,000	-	18	20	22
4	40,000	-	-	22	24

**TABLE B  
DIRECT CURRENT PROOF-TEST REQUIREMENTS**

CLASS OF EQUIPMENT	PROOF-TEST VOLTAGE
00	10,000
0	20,000
1	40,000
2	50,000
3	60,000
4	70,000

**NOTE:** The dc voltages listed in this table are not appropriate for proof testing rubber insulating line hose or covers. For this equipment, dc proof tests shall use a voltage high enough to indicate that the equipment can be safely used at the voltages listed in Table D.

See ASTM D-1050 "Standard Specification for Rubber Insulating Line Hose," 2005 edition with 2011 supplement and ASTM D-1049 "Standard Specification for Rubber Insulating Covers," 1998 edition with 2010 supplement, as adopted in R 408.13301a, for further information on proof tests for rubber insulating line hose and covers, respectively.

**TABLE C  
GLOVE TESTS – WATER LEVEL<sup>1,2</sup>**

CLASS OF GLOVE	ALTERNATING CURRENT PROOF TEST		DIRECT CURRENT PROOF TEST	
	mm	in	mm	in
00	38	1.5	38	1.5
0	38	1.5	38	1.5
1	38	1.5	51	2.0
2	64	2.5	76	3.0
3	89	3.5	102	4.0
4	127	5.0	153	6.0

<sup>1</sup> The water level is given as the clearance from the reinforced edge of the glove to the water line, with a tolerance of  $\pm 13$  mm. ( $\pm 0.5$  in.).

<sup>2</sup> If atmospheric conditions make the specified clearances impractical, the clearances may be increased by a maximum of 25 mm. (1 in.).

**TABLE D  
RUBBER INSULATING EQUIPMENT, VOLTAGE REQUIREMENTS**

<b>CLASS OF EQUIPMENT</b>	<b>MAXIMUM USE VOLTAGE<sup>1</sup> ALTERNATING CURRENT RMS</b>	<b>RETEST VOLTAGE<sup>2</sup> ALTERNATING CURRENT RMS</b>	<b>RETEST VOLTAGE<sup>2</sup> DIRECT CURRENT AVG</b>
00	500	2,500	10,000
0	1,000	5,000	20,000
1	7,500	10,000	40,000
2	17,000	20,000	50,000
3	26,500	30,000	60,000
4	36,000	40,000	70,000

<sup>1</sup> The maximum use voltage is the ac voltage (rms) classification of the protective equipment that designates the maximum nominal design voltage of the energized system that may be safely worked. The nominal design voltage is equal to the phase-to-phase voltage on multiphase circuits. However, the phase-to-ground potential is considered to be the nominal design voltage under the following conditions:

(1) There is no multiphase exposure in a system area and the voltage exposure is limited to the phase-to-ground potential, or

(2) The electric equipment and devices are insulated or isolated or both so that the multiphase exposure on a grounded wye circuit is removed.

<sup>2</sup> The proof-test voltage shall be applied continuously for at least 1 minute, but no more than 3 minutes.

**TABLE E  
RUBBER INSULATING EQUIPMENT TEST INTERVALS**

<b>TYPE OF EQUIPMENT</b>	<b>WHEN TO TEST</b>
Rubber insulating line hose	Upon indication that insulating value is suspect and after repair.
Rubber insulating covers	Upon indication that insulating value is suspect and after repair.
Rubber insulating blankets	Before first issue and every 12 months thereafter; <sup>1</sup> upon indication that insulating value is suspect; and after repair
Rubber insulating gloves	Before first issue and every 6 months thereafter; <sup>1</sup> upon indication that insulating value is suspect; after repair; and after use without protectors
Rubber insulating sleeves	Before first issue and every 12 months thereafter; <sup>1</sup> upon indication that insulating value is suspect; and after repair

<sup>1</sup> If the insulating equipment has been electrically tested but not issued for service, the insulating equipment shall not be placed into service unless it has been electrically tested within the previous 12 months.