WSR 17-21-015

EXPEDITED RULES

DEPARTMENT OF LICENSING

[Filed October 9, 2017, 8:10 a.m.]

Title of Rule and Other Identifying Information: Real estate brokers and managing brokers, WAC 308-124A-760 Grading of examinations.

Purpose of the Proposal and Its Anticipated Effects, Including Any Changes in Existing Rules: This expedited rule making will modify WAC 308-124A-760 to clarify that the questions on the managing broker state examination are related to the simulations. This language mirrors the national portion of the WAC.

Reasons Supporting Proposal: The WAC change is to clarify and be transparent that the state portion of the examination is simulation; it is not making a substantive change.

Statutory Authority for Adoption: RCW 18.85.041.

Statute Being Implemented: RCW 18.85.181.

Rule is not necessitated by federal law, federal or state court decision.

Name of Proponent: Department of licensing, governmental.

Name of Agency Personnel Responsible for Drafting, Implementation, and Enforcement: Jerry McDonald, 2000 4th Avenue West, Olympia, WA 98502, 360-664-6526.

This notice meets the following criteria to use the expedited adoption process for these rules:

Corrects typographical errors, make address or name changes, or clarify language of a rule without changing its effect.

Explanation of the Reason the Agency Believes the Expedited Rule-making Process is Appropriate: This expedited rule making does not make substantive changes to the WAC, rather it provides clarification. The agency will provide direct notice to stakeholders and all active licensees under chapter 18.85 RCW. Details will be posted on our web site and distributed through the real estate listserv at http://www.dol.wa.gov/business/realestate/relist.html.

NOTICE

THIS RULE IS BEING PROPOSED UNDER AN EXPEDITED RULE-MAKING PROCESS THAT WILL ELIMINATE THE NEED FOR THE AGENCY TO HOLD PUBLIC HEARINGS, PREPARE A SMALL BUSINESS ECONOMIC IMPACT STATEMENT, OR PROVIDE RESPONSES TO THE CRITERIA FOR A SIGNIFICANT LEGISLATIVE RULE. IF YOU OBJECT TO THIS USE OF THE EXPEDITED RULE-MAKING PROCESS, YOU MUST EXPRESS YOUR OBJECTIONS IN WRITING AND THEY MUST BE SENT TO Jerry McDonald, Department of Licensing, Real Estate Program, P.O. Box 48053, Olympia, WA 98502-48053 [98504-8053], phone 360-664-6526, fax 360-586-0998, email jmcdonald@dol.wa.gov, AND RECEIVED BY December 16 [18], 2017.

October 9, 2017
Damon Monroe
Rules Coordinator

AMENDATORY SECTION (Amending WSR 13-14-077, filed 7/1/13, effective 8/1/13)

WAC 308-124A-760 Grading of examinations. (1) To pass the broker examination a minimum scaled score of 70 is required on each portion. The broker examination shall consist of two portions:

(a) The national portion consisting of questions that test general real estate practices; and

(b) The state portion consisting of questions that test on Washington laws and regulations related to real estate licensing.

(2) To pass the managing broker examination a minimum scaled score of 75 is required on each portion. The managing broker examination shall consist of two portions:

(a) The national portion consisting of simulation examination questions that test general real estate brokerage practices which include information gathering and decision-making aspects. A candidate must achieve a minimum scaled score of 75 on each aspect to pass the entire portion; and

(b) The state portion consisting of simulation examination questions that test on Washington laws and regulations related to real estate licensing, and the closing/settlement process.

(3) A passing score for a portion of an examination is valid for a period of six months.

WSR 17-21-043

EXPEDITED RULES

PROFESSIONAL EDUCATOR STANDARDS BOARD

[Filed October 13, 2017, 9:11 a.m.]

Title of Rule and Other Identifying Information: Amending WAC 181-78A-300 to correct drafting error that changes the meaning of the requirement. In March 2015 in public hearing the rule was amended to permit the WEST B basis skill assessment to also have alternatives and exemptions. In the wording, the alternatives/exemptions applied to admittance but the intent was for alternatives/exemptions also to apply for the candidate to enter student teaching. An interpretive statement was filed by the professional educator standards board (PESB) under WSR 17-20-056 on September 29, 2017.

Purpose of the Proposal and Its Anticipated Effects, Including Any Changes in Existing Rules: Correct drafting error.

Reasons Supporting Proposal: Clarifies that alternatives and exemptions to WEST B testing are permitted as evidence of teacher readiness for student teaching.

Statutory Authority for Adoption: RCW 28A.410.220.

Rule is not necessitated by federal law, federal or state court decision.

Name of Proponent: PESB, governmental.

Name of Agency Personnel Responsible for Drafting, Implementation, and Enforcement: David Brenna, 600 Washington Street, Olympia, WA, 360-725-6238.

This notice meets the following criteria to use the expedited adoption process for these rules:

Corrects typographical errors, make address or name changes, or clarify language of a rule without changing its effect.

Explanation of the Reason the Agency Believes the Expedited Rule-making Process is Appropriate: Modifying language was not included in the sentence related to requirements for student teaching.

NOTICE

THIS RULE IS BEING PROPOSED UNDER AN EXPEDITED RULE-MAKING PROCESS THAT WILL ELIMINATE THE NEED FOR THE AGENCY TO HOLD PUBLIC HEARINGS, PREPARE A SMALL BUSINESS ECONOMIC IMPACT STATEMENT, OR PROVIDE RESPONSES TO THE CRITERIA FOR A SIGNIFICANT LEGISLATIVE RULE. IF YOU OBJECT TO THIS USE OF THE EXPEDITED RULE-MAKING PROCESS, YOU MUST EXPRESS YOUR OBJECTIONS IN WRITING AND THEY MUST BE SENT TO David Brenna, PESB, 600 Washington Street, Olympia, WA, phone 360-725-6238, fax 360-586-4548, email david.brenna@k12.wa.us, AND RECEIVED BY December 19, 2017.

October 11, 2017
David Brenna
Senior Policy Analyst

AMENDATORY SECTION (Amending WSR 15-08-054, filed 3/27/15, effective 4/27/15)

WAC 181-78A-300 Program requirements for teacher candidates. (1) Approved programs for teachers shall assure that all candidates entering the program shall have successfully passed the WEST B or its alternative or exemptions per chapter 181-01 WAC. The candidate must take and pass the WEST B, or provide evidence of meeting an alternative or exception at the time of admissions. Candidates admitted to a residency teacher preparation program prior to passage of the WEST B ((~~or its approved alternative or exemptions~~)) must pass the WEST B or show evidence of the alternative or exemption prior to student teaching. The program shall collect and hold evidence of this requirement.

(2) Approved programs, when placing a teacher candidate in the student teaching role with a school district, shall assure that the candidate has successfully attempted at least one WEST E or equivalent content assessment test per chapter 181-02 WAC. The program shall collect and hold evidence of this requirement.

(3) This section shall be in effect beginning September 1, 2017.

WSR 17-21-050
EXPEDITED RULES
DEPARTMENT OF REVENUE
[Filed October 13, 2017, 12:18 p.m.]

Title of Rule and Other Identifying Information: WAC 458-18-220 Refunds—Rate of interest, 458-30-262 Agricultural land valuation—Interest rate—Property tax component, and 458-30-590 Rates of inflation—Publication—Interest rate—Calculation.

Purpose of the Proposal and Its Anticipated Effects, Including Any Changes in Existing Rules: The department proposes to amend:

- WAC 458-18-220 to provide the rate of interest for treasury bill auction year 2017, which is used when refunding property taxes paid in 2018, as required by RCW 84.69.100.
- WAC 458-30-262 to provide the interest rate and property tax component used when valuing classified farm and agricultural land during the 2018 assessment year, as required by RCW 84.34.065.
- WAC 458-30-590 to provide the rate of inflation used in calculating interest for deferred special benefit assessments of land removed or withdrawn during 2018, as required by RCW 84.34.310.

Copies of draft rules are available for viewing and printing on our web site at dor.wa.gov.

Reasons Supporting Proposal: The department is required by statute to annually update these rules to provide the information identified above.

Statutory Authority for Adoption: RCW 84.34.065, 84.34.141, 84.34.360, and 84.69.100.

Statute Being Implemented: RCW 84.34.055, 84.34.065, 84.34.141, 84.34.310, 84.34.360, 84.68.030, and 84.69.100.

Rule is not necessitated by federal law, federal or state court decision.

Name of Proponent: Department of revenue, governmental.

Name of Agency Personnel Responsible for Drafting: Leslies [Leslie] Mullin, 6400 Linderson Way S.W., Tumwater, WA, 360-534-1589; Implementation and Enforcement: Marcus Glasper, 6400 Linderson Way S.W., Tumwater, WA, 360-534-1615.

This notice meets the following criteria to use the expedited adoption process for these rules:

Adopts or incorporates by reference without material change federal statutes or regulations, Washington state statutes, rules of other Washington state agencies, shoreline master programs other than those programs governing shorelines of statewide significance, or, as referenced by Washington state law, national consensus codes that generally establish industry standards, if the material adopted or incorporated regulates the same subject matter and conduct as the adopting or incorporating rule.

Explanation of the Reason the Agency Believes the Expedited Rule-making Process is Appropriate: The department is required by Washington state statutes to annually update these rules.

NOTICE

THIS RULE IS BEING PROPOSED UNDER AN EXPEDITED RULE-MAKING PROCESS THAT WILL ELIMINATE THE NEED FOR THE AGENCY TO HOLD PUBLIC HEARINGS, PREPARE A SMALL BUSINESS ECONOMIC IMPACT STATEMENT, OR PROVIDE RESPONSES TO THE CRITERIA FOR A SIGNIFICANT LEGISLATIVE RULE. IF YOU OBJECT TO THIS USE OF THE EXPEDITED RULE-MAKING PROCESS, YOU MUST EXPRESS YOUR OBJECTIONS IN WRITING AND THEY MUST BE SENT TO Leslie Mullin, Department of Revenue, P.O. Box 47453, Olympia, WA 98504-7453, phone 360-534-1589, fax 360-534-1606, email LeslieMu@dor.wa.gov, AND RECEIVED BY December 18, 2017.

October 13, 2017
Erin T. Lopez
Rules Coordinator

AMENDATORY SECTION (Amending WSR 17-01-162, filed 12/21/16, effective 1/1/17)

WAC 458-18-220 Refunds—Rate of interest. The following rates of interest apply to refunds of taxes made pursuant to RCW 84.69.010 through 84.69.090 in accordance with RCW 84.69.100. The following rates also apply to judgments entered in favor of the plaintiff pursuant to RCW 84.68.030. The interest rate is derived from the equivalent coupon issue yield of the average bill rate for twenty-six week treasury bills as determined at the first bill market auction conducted after June 30th of the calendar year preceding the date the taxes were paid. The rate is applied to the amount of the judgment or the amount of the refund, until paid:

Year tax paid	Auction Year	Rate
1984	1983	9.29%
1985	1984	11.27%
1986	1985	7.36%
1987	1986	6.11%
1988	1987	5.95%
1989	1988	7.04%
1990	1989	8.05%
1991	1990	8.01%
1992	1991	5.98%
1993	1992	3.42%
1994	1993	3.19%
1995	1994	4.92%
1996	1995	5.71%
1997	1996	5.22%
1998	1997	5.14%
1999	1998	5.06%
2000	1999	4.96%
2001	2000	5.98%
2002	2001	3.50%
2003	2002	1.73%
2004	2003	0.95%
2005	2004	1.73%
2006	2005	3.33%
2007	2006	5.09%
2008	2007	4.81%
2009	2008	2.14%
2010	2009	0.29%
2011	2010	0.21%
2012	2011	0.08%
2013	2012	0.15%
2014	2013	0.085%
2015	2014	0.060%
2016	2015	0.085%
2017	2016	0.340%
2018	2017	1.130%

AMENDATORY SECTION (Amending WSR 17-01-162, filed 12/21/16, effective 1/1/17)

WAC 458-30-262 Agricultural land valuation—Interest rate—Property tax component. For assessment year ((~~2017~~)) 2018, the interest rate and the property tax component that are used to value classified farm and agricultural lands are as follows:

(1) The interest rate is ((~~4.53~~)) 4.69 percent; and

(2) The property tax component for each county is:

COUNTY	PERCENT	COUNTY	PERCENT
Adams	((~~1.25~~)) 1.20	Lewis	((~~1.13~~)) 1.11
Asotin	1.14	Lincoln	1.17
Benton	1.16	Mason	((~~1.16~~)) 1.17
Chelan	((~~1.08~~)) 1.04	Okanogan	((~~1.08~~)) 1.10
Clallam	((~~1.02~~)) 1.00	Pacific	1.36
Clark	((~~1.23~~)) 1.16	Pend Oreille	((~~0.90~~)) 0.97
Columbia	((~~1.06~~)) 1.13	Pierce	((~~1.47~~)) 1.41
Cowlitz	((~~1.16~~)) 1.18	San Juan	((~~0.68~~)) 0.71
Douglas	((~~1.09~~)) 1.05	Skagit	((~~1.19~~)) 1.18

COUNTY	PERCENT	COUNTY	PERCENT
Ferry	((~~0.97~~)) 0.96	Skamania	((~~1.00~~)) 0.98
Franklin	((~~1.24~~)) 1.18	Snohomish	((~~1.13~~)) 1.12
Garfield	((~~0.95~~)) 1.08	Spokane	((~~1.36~~)) 1.33
Grant	((~~1.23~~)) 1.25	Stevens	((~~0.96~~)) 0.97
Grays Harbor	((~~1.36~~)) 1.34	Thurston	1.28
Island	((~~0.93~~)) 0.89	Wahkiakum	((~~0.89~~)) 0.86
Jefferson	((~~1.01~~)) 1.03	Walla Walla	((~~1.32~~)) 1.26
King	((~~1.06~~)) 1.03	Whatcom	((~~1.13~~)) 1.14
Kitsap	((~~1.23~~)) 1.14	Whitman	((~~1.44~~)) 1.32
Kittitas	((~~1.00~~)) 1.02	Yakima	((~~1.22~~)) 1.20
Klickitat	((~~0.96~~)) 0.95		

AMENDATORY SECTION (Amending WSR 17-01-162, filed 12/21/16, effective 1/1/17)

WAC 458-30-590 Rate of inflation—Publication—Interest rate—Calculation. (1) **Introduction.** This rule ((~~sets forth~~)) provides the rates of inflation discussed in WAC 458-30-550. It also explains the department of revenue's obligation to annually publish a rate of inflation and the manner in which this rate is determined.

(2) **General duty of department - Basis for inflation rate.** Each year the department determines and publishes a rule establishing an annual rate of inflation. This rate of inflation is used in computing the interest that is assessed when farm and agricultural or timber land, which are exempt from special benefit assessments, is withdrawn or removed from current use classification.

(a) The rate of inflation is based upon the implicit price deflator for personal consumption expenditures calculated by the United States Department of Commerce. This rate is used to calculate the rate of interest collected on exempt special benefit assessments.

(b) The rate is published by December 31st of each year and applies to all withdrawals or removals from farm and agricultural or timber land classification that occur the following year.

(3) **Assessment of rate of interest.** An owner of classified farm and agricultural or timber land is liable for interest on the exempt special benefit assessment. Interest accrues from the date the local improvement district is created until the land is withdrawn or removed from classification. Interest accrues and is assessed in accordance with WAC 458-30-550.

(a) Interest is assessed only for the time (years and months) the land remains classified under RCW 84.34.020 (2) or (3).

(b) If the classified land is exempt from the special benefit assessment for more than one year, the annual inflation rates are used to calculate an average rate of interest. This average is determined by adding the inflation rate for each year the classified land was exempt from the special benefit assessment after the local improvement district was created. The sum of the inflation rates is then divided by the number of years involved to determine the applicable rate of interest.

(c) Example. A local improvement district for a domestic water supply system was created in January 1990 and the owner used the statutory exemption provided in RCW 84.34.320. On July 1, 1997, the land was removed from the farm and agricultural classification. An average interest rate was calculated using the inflation rates for 1990 through 1997. The owner was then notified of the amount of previously exempt special benefit assessment, plus the average interest rate.

(4) **Rates of inflation.** The rates of inflation used to calculate the interest as required by WAC 458-30-550 are as follows:

YEAR	PERCENT	YEAR	PERCENT
1976	5.6	1977	6.5
1978	7.6	1979	11.3
1980	13.5	1981	10.3
1982	6.2	1983	3.2
1984	4.3	1985	3.5
1986	1.9	1987	3.7
1988	4.1	1989	4.8
1990	5.4	1991	4.2
1992	3.3	1993	2.7
1994	2.2	1995	2.3
1996	2.2	1997	2.1
1998	0.85	1999	1.42
2000	2.61	2001	1.89
2002	1.16	2003	1.84
2004	2.39	2005	2.54
2006	3.42	2007	2.08
2008	4.527	2009	-0.85 (negative)
2010	1.539	2011	2.755
2012	1.295	2013	1.314
2014	1.591	2015	0.251
2016	0.953	2017	1.553

WSR 17-21-093
EXPEDITED RULES
DEPARTMENT OF LABOR AND INDUSTRIES

[Filed October 17, 2017, 4:22 p.m.]

Title of Rule and Other Identifying Information: Change Log Phase 3: WAC 296-24-23503 General requirements, 296-24-23529 Operators, 296-24-24007 Inspection classification, 296-24-33005 Tank storage, 296-24-58503 Scope, application and definitions applicable, 296-24-63299 Appendix B—National consensus standards, 296-24-63399 Appendix C—Fire protection references for further information, 296-24-63499 Appendix D—Availability of publications incorporated by references in WAC 296-24-58505—Fire brigades, 296-24-63599 Appendix E—Test methods for protective clothing, 296-24-69503 Special precautions, 296-24-75011 Railing, toeboards, and cover specifications, 296-24-76511 Angle of stairway rise, 296-24-76513 Stair treads, 296-24-88050 Appendix C—Personal fall arrest system (Part I—Mandatory; Parts II and III—Nonmandatory), 296-56-60103 Terminals handling intermodal containers or roll-on roll-off operations, and 296-56-60107 Terminal facilities handling menhaden and similar species of fish.

Purpose of the Proposal and Its Anticipated Effects, Including Any Changes in Existing Rules: The purpose of this proposal is to fix any outstanding housekeeping issues that are on the department of labor and industries division of occupational safety and health's change log for the WAC sections listed above. Below is a list of amendments being proposed in this rule making:

Amended Sections:

WAC 296-24-23503 General requirements.
- Add the word "are" in subsection (8) so it reads "You must ensure that only designated personnel are permitted to operate a crane covered by this section."

WAC 296-24-23529 Operators.
- Move the phrase "If the power goes off" from the end to the beginning of subsection (11) for clarification.

WAC 296-24-24007 Inspection classification.
- Update numerical subsection references throughout this section.

WAC 296-24-33005 Tank storage.
- Throughout this section, remove the term "or combustible" from multiple subsections. The term is no longer used in this manner after updates from the global harmonization rule-making project.
- Update font of the word "combustible" in subsection (1)(c)(i)(A) to match the rest of the title. Changing the font was a typo from previous rule making.

WAC 296-24-58503 Scope, application and definitions applicable.
- Remove the term "or combustible" from the definition for Class B fire.

WAC 296-24-63299 Appendix B—National consensus standards.
- In the table, remove references to WAC 296-24-58505 and 296-24-631 as well as corresponding ANSI references. These WAC sections were repealed during previous rule making.

WAC 296-24-63399 Appendix C—Fire protection references for further information.
- In subsection (2), remove subdivision (a) and items (i)-(xxiii) and reletter the rest of the subsection. In an older version of chapter 296-24 WAC, fire brigades was part of the fire suppression section, but this is no longer the case. The referenced section, WAC 296-24-58505, was repealed in previous rule making and all fire brigade information was moved to chapter 296-811 WAC, Fire brigades. The reference material listed under WAC 296-24-58505 would no longer be applicable to the suppression standard since fire brigades is no longer in chapter 296-24 WAC.

WAC 296-24-63599 Appendix E—Test methods for protective clothing.
- Update reference in opening paragraph from "WAC 296-24-58505" to "chapter 296-811 WAC."

WAC 296-24-69503 Special precautions.
- Remove "asbestos guards" from subsection (7).

WAC 296-24-75011 Railing, toeboards, and cover specifications.
- Update spelling of "steamless" to "seamless" in ANSI title in subsection (3).

WAC 296-24-76511 Angle of stairway rise.
- Add "Table D-1" to the bottom of this section - it was removed from WAC 296-24-76513 due to it not matching the subject matter of that section.

WAC 296-24-76513 Stair treads.
- Remove "Table D-1" and move it to WAC 296-24-76511.

WAC 296-24-88050 Appendix C—Personal fall arrest system (Part I— Mandatory; Parts II and III—Nonmandatory).
- In subsection (1), update reference from "WAC 296-24-88035" to "chapter 296-870 WAC, Powered platforms."

WAC 296-56-60103 Terminals handling intermodal containers or roll-on roll-off operations.
- Combine subsection (4)(a) and (b) and renumbered them as subsection (5). Renumbered the rest of the section, as well as updating subsection references throughout.

WAC 296-56-60107 Terminal facilities handling menhaden and similar species of fish.
- Add the following new language to the end of subsection (1)(b): "… such as to affect a rescue in accordance with the terminal's emergency action plan complying with WAC 296-56-60010 (2)(d)."

Repealed Section

WAC 296-24-63499 Appendix D—Availability of publications incorporated by references in WAC 296-24-58505—Fire brigades.

- This section was repealed due to the fire brigades section that used to be in chapter 296-24 WAC is now on its own in chapter 296-811 WAC, Fire brigades. This information is out-of-date.

Reasons Supporting Proposal: Updating these housekeeping errors, such as updating old references and fixing typos, will ensure that all readers of these rule sections can clearly understand the rules, keeping employers and employees safe on the job.

Statutory Authority for Adoption: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060.

Statute Being Implemented: Chapter 49.17 RCW.

Rule is not necessitated by federal law, federal or state court decision.

Name of Proponent: Department of labor and industries, governmental.

Name of Agency Personnel Responsible for Drafting and Implementation: Chris Miller, Tumwater, Washington, 360-902-5516; and Enforcement: Anne Soiza, Tumwater, Washington, 360-902-5090.

This notice meets the following criteria to use the expedited adoption process for these rules:

Corrects typographical errors, make address or name changes, or clarify language of a rule without changing its effect.

Explanation of the Reason the Agency Believes the Expedited Rule-making Process is Appropriate: No requirements are being changed during this rule making, only clarifying language and updating errors, which fits within the parameters of RCW 34.05.353, Expedited rule making.

NOTICE

THIS RULE IS BEING PROPOSED UNDER AN EXPEDITED RULE-MAKING PROCESS THAT WILL ELIMINATE THE NEED FOR THE AGENCY TO HOLD PUBLIC HEARINGS, PREPARE A SMALL BUSINESS ECONOMIC IMPACT STATEMENT, OR PROVIDE RESPONSES TO THE CRITERIA FOR A SIGNIFICANT LEGISLATIVE RULE. IF YOU OBJECT TO THIS USE OF THE EXPEDITED RULE-MAKING PROCESS, YOU MUST EXPRESS YOUR OBJECTIONS IN WRITING AND THEY MUST BE SENT TO Chris Miller, Department of Labor and Industries, P.O. Box 44610, Olympia, WA 98504, phone 360-902-5516, fax 360-902-5619, email christopher.miller@lni.wa.gov, AND RECEIVED BY December 20, 2017.

October 17, 2017
Joel Sacks
Director

AMENDATORY SECTION (Amending WSR 15-24-100, filed 12/1/15, effective 1/5/16)

WAC 296-24-23503 General requirements. (1) **Application.** This section applies to overhead and gantry cranes, including semigantry, cantilever gantry, wall cranes, storage bridge cranes, and others having the same fundamental characteristics. These cranes are grouped because they all have trolleys and similar travel characteristics.

(2) **New and existing equipment.** You must ensure that all new overhead and gantry cranes constructed and installed on or after the effective date of these standards meet the design specifications of the American National Standards Institute, Safety Code for Overhead and Gantry Cranes, ANSI B30.2.0-1967. Overhead and gantry cranes constructed before the effective date of these standards, should be modified to conform to those design specifications, unless it can be shown that the crane cannot feasibly or economically be altered and that the crane substantially complies with the requirements of this section. (See chapter 296-900 WAC, Administrative rules, for information on applying for a variance.)

(3) **Modifications.** Cranes may be modified and rerated provided such modifications and the supporting structure are checked thoroughly for the new rated load by a qualified engineer or the equipment manufacturer. You must test the crane in accordance with WAC 296-24-23521(2). You must display new rated load in accordance with (5) of this section.

(4) **Wind indicators and rail clamps.**

(a) You must provide outdoor storage bridges with automatic rail clamps. You must provide a wind-indicating device which will give a visible or audible alarm to the bridge operator at a predetermined wind velocity. If the clamps act on the rail heads, you must ground off any beads or weld flash on the rail heads.

(b) You must base calculations for wind pressure on outside overhead traveling cranes on not less than 30 pounds per square foot of exposed surface.

(5) **Rated load marking.** You must plainly mark the rated load of the crane on each side of the crane, and if the crane has more than one hoisting unit, each hoist must have its rated load marked on it or its load block. You must ensure that the rated load marking is clearly legible from the ground or floor.

(6) **Clearance from obstruction.**

(a) You must provide and maintain minimum clearance of 3 inches overhead and 2 inches laterally between crane and obstructions in conformity with Specification No. 61 Crane Manufactures Association of America, Inc., 8720 Red Oak Blvd., Suite 201, Charlotte, NC 28217.

(b) Where passageways or walkways are provided you must not place obstructions so that safety of personnel will be jeopardized by movements of the crane.

(7) **Clearance between parallel cranes.** If the runways of two cranes are parallel, and there are no intervening walls or structure, you must ensure that there is adequate clearance provided and maintained between the two bridges.

(8) **Designated personnel.** You must ensure that only designated personnel are permitted to operate a crane covered by this section.

AMENDATORY SECTION (Amending WSR 15-24-100, filed 12/1/15, effective 1/5/16)

WAC 296-24-23529 Operators. (1) You must ensure that cranes are operated only by regular crane operators, authorized substitutes who have had adequate experience and training under the supervision of a competent operator, or by crane repairmen or inspectors.

(2) You must ensure that crane operators are able to communicate with others at the worksite sufficiently to understand the signs, notices, operation instructions, and the signal code in use to ensure safe operation of the crane.

(3) You must ensure that no minor under eighteen years of age is employed in occupations involving the operation of any power-driven hoisting apparatus or assisting in such operations by work such as hooking on, loading slings, rigging gear, etc.

(4) You must ensure that no person is permitted to operate a crane whose hearing or eye-sight is impaired, or who may be suffering from heart disease or similar ailments. The following physical qualifications must be minimum requirements for overhead and gantry crane operators and trainees:

(a) They must have vision of at least 20/30 in one eye, and 20/50 in the other, with or without corrective lenses.

(b) They must be able to distinguish colors, regardless of position of colors, if color differential is required for operation.

(c) Their hearing, with or without hearing aid, must be adequate for a specific operation.

(d) They must have sufficient strength, endurance, agility, coordination, and speed of reaction to meet the demands of equipment operation.

(e) They must have normal depth perception, field of vision, reaction time, manual dexterity, coordination and no tendencies to dizziness or similar undesirable characteristics.

(f) Evidence of physical defects, or emotional instability which could render the operator or trainee a hazard to their self or others, or could interfere with their safe performance may be sufficient cause for disqualification. In such cases, you must require specialized clinical or medical judgments or tests (which include annual medical certification for recovered heart attack patients).

(g) Evidence that an operator or trainee is subject to seizures or loss of physical control must be sufficient reason for disqualification. You must require specialized medical tests to substantiate these conditions.

(5) Persons who have recovered from a heart attack must be exempted from the provisions of subsection (4) of this section, as it pertains to their heart condition, provided:

(a) A medical release is obtained from their attending medical doctor.

(b) The release must state that the operation of a crane will not present a hazard to their self or others.

(c) An examination by a medical doctor, and renewal of the work release certification is required annually.

(6) The operator must be fully familiar with all crane rules and with the crane mechanism and its proper care. Needed adjustments or repairs must be reported at once to the proper authority.

(7) The operator must not eat, smoke or read while actually engaged in the operation of the crane, or operate the crane when physically unfit.

(8) The operator or someone especially designated must properly lubricate all working parts of the crane.

(9) You must keep cranes clean.

(10) You must ensure that whenever the operator finds the main or emergency switch open, it is not closed, even when starting on regular duty, until it is determined that no one is on or about the crane. You must not oil or repair the crane unless the main switch is open.

(11) If the power goes off, the operator must immediately throw all controllers to "off" position until the power is again available ((~~if the power goes off~~)).

(12) The operator must make sure that all controllers are in "off" position until the power is again available before closing the main switch.

(13) You must ensure that the operator recognizes signals only from the employee who is supervising the lift. Operating signals must follow an established standard. Whistle signals may be used where only one crane is in operation.

(14) You must ensure that bumping into runway stops or other cranes is avoided. When the operator is ordered to engage with or push other cranes, it must be done with special care for the safety of persons on or below cranes.

(15) You must ensure that when lowering a load, the operator proceeds carefully and makes sure the load is under safe control.

(16) You must ensure that when leaving the cage the operator throws all controllers to "off" position and opens the main switch.

(17) You must ensure that if the crane is located out-of-doors the operator locks the crane in a secure position to prevent it from being blown along or off the track by a severe wind.

(18) Operators must not permit anyone to ride on the load or hooks, unless using a lifeline or safety device approved by the department.

AMENDATORY SECTION (Amending WSR 15-24-100, filed 12/1/15, effective 1/5/16)

WAC 296-24-24007 Inspection classification. (1) **Regular inspection.** Inspection procedure for cranes in regular service is divided into two general classifications based upon the intervals at which inspection should be performed. The intervals in turn are dependent upon the nature of the critical components of the crane and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications are herein designated as "frequent" and "periodic" with respective intervals between inspections as defined below:

(a) Frequent inspection: Daily to monthly intervals.

(b) Periodic inspection: One- to 12-month intervals, or as specifically recommended by the manufacturer.

(2) **Frequent inspection.** You must inspect items such as the following for defects at intervals as defined in ((~~(2)~~)) subsection (1)(a) of this section or as specifically indicated including observation during operation for any defects which might appear between regular inspection. Any deficiencies

such as listed must be carefully examined and determination made as to whether they constitute a safety hazard:

(a) All control mechanisms for maladjustment interfering with proper operation: Daily.

(b) All control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter.

(c) All safety devices for malfunction.

(d) Deterioration or leakage in air or hydraulic systems: Daily.

(e) Crane hooks with deformations or cracks. For hooks with cracks or having more than 15% in excess of normal throat opening or more than 10° twist from the plane of the unbent hook.

(f) Rope reeving for noncompliance with manufacturer's recommendations.

(g) Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, and moisture accumulation.

(3) **Periodic inspection.** You must perform complete inspections of the crane at intervals as generally defined in (((~~(2)~~))) subsection (1)(b) of this section depending upon its activity, severity of service, and environment, or as specifically indicated below. These inspections must include the requirements of (((~~(3)~~))) subsection (2) of this section and in addition, items such as the following. You must carefully examine any deficiencies such as listed and determine whether they constitute a safety hazard:

(a) Deformed, cracked, or corroded members, in the crane structure and boom.

(b) Loose bolts or rivets.

(c) Cracked or worn sheaves and drums.

(d) Worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers and locking devices.

(e) Excessive wear on brake and clutch system parts, linings, pawls, and ratchets.

(f) Load, boom angle, and other indicators over their full range, for any significant inaccuracies.

(g) Gasoline, diesel, electric, or other power plants for improper performance or noncompliance with safety requirements.

(h) Excessive wear of chain-drive sprockets and excessive chain stretch.

(i) Travel steering, braking, and locking devices, for malfunction.

(j) Excessively worn or damaged tires.

(4) **Cranes not in regular use.**

(a) A crane which has been idle for a period of one month or more, but less than 6 months, must be given an inspection conforming with requirements of (((~~(3)~~))) subsection (2) of this section and WAC 296-24-24013 (2)(b) before placing in service.

(b) A crane which has been idle for a period of 6 months must be given a complete inspection conforming with requirements of (((~~(3)~~))) subsection (2) and (((~~(4)~~))) (3) of this section and WAC 296-24-24013 (2)(b) before placing in service.

(c) You must inspect standby cranes at least semi-annually in accordance with requirements of (((~~(3)~~))) subsection (2) of this section and WAC 296-24-24013 (2)(b). Such cranes which are exposed to adverse environment should be inspected more frequently.

(5) **Inspection records.** You must make written, dated, and signed inspection reports and records monthly on critical items in use such as brakes, crane hooks, and ropes. You must keep records readily available.

AMENDATORY SECTION (Amending WSR 15-24-100, filed 12/1/15, effective 1/5/16)

WAC 296-24-33005 Tank storage. (1) **Design and construction of tanks.**

(a) **Materials.**

(i) Tanks must be built of steel except as provided in (a)(ii) through (v) of this subsection.

(ii) Tanks may be built of materials other than steel for installation underground or if required by the properties of the liquid stored. Tanks located above ground or inside buildings must be of noncombustible construction.

(iii) Tanks built of materials other than steel must be designed to specifications embodying principles recognized as good engineering design for the material used.

(iv) Unlined concrete tanks may be used for storing flammable liquids having a gravity of 40°API or heavier. Concrete tanks with special lining may be used for other services provided the design is in accordance with sound engineering practice.

(v) Tanks may have combustible or noncombustible linings.

(vi) You must require special engineering consideration if the specific gravity of the liquid to be stored exceeds that of water or if the tanks are designed to contain flammable liquids at a liquid temperature below 0°F.

(b) **Fabrication.**

(i) Tanks may be of any shape or type consistent with sound engineering design.

(ii) Metal tanks must be welded, riveted, and caulked, brazed, or bolted, or constructed by use of a combination of these methods. Filler metal used in brazing must be nonferrous metal or an alloy having a melting point above 1000°F and below that of the metal joined.

(c) **Atmospheric tanks.**

(i) Atmospheric tanks must be built in accordance with acceptable good standards of design. Atmospheric tanks may be built in accordance with:

(A) Underwriters' Laboratories, Inc., Subjects No. 142, Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids, 1968; No. 58, Standards for Steel Underground Tanks for Flammable and ((~~COMBUSTIBLE~~)) Combustible Liquids, Fifth Edition, December 1961; or No. 80, Standard for Steel Inside Tanks for Oil-Burner Fuel, September 1963.

(B) American Petroleum Institute Standards No. 650, Welded Steel Tanks for Oil Storage, Third Edition, 1966.

(C) American Petroleum Institute Standards No. 12B, Specification for Bolted Production Tanks, Eleventh Edition, May 1958, and Supplement 1, March 1962; No. 12D, Specification for Large Welded Production Tanks, Seventh Edition, August 1957; or No. 12F, Specification for Small Welded Production Tanks, Fifth Edition, March 1961. Tanks

built in accordance with these standards must be used only as production tanks for storage of crude petroleum in oil-producing areas.

(ii) Tanks designed for underground service not exceeding 2,500 gallons capacity may be used aboveground.

(iii) Low-pressure tanks and pressure vessels may be used as atmospheric tanks.

(iv) You must not use atmospheric tanks for the storage of a flammable liquid at a temperature at or above its boiling point.

(d) **Low pressure tanks.**

(i) The normal operating pressure of the tank must not exceed the design pressure of the tank.

(ii) Low-pressure tanks must be built in accordance with acceptable standards of design. Low-pressure tanks may be built in accordance with:

(A) American Petroleum Institute Standard No. 620, Recommended Rules for the Design and Construction of Large, Welded, Low-Pressure Storage Tanks, Third Edition, 1966.

(B) The principles of the Code for Unfired Pressure Vessels, Section VIII of the ASME Boiler and Pressure Vessels Code, 1968.

(iii) Atmospheric tanks built according to the Underwriters' Laboratories, Inc., requirements in (c)(i) of this subsection may be used for operating pressures not exceeding 1 p.s.i.g. and must be limited to 2.5 p.s.i.g. under emergency venting conditions. Pressure vessels may be used as low-pressure tanks.

(e) **Pressure vessels.**

(i) The normal operating pressure of the vessel must not exceed the design pressure of the vessel.

(ii) Pressure vessels must be built in accordance with the Code for Unfired Pressure Vessels, Section VIII of the ASME Boiler and Pressure Vessel Code, 1968.

(f) **Provisions for internal corrosion.** When tanks are not designed in accordance with the American Petroleum Institute, American Society of Mechanical Engineers, or the Underwriters' Laboratories, Inc.'s standards, or if corrosion is anticipated beyond that provided for in the design formulas used, you must provide additional metal thickness or suitable protective coatings or linings to compensate for the corrosion loss expected during the design life of the tank.

(2) **Installation of outside aboveground tanks.**

(a) **Location with respect to property lines and public ways.**

(i) Every aboveground tank for the storage of flammable liquids, except those liquids with boil-over characteristics and unstable liquids, operating at pressures not in excess of 2.5 p.s.i.g. and equipped with emergency venting which will not permit pressures to exceed 2.5 p.s.i.g. must be located in accordance with Table H-5.

(ii) Every aboveground tank for the storage of flammable liquids, except those liquids with boil-over characteristics and unstable flammable ((~~or combustible~~)) liquids, operating at pressures exceeding 2.5 p.s.i.g. or equipped with emergency venting which will permit pressures to exceed 2.5 p.s.i.g. must be located in accordance with Table H-6.

(iii) Every aboveground tank for the storage of flammable liquids with boil-over characteristics must be located in accordance with Table H-7.

(iv) Every aboveground tank for the storage of unstable liquids must be located in accordance with Table H-8.

(v) Reference minimum distances for use in Tables H-5 to H-8 inclusive.

(vi) Where end failure or horizontal pressure tanks and vessels may expose property, you must place the tank with the longitudinal axis parallel to the nearest important exposure.

TABLE H-5

Type of tank	Protection	Minimum distance in feet from property line which may be built upon, including the opposite side of a public way.	Minimum distance in feet from nearest side of any public way or from nearest important building and shall be not less than 5 feet.
Floating roof	Protection for exposures.	1/2 times diameter of tank but need not exceed 90 ft.	1/6 times diameter of tank but need not exceed 30 ft.
	None	Diameter of tank but need not exceed 175 ft.	1/6 times diameter of tank but need not exceed 30 ft.
Vertical with weak roof to shell seam	Approved foam or inerting system on the tank.	1/2 times diameter of tank but need not exceed 90 ft. and shall not be less than 5 ft.	1/6 times diameter of tank but need not exceed 30 ft.
	Protection for exposures.	Diameter of tank but need not exceed 175 ft.	1/3 times diameter of tank but need not exceed 60 ft.
	None	2 times diameter of tank but need not exceed 350 ft.	1/3 times diameter of tank but need not exceed 60 ft.
Horizontal and vertical, with emergency relief venting to limit pressures to 2.5 p.s.i.g.	Approved inerting system on the tank or approved foam system on vertical tanks.	1/2 times Table H-9 but shall not be less than 5 ft.	1/2 times Table H-9.
	Protection for exposures.	Table H-9	Table H-9
	None	2 times table	Table H-9

TABLE H-6

Type of tank	Protection	Minimum distance in feet from property line which may be built upon, including the opposite side of a public way.	Minimum distance in feet from nearest side of any public way or from nearest important building.
Any type	Protection for exposures.	1 1/2 times Table H-9 but shall not be less than 25 ft.	1 1/2 times Table H-9 but shall not be less than 25 ft.
	None	3 times Table H-9 but shall not be less than 50 ft.	1 1/2 times Table H-9 but shall not be less than 25 ft.

TABLE H-7

Type of tank	Protection	Minimum distance in feet from property line which may be built upon, including the opposite side of a public way.	Minimum distance in feet from nearest side of any public way or from nearest important building.
Floating roof	Protection for exposures.	Diameter of tank but need not exceed 175 ft.	1/3 times diameter of tank but need not exceed 60 ft.
	None	2 times diameter of tank but need not exceed 350 ft.	1/3 times diameter of tank but need not exceed 60 ft.
Fixed roof	Approved foam or inerting system.	Diameter of tank but need not exceed 175 ft.	1/3 times diameter of tank but need not exceed 60 ft.
	Protection for exposures.	2 times diameter of tank but need not exceed 350 ft.	2/3 times diameter of tank but need not exceed 120 ft.
	None	4 times diameter of tank but need not exceed 350 ft.	2/3 times diameter of tank but need not exceed 120 ft.

TABLE H-8

Type of tank	Protection	Minimum distance in feet from property line which may be built upon, including the opposite side of a public way.	Minimum distance in feet from nearest side of any public way or from nearest important building.
Floating roof	Protection for exposures.	Diameter of tank but need not exceed 175 ft.	1/3 times diameter of tank but need not exceed 60 ft.
	None	2 times diameter of tank but need not exceed 350 ft.	1/3 times diameter of tank but need not exceed 60 ft.
Fixed roof	Approved foam or inerting system.	Diameter of tank but need not exceed 175 ft.	1/3 times diameter of tank but need not exceed 60 ft.
	Protection for exposures.	2 times diameter of tank but need not exceed 350 ft.	2/3 times diameter of tank but need not exceed 120 ft.
	None	4 times diameter of tank but need not exceed 350 ft.	2/3 times diameter of tank but need not exceed 120 ft.

TABLE H-9

Capacity tank gallons			Minimum distance in feet from property line which may be built upon, including the opposite side of a public way.	Minimum distance in feet from nearest side of any public way or from nearest important building.
275	or less		5	5
276	to	750	10	5
751	to	12,000	15	5
12,001	to	30,000	20	5
30,001	to	50,000	30	10
50,001	to	100,000	50	15
100,001	to	500,000	80	25
500,001	to	1,000,000	100	35
1,000,001	to	2,000,000	135	45
2,000,001	to	3,000,000	165	55
3,000,001	or more		175	60

(b) **Spacing (shell-to-shell) between aboveground tanks.**

(i) The distance between any two flammable ((~~or combustible~~)) liquid storage tanks must not be less than three feet.

(ii) Except as provided in (b)(iii) of this subsection, the distance between any two adjacent tanks must not be less than one-sixth the sum of their diameters. When the diameter of one tank is less than one-half the diameter of the adjacent tank, the distance between the two tanks must not be less than one-half the diameter of the smaller tank.

(iii) Where crude petroleum in conjunction with production facilities are located in noncongested areas and have capacities not exceeding 126,000 gallons (3,000 barrels), the distance between such tanks must not be less than three feet.

(iv) Where unstable flammable liquids are stored, the distance between such tanks must not be less than one-half the sum of their diameters.

(v) When tanks are compacted in three or more rows or in an irregular pattern, you must provide greater spacing or other means so that inside tanks are accessible for firefighting purposes.

(vi) The minimum separation between a liquefied petroleum gas container and a flammable liquid storage tank must be twenty feet, except in the case of flammable liquid tanks operating at pressures exceeding 2.5 p.s.i.g. or equipped with emergency venting which will permit pressures to exceed 2.5 p.s.i.g. in which case the provisions of (b)(i) and (ii) of this subsection must apply. You must take suitable means to prevent the accumulation of flammable liquids under adjacent liquefied petroleum gas containers such as by diversion curbs or grading. When flammable liquid storage tanks are within a diked area, the liquefied petroleum gas containers must be outside the diked area and at least ten feet away from the centerline of the wall of the diked area. The foregoing provisions must not apply when liquefied petroleum gas containers of 125 gallons or less capacity are installed adjacent to fuel oil supply tanks of 550 gallons or less capacity.

(c) **Location of outside aboveground tanks with respect to important buildings on same property.** You must separate every outside aboveground tank from important buildings on the same property by distances not less than those specified in (a)(i) through (iv) of this subsection, whichever is applicable. The appropriate distance column in Tables H-5, H-6, H-7, H-8, or H-9, that you must use is the one reading: "Minimum distance in feet from nearest side of any public way or from nearest important building."

(d) **Normal venting for aboveground tanks.**

(i) You must adequately vent atmospheric storage tanks to prevent the development of vacuum or pressure sufficient to distort the roof of a cone roof tank or exceed the design pressure in the case of other atmospheric tanks, as a result of filling or emptying, and atmospheric temperature changes.

(ii) Normal vents must be sized either in accordance with: (A) The American Petroleum Institute Standard 2000 (1968), Venting Atmospheric and Low-Pressure Storage Tanks; or (B), other accepted standard; or (C) must be at least as large as the filling or withdrawal connection, whichever is larger but in no case less than 1 1/4 inch nominal inside diameter.

(iii) You must adequately vent low-pressure tanks and pressure vessels to prevent development of pressure or vacuum, as a result of filling or emptying and atmospheric temperature changes, from exceeding the design pressure of the tank or vessel. Protection must also be provided to prevent over-pressure from any pump discharging into the tank or vessel when the pump discharge pressure can exceed the design pressure of the tank or vessel.

(iv) If any tank or pressure vessel has more than one fill or withdrawal connection and simultaneous filling or withdrawal can be made, the vent size must be based on the maximum anticipated simultaneous flow.

(v) Unless the vent is designed to limit the internal pressure 2.5 p.s.i. or less, the outlet of vents and vent drains must be arranged to discharge in such a manner as to prevent localized overheating of any part of the tank in the event vapors from such vents are ignited.

(vi) Tanks and pressure vessels storing Category 1 flammable liquids must be equipped with venting devices which must be normally closed except when venting to pressures or vacuum conditions. Tanks and pressure vessels storing Category 2 flammable liquids and Category 3 flammable liquids with a flashpoint below 100°F (37.8°C) liquids must be equipped with venting devices which must be normally closed except when venting under pressure or vacuum conditions, or with approved flame arresters.

Exemption: Tanks of 3,000 bbls. (barrels) capacity or less containing crude petroleum in crude-producing areas; and, outside aboveground atmospheric tanks under 1,000 gallons capacity containing other than Category 1 flammable liquids may have open vents. (See (2)(f)(ii) of this section.)

(vii) Flame arresters or venting devices required in (e)(vi) of this subsection may be omitted for Category 2 flammable liquids and Category 3 flammable liquids with a flashpoint below 100°F (37.8°C) where conditions are such that their use may, in case of obstruction, result in tank damage.

(e) **Emergency relief venting for fire exposure for aboveground tanks.**

(i) Every aboveground storage tank must have some form of construction or device that will relieve excessive internal pressure caused by exposure fires.

(ii) In a vertical tank the construction referred to in (e)(i) of this subsection may take the form of a floating roof, lifter roof, a weak roof-to-shell seam, or other approved pressure relieving construction. The weak roof-to-shell seam must be constructed to fail preferential to any other seam.

(iii) Where entire dependence for emergency relief is placed upon pressure relieving devices, the total venting capacity of both normal and emergency vents must be enough to prevent rupture of the shell or bottom of the tank if vertical, or of the shell or heads if horizontal. If unstable liquids are stored, you must take into account the effects of heat or gas resulting from polymerization, decomposition, condensation, or self-reactivity. The total capacity of both normal and emergency venting devices must be not less than that derived from Table H-10 except as provided in (e)(v) and (vi) of this subsection. Such device may be a self-closing manhole cover, or one using long bolts that permit the cover to lift under internal pressure, or an additional or larger relief valve or valves. You must calculate the wetted area of the tank on the basis of 55% of the total exposed area of a sphere or spheroid, 75% of the total exposed area of a horizontal tank and the first thirty feet above grade of the exposed shell area of a vertical tank.

TABLE 10

WETTED AREA VERSUS CUBIC FEET FREE AIR PER HOUR (14.7 psia and 60°F)

Square feet	CFH	Square feet	CFH	Square feet	CFH
20	21,100	200	211,000	1,000	524,000
30	31,600	250	239,000	1,200	557,000
40	42,100	300	265,000	1,400	587,000
50	52,700	350	288,000	1,600	614,000
60	63,200	400	312,000	1,800	639,000
70	73,700	500	354,000	2,000	662,000
80	84,200	600	392,000	2,400	704,000
90	94,800	700	428,000	2,800	742,000
100	105,000	800	462,000	and	
120	126,000	900	493,000	over	
140	147,000	1,000	524,000		
160	168,000				
180	190,000				
200	211,000				

(iv) For tanks and storage vessels designed for pressure over 1 p.s.i.g., you must determine the total rate of venting in accordance with Table H-10, except that when the exposed wetted area of the surface is greater than 2,800 square feet, you must calculate the total rate of venting by the following formula:

$$CFH = 1{,}107A^{0.82}$$

Where:

CFH = Venting requirement, in cubic feet of free air per hour.

A = Exposed wetted surface, in square feet.

Note: The foregoing formula is based on $Q = 21{,}000A^{0.82}$.

(v) The total emergency relief venting capacity for any specific stable liquid may be determined by the following formula:

Cubic feet of free air per hour = V

$$V = \frac{1337}{L\ M}$$

V = Cubic feet of free air per hour from Table H-10.

L = Latent heat of vaporization of specific liquid in B.t.u. per pound.

M = Molecular weight of specific liquids.

(vi) The required airflow rate of (e)(iii) or (v) of this subsection may be multiplied by the appropriate factor listed in the following schedule when protection is provided as indicated. Only one factor may be used for any one tank.

0.5 for drainage in accordance with (2)(g)(ii) of this section for tanks over 200 square feet of wetted area.

0.3 for approved water spray.

0.3 for approved insulation.

0.15 for approved water spray with approved insulation.

(vii) You must arrange the outlet of all vents and vent drains on tanks equipped with emergency venting to permit pressures exceeding 2.5 p.s.i.g. to discharge in such a way as to prevent localized overheating of any part of the tank, in the event vapors from such vents are ignited.

(viii) Each commercial tank venting device must have stamped on it the opening pressure, the pressure at which the valve reaches the full open position, and the flow capacity at the latter pressure, expressed in cubic feet per hour of air at 60°F and at a pressure of 14.7 p.s.i.a.

(ix) You must determine the flow capacity of tank venting devices 12 inches and smaller in nominal pipe size by actual test of each type and size of vent. These flow tests may be conducted by the manufacturer if certified by a qualified impartial observer, or may be conducted by an outside agency. The flow capacity of tank venting devices larger than twelve inches nominal pipe size, including manhole covers with long bolts or equivalent, may be calculated provided that the opening pressure is actually measured, the rating pressure and corresponding free orifice area are stated, the word "calculated" appears on the nameplate, and the computation is based on a flow coefficient of 0.5 applied to the rated orifice area.

(f) **Vent piping for aboveground tanks.**

(i) Vent piping must be constructed in accordance with WAC 296-24-33007 of this section.

(ii) Where vent pipe outlets for tanks storing Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100°F (37.8°C), are adjacent to buildings or public ways, you must locate them so that the vapors are released at a safe point outside of buildings and not less than twelve feet above the adjacent ground level. In order to aid their dispersion, vapors must be discharged upward or horizontally away from closely adjacent walls. Vent outlets must be located so that flammable vapors will not be trapped by eaves or other obstructions and must be at least 5 feet from building openings.

(iii) When tank vent piping is manifolded, pipe sizes must be such as to discharge within the pressure limitations of the system, the vapors they may be required to handle when manifolded tanks are subject to the same fire exposure.

(g) **Drainage, dikes, and walls for aboveground tanks.**

(i) **Drainage and diked areas.** You must provide the area surrounding a tank or a group of tanks with drainage as in (g)(ii) of this subsection, or you must dike as provided in (g)(iii) of this subsection, to prevent accidental discharge of liquid from endangering adjoining property or reaching waterways.

(ii) **Drainage.** Where protection of adjoining property or waterways is by means of a natural or man-made drainage system, such systems must comply with the following:

(A) You must provide a slope of not less than 1% away from the tank toward the drainage system.

(B) The drainage system must terminate in vacant land or other area or in an impounding basin having a capacity not smaller than that of the largest tank served. This termination area and the route of the drainage system must be so located that, if the flammable liquids in the drainage system are ignited, the fire will not seriously expose tanks or adjoining property.

(C) The drainage system, including automatic drainage pumps, must not discharge to adjoining property, natural water courses, public sewers, or public drains unless the discharge of flammable liquids would not constitute a hazard, or the system is so designed that it will not permit flammable liquids to be released.

(iii) **Diked areas.** Where protection of adjoining property or waterways is accomplished by retaining the liquid around the tank by means of a dike, the volume of the diked area must comply with the following requirements:

(A) Except as provided in (g)(iii)(B) of this subsection, the volumetric capacity of the diked area must not be less than the greatest amount of liquid that can be released from the largest tank within the diked area, assuming a full tank. You must calculate the capacity of the diked area enclosing more than one tank by deducting the volume of the tanks other than the largest tank below the height of the dike.

(B) For a tank or group of tanks with fixed roofs containing crude petroleum with boilover characteristics, the volumetric capacity of the diked area must be not less than the capacity of the largest tank served by the enclosure, assuming a full tank. You must calculate the capacity of the diked enclosure by deducting the volume below the height of the dike of all tanks within the enclosure.

(C) Walls of the diked area must be of earth, steel, concrete or solid masonry designed to be liquidtight and to with-

stand a full hydrostatic head. Earthen walls three feet or more in height must have a flat section at the top not less than two feet wide. The slope of an earthen wall must be consistent with the angle of repose of the material of which the wall is constructed.

(D) You must restrict the walls of the diked area to an average height of six feet above interior grade.

(E) Where provision is made for draining water from diked areas, you must provide drainage at a uniform slope of not less than 1% away from tanks toward a sump, drainbox, or other safe means of disposal located at the greatest practical distance from the tank. You must normally control such drains in a manner so as to prevent flammable liquids from entering natural water courses, public sewers, or public drains, if their presence would constitute a hazard. Control of drainage must be accessible under fire conditions.

(F) You must not permit any loose combustible material, empty or full drum or barrel, within the diked area.

(G) You must subdivide each diked area containing two or more tanks preferably by drainage channels or at least by intermediate curbs in order to prevent spills from endangering adjacent tanks within the diked area as follows:

(I) When storing normally stable liquids in vertical cone roof tanks constructed with weak roof-to-shell seam or approved floating roof tanks or when storing crude petroleum in producing areas in any type of tank, one subdivision for each tank in excess of 10,000 bbls. and one subdivision for each group of tanks (no tank exceeding 10,000 bbls. capacity) having an aggregate capacity not exceeding 15,000 bbls.

(II) When storing normally stable flammable liquids in tanks not covered in (g)(iii)(G)(I) of this subsection, one subdivision for each tank in excess of 100,000 gallons (2,500 bbls.) and one subdivision for each group of tanks (no tank exceeding 100,000 gallons capacity) having an aggregate capacity not exceeding 150,000 gallons (3,570 bbls.).

(III) When storing unstable liquids in any type of tank, one subdivision for each tank except that tanks installed in accordance with the drainage requirements of NFPA 15-1969, Standard for Water Spray Fixed Systems for Fire Protection must require no additional subdivision.

(IV) The drainage channels or intermediate curbs must be located between tanks so as to take full advantage of the available space with due regard for the individual tank capacities. Intermediate curbs, where used, must be not less than eighteen inches in height.

(h) **Tank openings other than vents for aboveground tanks.**

(i) Connections for all tank openings must be vaportight and liquidtight. Vents are covered in (d) through (f) of this subsection.

(ii) You must provide each connection to an aboveground tank through which liquid can normally flow with an internal or an external valve located as close as practical to the shell of the tank. Such valves, when external, and their connections to the tank must be of steel except when the chemical characteristics of the liquid stored are incompatible with steel. When materials other than steel are necessary, they must be suitable for the pressures, structural stresses, and temperatures involved, including fire exposures.

(iii) You must provide each connection below the liquid level through which liquid does not normally flow with a liquidtight closure. This may be a valve, plug, or blind, or a combination of these.

(iv) You must provide openings for gaging with a vapor tight cap or cover.

(v) For Category 2 flammable liquids and Category 3 flammable liquids with a flashpoint below 100°F (37.8°C), other than crude oils, gasolines, and asphalts, you must design and install the fill pipe so as to minimize the possibility of generating static electricity. A fill pipe entering the top of a tank must terminate within six inches of the bottom of the tank and must be installed to avoid excessive vibration.

(vi) You must locate filling and emptying connections which are made and broken outside of buildings at a location free from any source of ignition and not less than five feet away from any building opening. Such connection must be closed and liquidtight when not in use. The connection must be properly identified.

(3) **Installation of underground tanks.**

(a) **Location.** You must do excavation for underground storage tanks with due care to avoid undermining of foundations of existing structures. You must locate underground tanks or tanks under buildings with respect to existing building foundations and supports that the loads carried by the latter cannot be transmitted to the tank. The distance from any part of a tank storing Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100°F (37.8°C), to the nearest wall of any basement or pit must be not less than one foot, and to any property line that may be built upon, not less than 3 feet. The distance from any part of a tank storing Category 3 flammable liquids with a flashpoint at or above 100°F (37.8°C) or Category 4 flammable liquids to the nearest wall of any basement, pit or property line must not be less than one foot.

(b) **Depth and cover.** You must set underground tanks on firm foundations and surrounded with at least 6 inches of noncorrosive, inert materials such as clean sand, earth, or gravel well tamped in place. You must place the tank in the hole with care since dropping or rolling the tank into the hole can break a weld, puncture or damage the tank, or scrape off the protective coating of coated tanks. You must cover tanks with a minimum of 2 feet of earth or with not less than one foot of earth, on top of which must be placed a slab of reinforced concrete not less than 4 inches thick. When underground tanks are, or are likely to be, subject to traffic, you must protect them against damage from vehicles passing over them by at least 3 feet of earth cover, or 18 inches of well-tamped earth, plus 6 inches of reinforced concrete or 8 inches of asphaltic concrete. When asphaltic or reinforced concrete paving is used as part of the protection, it must extend at least one foot horizontally beyond the outline of the tank in all directions.

(c) **Corrosion protection.** You must provide corrosion protection for the tank and its piping by one or more of the following methods:

(i) Use of protective coatings or wrappings;

(ii) Cathodic protection; or,

(iii) Corrosion resistant materials of construction.

(d) **Vents.**

(i) **Location and arrangement of vents for Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100°F (37.8°C).** Vent pipes from tanks storing Category 1 or 2 flammable liquids, or Category 3 flammable liquids with a flashpoint below 100°F (37.8°C), must be located so that the discharge point is outside of buildings, higher than the fill pipe opening, and not less than 12 feet above the adjacent ground level. Vent pipes must discharge only upward in order to disperse vapors. Vent pipes 2 inches or less in nominal inside diameter must not be obstructed by devices that will cause excessive back pressure. Vent pipe outlets must be located so that flammable vapors will not enter building openings, or be trapped under eaves or other obstructions. If the vent pipe is less than 10 feet in length, or greater than 2 inches in nominal inside diameter, the outlet must be provided with a vacuum and pressure relief device or there must be an approved flame arrester located in the vent line at the outlet or within the approved distance from the outlet.

(ii) **Size of vents.** You must vent each tank shall be vented through piping adequate in size to prevent blow-back of vapor or liquid at the fill opening while the tank is being filled. Vent pipes must be not less than one and one-fourth inch nominal inside diameter.

TABLE H-11
VENT LINE DIAMETERS

Maximum flow GPM	Pipe length*		
	50 feet	100 feet	200 feet
	Inches	Inches	Inches
100	1 1/4	1 1/4	1 1/4
200	1 1/4	1 1/4	1 1/4
300	1 1/4	1 1/4	1 1/2
400	1 1/4	1 1/2	2
500	1 1/2	1 1/2	2
600	1 1/2	2	2
700	2	2	2
800	2	2	3
900	2	2	3
1,000	2	2	3

* Vent lines of 50 ft., 100 ft., and 200 ft. of pipe plus 7 ells.

(iii) **Location and arrangement of vents for Category 3 flammable liquids with a flashpoint at or above 100°F (37.8°C) or Category 4 flammable liquids.** Vent pipes from tanks storing Category 3 flammable liquids with a flashpoint at or above 100°F (37.8°C) or Category 4 flammable liquids must terminate outside of the building and higher than the fill pipe opening. Vent outlets must be above normal snow level. They may be fitted with return bends, coarse screens or other devices to minimize ingress of foreign material.

(iv) Vent piping must be constructed in accordance with WAC 296-24-33007. Vent pipes must be laid so as to drain toward the tank without sags or traps in which liquid can collect. You must locate them so that they will not be subjected to physical damage. The tank end of the vent pipe must enter the tank through the top.

(v) When tank vent piping is manifolded, pipe sizes must be such as to discharge, within the pressure limitations of the system, the vapors they may be required to handle when manifolded tanks are filled simultaneously.

(e) **Tank openings other than vents.**

(i) Connections for all tank openings must be vapor or liquid tight.

(ii) You must provide openings for manual gaging, if independent of the fill pipe, with a liquid-tight cap or cover. If inside a building, you must protect each such opening against liquid overflow and possible vapor release by means of a spring-loaded check valve or other approved device.

(iii) Fill and discharge lines must enter tanks only through the top. Fill lines must be sloped toward the tank.

(iv) For Category 2 flammable liquids and Category 3 flammable liquids with a flashpoint below 100°F (37.8°C), other than crude oils, gasolines, and asphalts, you must design and install the fill pipe so as to minimize the possibility of generating static electricity by terminating within six inches of the bottom of the tank.

(v) You must locate filling and emptying connections which are made and broken outside of buildings at a location free from any source of ignition and not less than five feet away from any building opening. Such connection must be closed and liquidtight when not in use. The connection must be properly identified.

(4) **Installation of tanks inside of buildings.**

(a) **Location.** You must not permit tanks inside of buildings except as provided in WAC 296-24-33011 and 296-24-33015 through 296-24-33019.

(b) **Vents.** Vents for tanks inside of buildings must be as provided in subsections (2)(d), (e), (f)(ii) and (3)(d) of this section, except that emergency venting by the use of weak roof seams on tanks must not be permitted. Vents must discharge vapors outside the buildings.

(c) **Vent piping.** Vent piping must be constructed in accordance with WAC 296-24-33007.

(d) **Tank openings other than vents.**

(i) Connections for all tank openings must be vapor or liquidtight. Vents are covered in (b) of this subsection.

(ii) You must provide each connection to a tank inside of buildings through which liquid can normally flow with an internal or an external valve located as close as practical to the shell of the tank. Such valves, when external, and their connections to the tank must be of steel except when the chemical characteristics of the liquid stored are incompatible with steel. When materials other than steel are necessary, they must be suitable for the pressures, structural stresses, and temperatures involved, including fire exposures.

(iii) You must provide flammable liquid tanks located inside of buildings, except in one-story buildings designed and protected for flammable liquid storage, with an automatic-closing heat-actuated valve on each withdrawal connection below the liquid level, except for connections used for emergency disposal, to prevent continued flow in the event of fire in the vicinity of the tank. This function may be incorporated in the valve required in (d)(ii) of this subsection, and if a separate valve, must be located adjacent to the valve required in (d)(ii) of this subsection.

(iv) You must provide openings for manual gaging, if independent of the fill pipe (see (d)(vi) of this subsection), with a vaportight cap or cover. You must protect each such opening against liquid overflow and possible vapor release by means of a spring loaded check valve or other approved device.

(v) For Category 2 flammable liquids and Category 3 flammable liquids with a flashpoint below 100°F (37.8°C) liquids other than crude oils, gasolines, and asphalts, you must design and install the fill pipe so as to minimize the possibility of generating static electricity by terminating within 6 inches of the bottom of the tank.

(vi) You must install the fill pipe inside of the tank to avoid excessive vibration of the pipe.

(vii) The inlet of the fill pipe must be located outside of buildings at a location free from any source of ignition and not less than five feet away from any building opening. You must close the inlet of the fill pipe and ensure it is liquidtight when not in use. You must properly identify the fill connection.

(viii) You must equip tanks inside buildings with a device, or other means must be provided, to prevent overflow into the building.

(5) **Supports, foundations, and anchorage for all tank locations.**

(a) **General.** You must install tank supports on firm foundations. Tank supports must be of concrete, masonry, or protected steel. Single wood timber supports (not cribbing) laid horizontally may be used for outside aboveground tanks if not more than 12 inches high at their lowest point.

(b) **Fire resistance.** You must protect steel supports or exposed piling by materials having a fire resistance rating of not less than 2 hours, except that steel saddles need not be protected if less than 12 inches high at their lowest point. Water spray protection or its equivalent may be used in lieu of fire-resistive materials to protect supports.

(c) **Spheres.** You must give the design of the supporting structure for tanks such as spheres special engineering consideration.

(d) **Load distribution.** Every tank must be so supported as to prevent the excessive concentration of loads on the supporting portion of the shell.

(e) **Foundations.** Tanks must rest on the ground or on foundations made of concrete, masonry, piling, or steel. You must design tank foundations to minimize the possibility of uneven settling of the tank and to minimize corrosion in any part of the tank resting on the foundation.

(f) **Flood areas.** Where a tank is located in an area that may be subjected to flooding, you must observe the applicable precautions outlined in (f) of this subsection.

(i) You must not locate any aboveground vertical storage tank containing a flammable liquid so that the allowable liquid level within the tank is below the established maximum flood stage, unless the tank is provided with a guiding structure such as described in (f)(xiii), (xiv) and (xv) of this subsection.

(ii) You must provide independent water supply facilities at locations where there is no ample and dependable public water supply available for loading partially empty tanks with water.

(iii) In addition to the preceding requirements, you must safeguard each tank so located that more than 70%, but less than 100%, of its allowable liquid storage capacity will be submerged at the established maximum flood stage, by one of the following methods: You must raise the tank, or you must increase its height, until its top extends above the maximum flood stage a distance equivalent to 30% or more of its allowable liquid storage capacity: Provided, however, That the submerged part of the tank must not exceed 2 1/2 times the diameter. Or, as an alternative to the foregoing, you must provide adequate noncombustible structural guides, designed to permit the tank to float vertically without loss of product.

(iv) You must ensure that each horizontal tank so located that more than 70% of its storage capacity will be submerged at the established flood stage, is anchored, attached to a foundation of concrete or of steel and concrete, of sufficient weight to provide adequate load for the tank when filled with flammable liquid and submerged by flood waters to the established flood stage, or adequately secured by other means.

(v) You must protect spherical and spheroidal tanks by applicable methods as specified for either vertical or horizontal tanks.

(vi) At locations where there is no ample and dependable water supply, or where filling of underground tanks with liquid is impracticable because of the character of their contents, their use, or for other reasons, you must safeguard each tank against movement when empty and submerged by high groundwater or flood waters by anchoring, weighting with concrete or other approved solid loading material, or securing by other means. Each such tank must be so constructed and installed that it will safely resist external pressures due to high groundwater or flood waters.

(vii) You must ensure that at locations where there is an ample and dependable water supply available, underground tanks containing flammable liquids, so installed that more than 70% of their storage capacity will be submerged at the maximum flood stage, are so anchored, weighted, or secured by other means, as to prevent movement of such tanks when filled with flammable ((~~or combustible~~)) liquids, and submerged by flood waters to the established flood stage.

(viii) You must provide pipe connections below the allowable liquid level in a tank with valves or cocks located as closely as practicable to the tank shell. Such valves and their connections to tanks must be of steel or other material suitable for use with the liquid being stored. You must not use iron.

(ix) At locations where an independent water supply is required, it must be entirely independent of public power and water supply. Independent source of water must be available when flood waters reach a level not less than 10 feet below the bottom of the lowest tank on a property.

(x) You must locate or design self-contained power and pumping unit so that pumping into tanks may be carried on continuously throughout the rise in flood waters from a level 10 feet below the lowest tank to the level of the potential flood stage.

(xi) Capacity of the pumping unit must be such that the rate of rise of water in all tanks must be equivalent to the

established potential average rate of rise of flood waters at any stage.

(xii) You must test each independent pumping unit periodically to ((~~insure~~)) ensure that it is in satisfactory operating condition.

(xiii) You must ensure that structural guides for holding floating tanks above their foundations are designed so that there will be no resistance to the free rise of a tank, and that they are constructed of noncombustible material.

(xiv) The strength of the structure must be adequate to resist lateral movement of a tank subject to a horizontal force in any direction equivalent to not less than 25 pounds per square foot acting on the projected vertical cross-sectional area of the tank.

(xv) Where tanks are situated on exposed points or bends in a shoreline where swift currents in flood waters will be present, the structures must be designed to withstand a unit force of not less than 50 pounds per square foot.

(xvi) The filling of a tank to be protected by water loading must be started as soon as flood waters reach a dangerous flood stage. The rate of filling must be at least equal to the rate of rise of the floodwaters (or the established average potential rate of rise).

(xvii) Sufficient fuel to operate the water pumps must be available at all times to insure adequate power to fill all tankage with water.

(xviii) All valves on connecting pipelines must be closed and locked in closed position when water loading has been completed.

(xix) Where structural guides are provided for the protection of floating tanks, all rigid connections between tanks and pipelines must be disconnected and blanked off or binded before the floodwaters reach the bottom of the tank, unless control valves and their connections to the tank are of a type designed to prevent breakage between the valve and the tank shell.

(xx) All valves attached to tanks other than those used in connection with water loading operations must be closed and locked.

(xxi) If a tank is equipped with a swing line, the swing pipe must be raised to and secured at its highest position.

(xxii) **Inspections.** The director or their designated representative must make periodic inspections of all plants where the storage of flammable liquids is such as to require compliance with the foregoing requirements, in order to assure the following:

(A) That all flammable liquid storage tanks are in compliance with these requirements and so maintained.

(B) That detailed printed instructions of what to do in flood emergencies are properly posted.

(C) That station operators and other employees depended upon to carry out such instructions are thoroughly informed as to the location and operation of such valves and other equipment necessary to effect these requirements.

(g) **Earthquake areas.** In areas subject to earthquakes, the tank supports and connections must be designed to resist damage as a result of such shocks.

(6) **Sources of ignition.** In locations where flammable vapors may be present, you must take precautions to prevent ignition by eliminating or controlling sources of ignition. Sources of ignition may include open flames, lightning, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical, and mechanical), spontaneous ignition, chemical and physical-chemical reactions, and radiant heat.

(7) **Testing.**

(a) **General.** You must perform strength testing on all tanks, whether shop built or field erected, before they are placed in service in accordance with the applicable sections of the code under which they were built. The American Society of Mechanical Engineers (ASME) code stamp. American Petroleum Institute (API) monogram, or the label of the Underwriters' Laboratories, Inc., on a tank must be evidence of compliance with this strength test. You must perform strength testing on tanks not marked in accordance with the above codes before they are placed in service in accordance with good engineering principles and you must make reference to the sections on testing in the codes listed in (l)(c)(i), (d)(ii) or (e)(ii) of this section.

(b) **Strength.** When the vertical length of the fill and vent pipes is such that when filled with liquid the static head imposed upon the bottom of the tank exceeds ten pounds per square inch, you must test the tank and related piping hydrostatically to a pressure equal to the static head thus imposed.

(c) **Tightness.** In addition to the strength test called for in (a) and (b) of this subsection, you must test all tanks and connections for tightness. Except for underground tanks, you must make this tightness test at operating pressure with air, inert gas, or water prior to placing the tank in service. In the case of field-erected tanks the strength test may be considered to be the test for tank tightness. You must test underground tanks and piping, before being covered, enclosed, or placed in use, for tightness hydrostatically, or with air pressure at not less than three pounds per square inch and not more than five pounds per square inch.

(d) **Repairs.** You must correct all leaks or deformations in an acceptable manner before the tank is placed in service. Mechanical caulking is not permitted for correcting leaks in welded tanks except pinhole leaks in the roof.

(e) **Derated operations.** Tanks to be operated at pressures below their design pressure may be tested by the applicable provisions of (a) or (b) of this subsection based upon the pressure developed under full emergency venting of the tank.

AMENDATORY SECTION (Amending WSR 15-24-100, filed 12/1/15, effective 1/5/16)

WAC 296-24-58503 Scope, application and definitions applicable. (1) **Scope.** This section contains requirements for fire brigades, and all portable and fixed fire suppression equipment, fire detection systems, and fire or employee alarm systems installed to meet the fire protection requirements of this chapter.

(2) **Application.** This section applies to all employments except for maritime, construction and agriculture.

(3) **Definitions applicable to this section.**

After flame. The time a test specimen continues to flame after the flame source has been removed.

Aqueous film forming foam (AFFF). A fluorinated surfactant with a foam stabilizer which is diluted with water to act as a temporary barrier to exclude air from mixing with the fuel vapor by developing an aqueous film on the fuel surface of some hydrocarbons which is capable of suppressing the generation of fuel vapors.

Approved. Acceptable to the director under the following criteria:

- If it is accepted, or certified, or listed, or labeled or otherwise determined to be safe by a nationally recognized testing laboratory; or

- With respect to an installation or equipment of a kind which no nationally recognized testing laboratory accepts, certifies, lists, labels, or determines to be safe, if it is inspected or tested by another federal agency and found in compliance with the provisions of the applicable National Fire Protection Association Fire Code; or

- With respect to custom-made equipment or related installations which are designed, fabricated for, and intended for use by its manufacturer on the basis of test data which the employer keeps and makes available for inspection to the director; and

- **For the purposes of (c) of this subsection:**

- Equipment is listed if it is of a kind mentioned in a list which is published by a nationally recognized testing laboratory which makes periodic inspections of the production of such equipment and which states that such equipment meets nationally recognized standards or has been tested and found safe for use in a specified manner;

- Equipment is labeled if there is attached to it a label, symbol, or other identifying mark of a nationally recognized testing laboratory which makes periodic inspections of the production of such equipment and whose labeling indicates compliance with nationally recognized standards or tests to determine safe use in a specified manner;

- Equipment is accepted if it has been inspected and found by a nationally recognized testing laboratory to conform to specified plans or to procedures of applicable codes;

- Equipment is certified if it has been tested and found by a nationally recognized testing laboratory to meet nationally recognized standards or to be safe for use in a specified manner or is of a kind whose production is periodically inspected by a nationally recognized testing laboratory, and if it bears a label, tag, or other record of certification; and

- Refer to federal regulation 29 C.F.R. 1910.7 for definition of nationally recognized testing laboratory.

Automatic fire detection device. A device designed to automatically detect the presence of fire by heat, flame, light, smoke or other products of combustion.

Buddy-breathing device. An accessory to self-contained breathing apparatus which permits a second person to share the same air supply as that of the wearer of the apparatus.

Carbon dioxide. A colorless, odorless, electrically nonconductive inert gas (chemical formula CO_2) that is a medium for extinguishing fires by reducing the concentration of oxygen or fuel vapor in the air to the point where combustion is impossible.

Class A fire. A fire involving ordinary combustible materials such as paper, wood, cloth, and some rubber and plastic materials.

Class B fire. A fire involving flammable ((~~or combustible~~)) liquids, flammable gases, greases and similar materials, and some rubber and plastic materials.

Class C fire. A fire involving energized electrical equipment where safety to the employee requires the use of electrically nonconductive extinguishing media.

Class D fire. A fire involving combustible metals such as magnesium, titanium, zirconium, sodium, lithium and potassium.

Dry chemical. An extinguishing agent composed of very small particles of chemicals such as, but not limited to, sodium bicarbonate, potassium bicarbonate, urea-based potassium bicarbonate, potassium chloride, or monoammonium phosphate supplemented by special treatment to provide resistance to packing and moisture absorption (caking) as well as to provide proper flow capabilities. Dry chemical does not include dry powders.

Dry powder. A compound used to extinguish or control Class D fires.

Education. The process of imparting knowledge or skill through systematic instruction. It does not require formal classroom instruction.

Enclosed structure. A structure with a roof or ceiling and at least two walls which may present fire hazards to employees, such as accumulations of smoke, toxic gases and heat similar to those found in buildings.

Extinguisher classification. The letter classification given an extinguisher to designate the class or classes of fire on which an extinguisher will be effective.

Extinguisher rating. The numerical rating given to an extinguisher which indicates the extinguishing potential of the unit based on standardized tests developed by Underwriters' Laboratories, Inc.

Fixed extinguishing system. A permanently installed system that either extinguishes or controls a fire at the location of the system.

Flame resistance. The property of materials, or combinations of component materials, to retard ignition and restrict the spread of flame.

Foam. A stable aggregation of small bubbles which flow freely over a burning liquid surface and form a coherent blanket which seals combustible vapors and thereby extinguishes the fire.

Gaseous agent. A fire extinguishing agent which is in the gaseous state at normal room temperature and pressure. It has low viscosity, can expand or contract with changes in pressure and temperature, and has the ability to diffuse readily and to distribute itself uniformly throughout an enclosure.

Halon 1211. A colorless, faintly sweet smelling, electrically nonconductive liquefied gas (chemical formula $CBrC1F_2$) which is a medium for extinguishing fires by inhibiting the chemical chain reaction of fuel and oxygen. It is also known as bromochlorodifluoromethane.

Halon 1301. A colorless, odorless, electrically nonconductive gas (chemical formula $CBrF_3$) which is a medium for extinguishing fires by inhibiting the chemical chain reaction

of fuel and oxygen. It is also known as bromotrifluoromethane.

Helmet. A head protective device consisting of a rigid shell, energy absorption system and chin strap intended to be worn to provide protection for the head or portions thereof, against impact, flying or falling objects, electric shock, penetration, heat and flame.

Incipient stage fire. A fire which is in the initial or beginning stage and which can be controlled or extinguished by portable fire extinguishers, Class II standpipe or small hose systems without the need for protective clothing or breathing apparatus.

Industrial fire brigade. An organized group of employees whose primary employment is other than firefighting who are knowledgeable, trained and skilled in specialized operations based on site-specific hazards present at a single commercial facility or facilities under the same management.

Inspection. A visual check of fire protection systems and equipment to ensure that they are in place, charged, and ready for use in the event of a fire.

Interior structural firefighting. The physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures which are involved in a fire situation beyond the incipient stage.

Lining. A material permanently attached to the inside of the outer shell of a garment for the purpose of thermal protection and padding.

Local application system. A fixed fire suppression system which has a supply of extinguishing agent, with nozzles arranged to automatically discharge extinguishing agent directly on the burning material to extinguish or control a fire.

Maintenance. The performance of services on fire protection equipment and systems to assure that they will perform as expected in the event of a fire. Maintenance differs from inspection in that maintenance requires the checking of internal fitting, devices and agent supplies.

Multipurpose dry chemical. A dry chemical which is approved for use on Class A, Class B and Class C fires.

Outer shell. The exterior layer of material on the fire coat and protective trousers which forms the outermost barrier between the firefighter and the environment. It is attached to the vapor barrier and liner and is usually constructed with a storm flap, suitable closures, and pockets.

Positive-pressure breathing apparatus. Self-contained breathing apparatus in which the pressure in the breathing zone is positive in relation to the immediate environment during inhalation and exhalation.

Predischarge employee alarm. An alarm which will sound at a set time prior to actual discharge of an extinguishing system so that employees may evacuate the discharge area prior to system discharge.

Quick disconnect valve. A device which starts the flow of air by inserting of the hose (which leads from the facepiece) into the regulator of self-contained breathing apparatus, and stops the flow of air by disconnection of the hose from the regulator.

Sprinkler alarm. An approved device installed so that any waterflow from a sprinkler system equal to or greater than that from single automatic sprinkler will result in an audible alarm signal on the premises.

Sprinkler system. A system of piping designed in accordance with fire protection engineering standards and installed to control or extinguish fires. The system includes an adequate and reliable water supply, and a network of specially sized piping and sprinklers which are interconnected. The system also includes a control valve and a device for actuating an alarm when the system is in operation.

Standpipe systems:

Class I standpipe system. A two and one-half-inch (6.3 cm) hose connection for use by fire departments and those trained in handling heavy fire streams.

Class II standpipe system. A one and one-half-inch (3.8 cm) hose system which provides a means for the control or extinguishment of incipient stage fires.

Class III standpipe system. A combined system of hose which is for the use of employees trained in the use of hose operations and which is capable of furnishing effective water discharge during the more advanced stages of fire (beyond the incipient stage) in the interior of workplaces. Hose outlets are available for both one and one-half-inch (3.8 cm) and two and one-half-inch (6.3 cm) hose.

Small hose system. A system of hose ranging in diameter from five-eighths-inch (1.6 cm) up to one and one-half-inch (3.8 cm) which is for the use of employees and which provides a means for the control and extinguishment of incipient stage fires.

Total flooding system. A fixed suppression system which is arranged to automatically discharge a predetermined concentration of agent into an enclosed space for the purpose of fire extinguishment or control.

Training. The process of making proficient through instruction and hands-on practice in the operation of equipment, including respiratory protection equipment, that is expected to be used in the performance of assigned duties.

Vapor barrier. That material used to prevent or substantially inhibit the transfer of water, corrosive liquids and steam or other hot vapors from the outside of a garment to the wearer's body.

AMENDATORY SECTION (Amending WSR 94-15-096, filed 7/20/94, effective 9/20/94)

WAC 296-24-63299 Appendix B—National consensus standards. The following table contains a cross-reference listing of those current national consensus standards which contains information and guidelines that would be considered acceptable in complying with requirements in the specific sections.

Section	National Consensus Standard
((~~WAC 296-24-58505 . .~~	~~ANSI/NFPA No. 1972, Structural Firefighter's Helmets.~~
	~~ANSI Z88.5 American National Standard, Practice for Respirator Protection for the Fire Service.~~
	~~ANSI/NFPA No. 1971, Protective Clothing for Structural Firefighters.~~
	~~NFPA No. 1041, Fire Service Instructor Professional Qualifications.~~))
WAC 296-24-592 . .	ANSI/NFPA No. 10, Portable Fire Extinguishers.

Section	National Consensus Standard
WAC 296-24-602 . .	ANSI/NFPA No. 18, Wetting Agents. ANSI/NFPA No. 20, Centrifugal Fire Pumps. NFPA No. 21, Steam Fire Pumps. ANSI/NFPA No. 22, Water Tanks. NFPA No. 24, Outside Protection. NFPA No. 26, Supervision of Valves. NFPA No. 13E, Fire Department Operations in Properties Protected by Sprinkler, Standpipe Systems. ANSI/NFPA No. 194, Fire Hose Connections. NFPA No. 197, Initial Fire Attack, Training for. NFPA No. 1231, Water Supplies for Suburban and Rural Firefighting.
WAC 296-24-607 . .	ANSI/NFPA No. 13, Sprinkler Systems. NFPA No. 13A, Sprinkler Systems, Maintenance. ANSI/NFPA No. 18, Wetting Agents. ANSI/NFPA No. 20, Centrifugal Fire Pumps. ANSI/NFPA No. 22, Water Tanks. NFPA No. 24, Outside Protection. NFPA No. 26, Supervision of Valves. ANSI/NFPA No. 72B, Auxiliary Signaling Systems. NFPA No. 1231, Water Supplies for Suburban and Rural Firefighting.
WAC 296-24-617 . .	ANSI/NFPA No. 11, Foam Systems. ANSI/NFPA No. 11A, High Expansion Foam Extinguishing Systems. ANSI/NFPA No. 11B, Synthetic Foam and Combined Agent Systems. ANSI/NFPA No. 12, Carbon Dioxide Systems. ANSI/NFPA No. 12A, Halon 1301 Systems. ANSI/NFPA No. 12B, Halon 1211 Systems. ANSI/NFPA No. 15, Water Spray Systems. ANSI/NFPA No. 16, Foam-Water Spray Systems. ANSI/NFPA No. 17, Dry Chemical Systems. ANSI/NFPA No. 69, Explosion Suppression Systems.
WAC 296-24-622 . .	ANSI/NFPA No. 11B, Synthetic Foam and Combined Agent Systems. ANSI/NFPA No. 17, Dry Chemical Systems.
WAC 296-24-623 . .	ANSI/NFPA No. 12, Carbon Dioxide Systems. ANSI/NFPA No. 12A, Halon 1211 Systems. ANSI/NFPA No. 12B, Halon 1301 Systems. ANSI/NFPA No. 69, Explosion Suppression Systems.
WAC 296-24-627 . .	ANSI/NFPA No. 11, Foam Extinguishing Systems. ANSI/NFPA No. 11A, High Expansion Foam Extinguishing Systems. ANSI/NFPA No. 11B, Synthetic Foam and Combined Agent Systems. ANSI/NFPA No. 15, Water Spray Fixed Systems. ANSI/NFPA No. 16, Foam-Water Spray Systems. ANSI/NFPA No. 18, Wetting Agents. NFPA No. 26, Supervision of Valves.
WAC 296-24-629 . .	ANSI/NFPA No. 71, Central Station Signaling Systems. ANSI/NFPA No. 72A, Local Protective Signaling Systems. ANSI/NFPA No. 72B, Auxiliary Signaling Systems. ANSI/NFPA No. 72D, Proprietary Protective Signaling Systems. ANSI/NFPA No. 72E, Automatic Fire Detectors. ANSI/NFPA No. 101, Life Safety Code.
((~~WAC 296-24-631 . .~~	~~ANSI/NFPA No. 71, Central Station Signaling Systems.~~ ~~ANSI/NFPA No. 72A, Local Protective Signaling Systems.~~ ~~ANSI/NFPA No. 72B, Auxiliary Protective Signaling Systems.~~ ~~ANSI/NFPA No. 72C, Remote Station Protective Signaling Systems.~~ ~~ANSI/NFPA No. 72D, Proprietary Protective Signaling Systems.~~ ~~ANSI/NFPA No. 101, Life Safety Code.~~))
Metric Conversion . .	ANSI/ASTM NSo. E380, American National Standard for Metric Practice.

NFPA standards are available from the National Fire Protection Association; Batterymarch Park, Quincy, MA 02269-9101.

ANSI Standards are available from the American National Standards Institute; 11 West 42nd Street; New York, NY 10036.

AMENDATORY SECTION (Amending WSR 15-24-100, filed 12/1/15, effective 1/5/16)

WAC 296-24-63399 Appendix C—Fire protection references for further information. (1) **Appendix general references.** The following references provide information which can be helpful in understanding the requirements contained in all of the sections of Part G:

(a) Fire Protection Handbook, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(b) Accident Prevention Manual for Industrial Operations, National Safety Council, 444 North Michigan Avenue, Chicago, IL 60611.

(c) Various associations also publish information which may be useful in understanding these standards. Examples of these associations are: Fire Equipment Manufacturers Association (FEMA) of Cleveland, OH 44115-2851, and the National Association of Fire Equipment Distributors (NAFED) of Chicago, IL 60611-4267.

(2) **Appendix references applicable to individual sections.** The following references are grouped according to individual sections contained in Part G. These references provide information which may be helpful in understanding and implementing the standards of each section of Part G.

(a) ((~~WAC 296-24-58505 - Fire brigades:~~

~~(i) Private Fire Brigades, NFPA 27; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.~~

~~(ii) Initial Fire Attack, Training Standard On, NFPA 197; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.~~

~~(iii) Firefighter Professional Qualifications, NFPA 1001; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.~~

~~(iv) Organization for Fire Services, NFPA 1201; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.~~

~~(v) Organization of a Fire Department, NFPA 1202; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.~~

~~(vi) Protective Clothing for Structural Firefighting, ANSI/NFPA 1971; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.~~

~~(vii) American National Standards Institute for Men's Safety-Toe Footwear, ANSI Z41.1; American National Standards Institute, New York, NY 10036.~~

~~(viii) American National Standards Institute for Occupational and Educational Eye and Face Protection, ANSI Z87.1; American National Standards Institute, New York, NY 10036.~~

~~(ix) American National Standards Institute, Safety Requirements for Industrial Head Protection, ANSI Z89.1; American National Standards Institute, New York, NY 10036.~~

~~(x) Specifications for Protective Headgear for Vehicular Users, ANSI Z90.1; American National Standards Institute, New York, NY 10036.~~

~~(xi) Testing Physical Fitness; Davis and Santa Maria, Fire Command, April 1975.~~

~~(xii) Development of a Job-Related Physical Performance Examination for Firefighters; Dotson and Others. A summary report for the National Fire Prevention and Control Administration, Washington, D.C., March 1977.~~

~~(xiii) Proposed Sample Standards for Firefighters' Protective Clothing and Equipment; International Association of Firefighters, Washington, D.C. 20006-5395.~~

~~(xiv) A Study of Facepiece Leakage of Self-Contained Breathing Apparatus by DOP Man Tests; Los Alamos National Laboratory, Los Alamos, N.M.~~

~~(xv) The Development of Criteria for Firefighters' Gloves; Vol. II: Glove Criteria and Test Methods; National Institute for Occupational Safety and Health, Cincinnati, Ohio, 1976.~~

~~(xvi) Model Performance Criteria for Structural Firefighters' Helmets; National Fire Prevention and Control Administration, Washington, D.C., 1977.~~

~~(xvii) Firefighters; Job Safety and Health Magazine, Occupational Safety and Health Administration, Washington, D.C., June 1978.~~

~~(xviii) Eating Smoke - The Dispensable Diet; Utech, H.P. The Fire Independent, 1975.~~

~~(xix) Project Monoxide - A Medical Study of an Occupational Hazard of Firefighters; International Association of Firefighters, Washington, D.C. 20006-5395.~~

~~(xx) Occupational Exposures to Carbon Monoxide in Baltimore Firefighters; Radford Baltimore, MD. Journal of Occupational Medicine, September, 1976.~~

~~(xxi) Fire Brigades; National Safety Council, Chicago, IL 60611, 1966.~~

~~(xxii) American National Standards Institute, Practice for Respiratory Protection for the Fire Service, ANSI Z88.5; American National Standards Institute, New York, NY 10036.~~

~~(xxiii) Respirator Studies for the Nuclear Regulatory Commission; October 1, 1977 - September 30, 1978. Evaluation and Performance of Open-Circuit Breathing Apparatus. NUREG/CR-1235. Los Alamos National Laboratory; Los Alamos, NM 87545, January, 1980.~~

~~(b)~~))) WAC 296-24-592 - Portable fire extinguishers:

(i) Standard for Portable Fire Extinguishers, ANSI/NFPA 10; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

(ii) Methods for Hydrostatic Testing of Compressed-Gas Cylinders, C-1; Compressed Gas Association, 1725 Jefferson Davis Highway, Arlington, VA 22202-4100.

(iii) Recommendations for the Disposition of Unserviceable Compressed-Gas Cylinders, C-2; Compressed Gas Association, 1725 Jefferson Davis Highway, Arlington, VA 22202-4100.

(iv) Standard for Visual Inspection of Compressed-Gas Cylinders, C-6; Compressed Gas Association, 1725 Jefferson Davis Highway, Arlington, VA 22202-4100.

(v) Portable Fire Extinguisher Selection Guide, National Association of Fire Equipment Distributors, 401 North Michigan Avenue Chicago, IL 60611-4267.

(((~~c~~))) (b) WAC 296-24-602 - Standpipe and hose systems:

(i) Standard for the Installation of Sprinkler Systems, ANSI/NFPA 13; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(ii) Standard of the Installation of Standpipe and Hose Systems, ANSI/NFPA 14; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(iii) Standard for the Installation of Centrifugal Fire Pumps, ANSI/NFPA 20; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(iv) Standard for Water Tanks for Private Fire Protection, ANSI/NFPA 22; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(v) Standard for Screw Threads and Gaskets for Fire Hose Connections, ANSI/NFPA 194; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(vi) Standard for Fire Hose, NFPA 196; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(vii) Standard for the Care of Fire Hose, NFPA 198; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(((~~d~~))) (c) WAC 296-24-607 - Automatic sprinkler systems:

(i) Standard of the Installation of Sprinkler Systems, ANSI/NFPA 13; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(ii) Standard for the Care and Maintenance of Sprinkler Systems, ANSI/NFPA 13A; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(iii) Standard for the Installation of Standpipe and Hose Systems, ANSI/NFPA 14; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(iv) Standard for the Installation of Centrifugal Fire Pumps, ANSI/NFPA 20; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(v) Standard for Water Tanks for Private Fire Protection, ANSI/NFPA 22; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(vi) Standard for Indoor General Storage, ANSI/NFPA 231; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(vii) Standard for Rack Storage of Materials, ANSI/NFPA 231C; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(((~~e~~))) (d) WAC 296-24-617 - Fixed extinguishing systems, general information:

(i) Standard for Foam Extinguishing Systems, ANSI/NFPA 11; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(ii) Standard for Hi-Expansion Foam Systems, ANSI/NFPA 11A; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(iii) Standard on Synthetic Foam and Combined Agent Systems, ANSI/NFPA 11B; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(iv) Standard on Carbon Dioxide Extinguishing Systems, ANSI/NFPA 12; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(v) Standard on Halon 1301, ANSI/NFPA 12A; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(vi) Standard on Halon 1211, ANSI/NFPA 12B; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(vii) Standard for Water Spray Systems, ANSI/NFPA 15; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(viii) Standard for Foam-Water Sprinkler Systems and Foam-Water Spray Systems, ANSI/NFPA 16; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(ix) Standard for Dry Chemical Extinguishing Systems, ANSI/NFPA 17; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(((~~f~~))) (e) WAC 296-24-622 - Fixed extinguishing systems, dry chemical:

(i) Standard for Dry Chemical Extinguishing Systems, ANSI/NFPA 17; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(ii) National Electrical Code, ANSI/NFPA 70; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(iii) Standard for the Installation of Equipment for the Removal of Smoke and Grease-Laden Vapor from Commercial Cooling Equipment, NFPA 96; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(((~~g~~))) (f) WAC 296-24-623 - Fixed extinguishing systems, gaseous agents:

(i) Standard on Carbon Dioxide Extinguishing Systems, ANSI/NFPA 12; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(ii) Standard on Halon 1301, ANSI/NFPA 12B; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(iii) Standard on Halon 1211, ANSI/NFPA 12B; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(iv) Standard on Explosion Prevention Systems, ANSI/NFPA 69; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(v) National Electrical Code, ANSI/NFPA 70; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(vi) Standard on Automatic Fire Detectors, ANSI/NFPA 72E; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(vii) Determination of Halon 1301/1211 Threshold Extinguishing Concentrations Using the Cup Burner Method, Riley and Olson, Ansul Report AL-530-A.

(((~~h~~))) (g) WAC 296-24-627 - Fixed extinguishing systems, water spray and foam agents:

(i) Standard for Foam Extinguisher Systems, ANSI/NFPA 11; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(ii) Standard for High-Expansion Foam Systems, ANSI/NFPA 11A; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(iii) Standard for Water Spray Fixed Systems for Fire Protection, ANSI/NFPA 15; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(iv) Standard for the Installation of Foam-Water Sprinkler Systems and Foam-Water Spray Systems, ANSI/NFPA 16; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(((~~i~~))) (h) WAC 296-24-629 - Fire detection systems:

(i) National Electrical Code, ANSI/NFPA 70; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(ii) Standard for Central Station Signaling Systems, ANSI/NFPA 71; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(iii) Standard on Automatic Fire Detectors, ANSI/NFPA 72E; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(i) Reserved.

(j) WAC 296-800-310 - Employee alarm systems:

(i) National Electrical Code, ANSI/NFPA 70; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(ii) Standard for Central Station Signaling Systems, ANSI/NFPA 71; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(iii) Standard for Local Protective Signaling Systems, ANSI/NFPA 72A; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(iv) Standard for Auxiliary Protective Signaling Systems, ANSI/NFPA 72B; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(v) Standard for Remote Station Protective Signaling Systems, ANSI/NFPA 72C; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(vi) Standard for Proprietary Protective Signaling Systems, ANSI/NFPA 72D; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269-9101.

(vii) Vocal Emergency Alarms in Hospitals and Nursing Facilities: Practice and Potential, National Institute of Standards and Technology, Quince Orchard and Clopper Roads, Gaithersburg, MD 20899-0011, July, 1977.

(viii) Fire Alarm and Communication Systems, National Institute of Standards and Technology, Quince Orchard and Clopper Roads, Gaithersburg, MD 20899-0011, April, 1976.

AMENDATORY SECTION (Amending WSR 15-24-100, filed 12/1/15, effective 1/5/16)

WAC 296-24-63599 Appendix E—Test methods for protective clothing. This appendix contains test methods which must be used to determine if protective clothing affords the required level of protection as specified in chapter 296-811 WAC ((~~296-24-58505~~)) - fire brigades.

(1) **Puncture resistance test method for foot protection.**

(a) **Apparatus.** You must perform the puncture resistance test on a testing machine having a movable platform adjusted to travel at one-quarter-inch per minute (0.1 cm/sec). You must prepare two blocks of hardwood, metal, or plastic as follows: The blocks must be of such size and thickness as to insure a suitable rigid test ensemble and allow for at least one-inch of the pointed end of an 8D nail to be exposed for the penetration. One block must have a hole drilled to hold an 8D common nail firmly at an angle of 98°. The second block must have a maximum one-half inch (1.3 cm) diameter hole drilled through it so that the hole will allow free passage of the nail after it penetrates the insole during the test.

(b) **Procedure.** You must place the test ensemble consisting of the sample unit, the two prepared blocks, a piece of leather outsole 10 to 11 irons thick and a new 8D nail, as follows: The 8D nail in the hole, the sample of outsole stock superimposed above the nail, the area of the sole plate to be tested placed on the outsole, and the second block with hole so placed as to allow for free passage of the nail after it passes through the outsole stock and sole plate in that order. You must start the machine and the pressure, in pounds required for the nail to completely penetrate the outsole and sole plate, recorded to the nearest 5 pounds. You must make two determinations on each sole plate and the results averaged. A new nail shall be used for each determination.

(c) **Source.** These test requirements are contained in "Military Specification For Fireman's Boots," MIL-B-2885D (1973 and amendment dated 1975) and are reproduced for your convenience.

(2) **Test method for determining the strength of cloth by tearing:**

(a) **Test specimen.** The specimen must be a rectangle of cloth three-inches by six-inches (7.6 cm by 15.2 cm). The long dimension must be parallel to the warp for warp tests and parallel to the filling for filling tests. No two specimens for warp tests must contain the same warp yarns, nor must any two specimens for filling tests contain the same filling yarns. You must take the specimen no nearer the selvage than 1/10 the width of the cloth. You must mark an isosceles trapezoid having an altitude of three inches (7.6 cm) and bases of one inch (2.5 cm) and four inches (10.2 cm) in length, respectively, on each specimen, preferably with the aid of a template. You must then make a cut approximately three-eighths inch (1 cm) in length in the center of a perpendicular to the one inch (2.5 cm) edge.

(b) **Apparatus.**

(i) You must use 6 ounce (.17 kg) weight tension clamps so designed that the six ounces (.17 kg) of weight are distributed evenly across the complete width of the sample.

(ii) The machine must consist of three main parts: Straining mechanism, clamps for holding specimen, and load and elongation recording mechanisms.

(iii) You must use a machine wherein the specimen is held between 2 clamps and strained by a uniform movement of the pulling clamp.

(iv) You must adjust the machine so that the pulling clamp shall have a uniform speed of 12 ± 10.5 inches per minute (0.5 ± .02 cm/sec).

(v) The machine must have 2 clamps with 2 jaws on each clamp. The design of the 2 clamps must be such that one gripping surface or jaw may be an integral part of the rigid frame of the clamp or be fastened to allow a slight vertical movement, while the other gripping surface or jaw must be completely moveable. The dimension of the immovable jaw of each clamp parallel to the application of the load shall measure one inch, and the dimension of the jaw perpendicular to this direction must measure 3 inches or more. The face of the moveable jaw of each clamp must measure one inch by 3 inches.

Each jaw face must have a flat, smooth, gripping surface. You must round all edges which might cause a cutting action to a radius of not over 1/64 inch (.04 cm). In cases where a cloth tends to slip when being tested, the jaws may be faced with rubber or other material to prevent slippage. The distance between the jaws (gage length) must be one inch at the start of the test.

(vi) You must use calibrated dial; scale or chart to indicate applied load and elongation. You must adjust or set the machine, so that the maximum load required to break the specimen will remain indicated on the calibrated dial or scale after the test specimen has ruptured.

(vii) The machine must be of such capacity that the maximum load required to break the specimen must be not greater than 85% or less than 15% of the rated capacity.

(viii) The error of the machine must not exceed 2% up to and including a fifty-pound load (22.6 kg) and 1% over a 50 pound load (22.6 kg) at any reading within its loading range.

(ix) You must disengage machine attachments for determining maximum loads during this test.

(c) **Procedure.**

(i) You must clamp the specimen in the machine along the nonparallel sides of the trapezoid so that these sides lie along the lower edge of the upper clamp and the upper edge of the lower clamp with the cut halfway between the clamps. The short trapezoid base must be held taut and the long trapezoid base must lie in the folds.

(ii) You must start the machine and you must observe the force necessary to tear the cloth by means of an autographic recording device. The speed of the pulling clamp must be 12 inches ± 0.5-inch per minute (0.5 ± .02 cm/sec).

(iii) If a specimen slips between the jaws, breaks in or at the edges of the jaws, or if for any reason attributable to faulty technique, an individual measurement falls markedly below the average test results for the sample unit, you must discard such result and test another specimen.

(iv) The tearing strength of the specimen must be the average of the five highest peak loads of resistance registered for three inches (7.6 cm) of separation of the tear.

(d) **Report.**

(i) You must test five specimens in each of the warp and filling direction must be tested from each sample unit.

(ii) The tearing strength of the sample unit must be the average of the result obtained from the specimens tested in each of the warp and filling directions and you must report separately to the nearest 0.1 pound (.05 kg).

(e) **Source.** These test requirements are contained in "Federal Test Method Standard 191, Method 5136," and are reproduced for your convenience.

(3) **Test method for determining flame resistance of cloth; vertical.**

(a) **Test specimen.** The specimen must be a rectangle of cloth two and three-quarter inches (7.0 cm) by twelve inches (30.5 cm) with the long dimension parallel to either the warp or filling direction of the cloth. No two warp specimens must contain the same warp yarns, and no two filling specimens must contain the same filling yarn.

(b) **Number of determinations.** You must test five specimens from each of the warp and filling directions from each sample unit.

(c) **Apparatus.**

(i) **Cabinet.** You must fabricate a cabinet and accessories in accordance with the requirements specified in Figures L-1, L-2, and L-3. You must use galvanized sheet metal or other suitable metal. You must paint the entire inside back wall of the cabinet black to facilitate the viewing of the test specimen and pilot flame.

(ii) **Burner.** The burner must be equipped with a variable orifice to adjust the flame height, a barrel having a 3/8 inch (9.5 mm) inside diameter and a pilot light.

(A) The burner may be constructed by combining a 3/8 inch (1 cm) inside diameter barrel 3 ± 1/4-inches (7.6 ± .6 cm) long from a fixed orifice burner with a base from a variable orifice burner.

(B) The pilot light tube must have a diameter of approximately 1/16 inch (.2 cm) and must be spaced 1/8 inch (.3 cm) away from the burner edge with a pilot flame 1/8 inch (.3 cm) long.

(C) The necessary gas connections and the applicable plumbing must be as specified in Figure L-4 except that a solenoid valve may be used in lieu of the stopcock valve to which the burner is attached. The stopcock valve or solenoid valve, whichever is used, must be capable of being fully opened or fully closed in 0.1 second.

(D) On the side of the barrel of the burner, opposite the pilot light there must be a metal rod of approximately 1/8 inch (.3 cm) diameter spaced 1/2 inch (1.3 cm) from the barrel and extending above the burner. The rod must have 2 5/16 inch (.8 cm) prongs marking the distances of 3/4 inch (1.9 cm), and one and 1/2 inches (3.8 cm) above the top of the burner.

(E) The burner must be fixed in a position so that the center of the barrel of the burner is directly below the center of the specimen.

(iii) There must be a control valve system with a delivery rate designed to furnish gas to the burner under a pressure of 2-1/2 ± 1/4 (psi) (17.5 ± 1.8 kPa) at the burner inlet. You must include the manufacturer's recommended delivery rate for the valve system in the required pressure.

(iv) A synthetic gas mixture must be of the following composition within the following limits (analyzed at standard conditions): 55 ± 3% hydrogen, 24 ± 1% methane, 3 ± 1% ethane, and 18 ± 1% carbon monoxide which will give a specific gravity of 0.365 ± 0.018 (air = 1) and a B.T.U. content of 540 ± 20 per cubic foot (20.1 ± 3.7 kJL) (dry basis) at 69.8 F (21 C).

(v) There must be metal hooks and weights to produce a series of total loads to determine length of char. The metal hooks must consist of No. 19 gage steel wire or equivalent and must be made from 3 inch (7.6 cm) lengths of wire and bent 1/2 inch (1.3 cm) from one end to a 45-degree hook. You must fasten one end of the hook shall be fastened around the neck of the weight to be used.

(vi) There must be a stop watch or other device to measure the burning time 0.2 second.

(vii) There must be a scale, graduated in 0.1 inch (.3 cm) to measure the length of char.

(d) **Procedure.**

(i) You must evaluate the material undergoing test for the characteristics of after-flame time and char length on each specimen.

(ii) All specimens to be tested must be at moisture equilibrium under standard atmospheric conditions in accordance with subsection (3)(c) of this appendix. You must expose each specimen to be tested to the test flame within 20 seconds after removal from the standard atmosphere. In case of dispute, all testing will be conducted under standard atmospheric conditions in accordance with subsection (3)(c) of this appendix.

(iii) You must suspend the specimen in its holder vertically in the cabinet in such a manner that the entire length of the specimen is exposed and the lower end is 3/4 inch (1.9 cm) above the top of the gas burner. You must set up the apparatus in a draft-free area.

(iv) Prior to inserting the specimen, you must adjust the pilot flame to approximately 1/8 inch (.3 cm) in height measured from its lowest point to the tip.

You must adjust the burner flame by means of the needle valve in the base of the burner to give a flame height of 1 1/2 inches (3.8 cm) with the stopcock fully open and the air supply to burner shut off and taped. The 1 1/2 inch (3.8 cm) flame height is obtained by adjusting the valve so that the uppermost portion (tip) of the flame is level with the tip of the metal prong (see Fig. L-2) specified for adjustment of flame height. It is an important aspect of the evaluation that the flame height to be adjusted with the tip of the flame level with the tip of the metal prong. After inserting the specimen, the stopcock must be fully opened, and the burner flame applied vertically at the middle of the lower edge of the specimen for twelve seconds and the burner turned off. The cabinet door must remain shut during testing.

(v) The after-flame must be the time the specimen continues to flame after the burner flame is shut off.

(vi) After each specimen is removed, you must clear the test cabinet of fumes and smoke prior to testing the next specimen.

(vii) After both flaming and glowing have ceased, you must measure the char length. The char length must be the distance from the end of the specimen, which was exposed to the flame, to the end of a tear (made lengthwise) of the specimen through the center of the charred area as follows: You must fold the specimen lengthwise and crease it by hand along a line through the highest peak of the charred area. You must insert the hook in the specimen (or a hole, 1/4 inch (.6 cm) diameter or less, punched out for the hook) at one side of the charred area 1/4 inch (.6 cm) from the adjacent outside edge and 1/4 inch (.6 cm) in from the lower end. A weight of sufficient size such that the weight and hook together must equal the total tearing load required in Table L-2 of this section must be attached to the hook.

(viii) You must apply a tearing force gently to the specimen by grasping the corner of the cloth at the opposite edge of the char from the load and raising the specimen and weight clear of the supporting surface. You must mark off the end of the tear on the edge and the char length measurement made along the undamaged edge.

Loads for determining char length applicable to the weight of the test cloth must be as shown in Table L-2.

TABLE L-2

Specified weight per square yard of cloth before any fire retardant treatment or coating - ounces	Total learning weight for determining the charred length - pound
2.0 to 6.0	0.25
Over 6.0 to 15.0	0.50
Over 15.0 to 23.0	0.75
Over 23.0	1.0

To change into S.I. (System International) units, 1 ounce =28.35 grams, 1 pound = 453 grams, 1 yard = .91 metre.

(ix) You must record the after-flame time of the specimen to the nearest 0.2 second and the char length to the nearest 0.1 inch (.3 cm).

(e) **Report.**

(i) The after-flame time and char length of the sample unit must be the average of the results obtained from the individual specimens tested. You must record all values obtained from the individual specimens.

(ii) You must report the after-flame time in the nearest 0.2 second and the char length to the nearest 0.1 inch (.3 cm).

(f) **Source.** These test requirements are contained in "Federal Test Method Standard 191, Method 5903 (1971)," and are reproduced for your convenience.

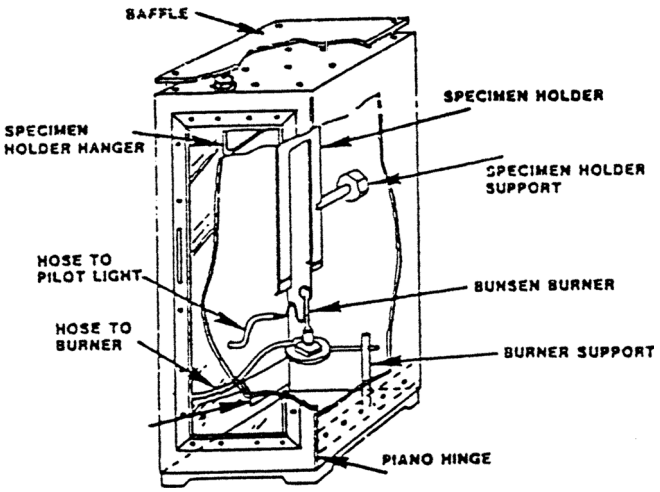

Figure L-1 - Vertical flame resistance textile apparatus. All given dimensions are in inches. System International (S.I.) unit: 1 inch = 2.54 cm.

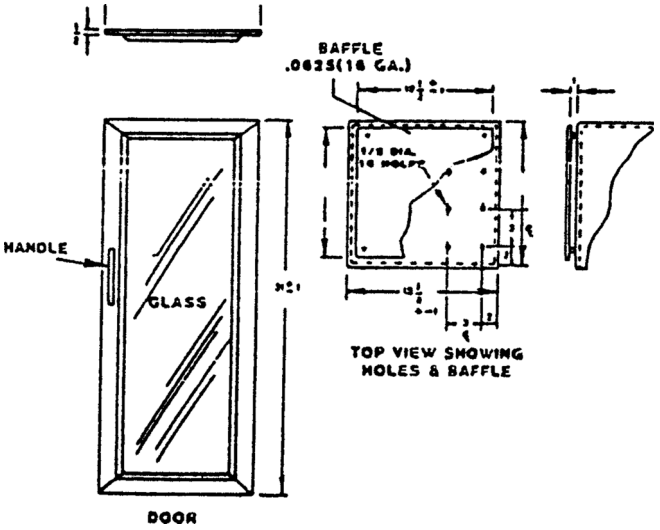

Figure L-2 - Vertical flame resistance textile apparatus, door and top view w/baffle. All given dimensions are in inches. System International (S.I.) unit: 1 inch = 2.54 cm.

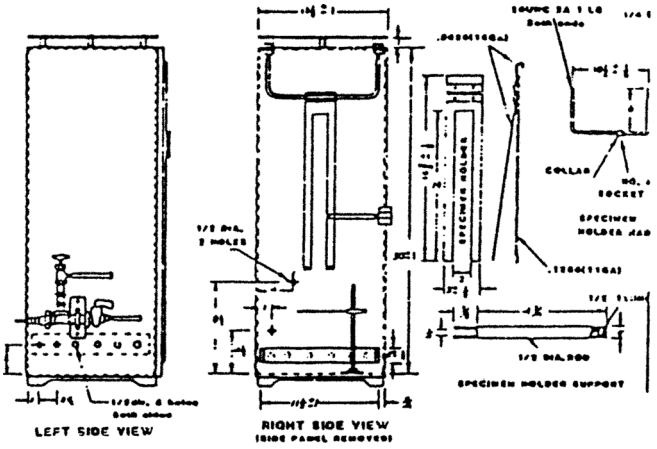

Figure L-3 - Vertical flame resistance textile apparatus, views and details. All given dimensions are in inches. System International (S.I.) unit: 1 inch = 2.54 cm.

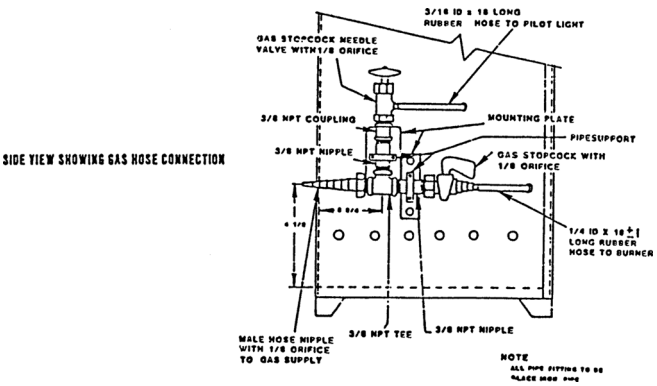

Figure L-4 - Vertical flame resistance textile apparatus. All given dimensions are in inches. System International (S.I.) unit: 1 inch = 2.54 cm.

AMENDATORY SECTION (Amending WSR 15-24-100, filed 12/1/15, effective 1/5/16)

WAC 296-24-69503 Special precautions. When the nature of the work to be performed falls within the scope of WAC 296-24-69501(2) certain additional precautions may be necessary:

(1) **Combustible material.** Wherever there are floor openings or cracks in the flooring that cannot be closed, you must take precautions so that no readily combustible materials on the floor below will be exposed to sparks which might drop through the floor. You must observe the same precautions with regard to cracks or holes in walls, open doorways and open or broken windows.

(2) **Fire extinguishers.** You must maintain suitable fire extinguishing equipment in a state of readiness for instant use. Such equipment may consist of pails of water, buckets of sand, hose or portable extinguishers depending upon the nature and quantity of the combustible material exposed.

(3) **Fire watch.**

(a) Fire watchers must be required whenever welding or cutting is performed in locations where other than a minor fire might develop, or any of the following conditions exist:

(i) Appreciable combustible material, in building construction or contents, closer than 35 feet to the point of operation.

(ii) Appreciable combustibles are more than 35 feet away but are easily ignited by sparks.

(iii) Wall or floor openings within a 35-foot radius expose combustible material in adjacent areas including concealed spaces in walls or floors.

(iv) Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.

(b) Fire watchers must have fire extinguishing equipment readily available and be trained in its use. They must be familiar with facilities for sounding an alarm in the event of a fire. They must watch for fires in all exposed areas, try to extinguish them only when obviously within the capacity of the equipment available, or otherwise sound the alarm. A fire watch must be maintained for at least 1/2 hour after completion of welding or cutting operations to detect and extinguish possible smoldering fires.

(4) **Authorization.** Before cutting or welding is permitted, the area must be inspected by the individual responsible for authorizing cutting and welding operations. The responsible individual must designate precautions to be followed in granting authorization to proceed, preferably in the form of a written permit.

(5) **Floors.** Where combustible materials such as paper clippings, wood shavings, or textile fibers are on the floor, you must sweep the floor clean for a radius of 35 feet. You must keep combustible floors wet, covered with damp sand, or protected by fire-resistant shields. Where floors have been wet down, you must protect personnel operating arc welding or cutting equipment from possible shock.

(6) **Prohibited areas.** You must not permit cutting or welding in the following situations:

(a) In areas not authorized by management.

(b) In sprinklered buildings while such protection is impaired.

(c) In the presence of explosive atmospheres (mixtures of flammable gases, vapors, liquids, or dusts with air), or explosive atmospheres that may develop inside uncleaned or improperly prepared tanks or equipment which have previously contained such materials, or that may develop in areas with an accumulation of combustible dusts.

(d) In areas near the storage of large quantities of exposed, readily ignitable materials such as bulk sulphur, baled paper, or cotton.

(7) **Relocation of combustibles.** Where practicable, you must relocate all combustibles at least 35 feet from the work site. Where relocation is impracticable, you must protect combustibles with flameproofed covers or otherwise shielded with metal ((~~or asbestos guards~~)) or curtains. Edges of covers at the floor should be tight to prevent sparks from going under them. This precaution is also important at overlaps where several covers are used to protect a large pile.

(8) **Ducts.** You must suitably protect or shut down ducts and conveyor systems that might carry sparks to distant combustibles.

(9) **Combustible walls.** Where cutting or welding is done near walls, partitions, ceiling or roof of combustible construction, you must provide fire-resistant shields or guards to prevent ignition.

(10) **Noncombustible walls.** If welding is to be done on a metal wall, partition, ceiling or roof, you must take precautions to prevent ignition of combustibles on the other side, due to conduction or radiation, preferably by relocating combustibles. Where combustibles are not relocated, you must provide a fire watch on the opposite side from the work.

(11) **Combustible cover.** You must not attempt welding on a metal partition, wall, ceiling or roof having a combustible covering nor on walls or partitions of combustible sandwich-type panel construction.

(12) **Pipes.** You must not undertake cutting or welding on pipes or other metal in contact with combustible walls, partitions, ceilings or roofs if the work is close enough to cause ignition by conduction.

(13) **Management.** Management must recognize its responsibility for the safe usage of cutting and welding equipment on its property and:

(a) Based on fire potentials of plant facilities, establish areas for cutting and welding, and establish procedures for cutting and welding, in other areas.

(b) Designate an individual responsible for authorizing cutting and welding operations in areas not specifically designed for such processes.

(c) Insist that cutters or welders and their supervisors are suitably trained in the safe operation of their equipment and the safe use of the process.

(d) Advise all contractors about flammable materials or hazardous conditions of which they may not be aware.

(14) **Supervisor.** The supervisor:

(a) Must be responsible for the safe handling of the cutting or welding equipment and the safe use of the cutting or welding process.

(b) Must determine the combustible materials and hazardous areas present or likely to be present in the work location.

(c) Must protect combustibles from ignition by the following:

(i) Have the work moved to a location free from dangerous combustibles.

(ii) If the work cannot be moved, have the combustibles moved to a safe distance from the work or have the combustibles properly shielded against ignition.

(iii) See that cutting and welding are so scheduled that plant operations that might expose combustibles to ignition are not started during cutting or welding.

(d) Must secure authorization for the cutting or welding operations from the designated management representative.

(i) Must determine that the cutter or welder secures their approval that conditions are safe before going ahead.

(ii) Must determine that fire protection and extinguishing equipment are properly located at the site.

(iii) Must ensure fire watches are available at the site when required.

(15) **Fire prevention precautions.** You must permit cutting or welding only in areas that are or have been made fire safe. Within the confines of an operating plant or building, cutting and welding should preferably be done in a specific area designed for such work, such as a maintenance shop or a detached outside location. Such areas should be of noncombustible or fire-resistive construction, essentially free of combustible and flammable contents, and suitably segregated from adjacent areas. When work cannot be moved practically, as in most construction work, you must make the area safe by removing combustibles or protecting combustibles from ignition sources.

AMENDATORY SECTION (Amending WSR 15-24-100, filed 12/1/15, effective 1/5/16)

WAC 296-24-75011 Railing, toeboards, and cover specifications. (1) You must ensure that a standard railing consists of top rail, intermediate rail, and posts, and has a vertical height of forty-two inches, plus or minus three inches, from upper surface of top rail to floor, platform, runway, or ramp level and:

(a) The top rail must be smooth-surfaced throughout the length of the railing.

(b) The intermediate rail must be approximately halfway between the top rail and the floor, platform, runway, or ramp.

(c) The ends of the rails must not overhang the terminal posts except where such overhang does not constitute a projection hazard.

(d) Guardrails with heights greater than 42 inches are permissible provided the extra height does not create a dangerous situation for employees and that additional mid-rails were installed so that openings beneath the top rail would not permit the passage of a 19-inch or larger spherical object.

(2) You must ensure that a stair railing is of construction similar to a standard railing but the vertical height is not more than 34 inches nor less than 30 inches from upper surface of top rail to surface of tread in line with face of riser at forward edge of tread.

(3) Minimum requirements for standard railings under various types of construction are specified in this subsection. Dimensions specified are based on the U.S. Department of Agriculture Wood Handbook, No. 72, 1955 (No. 1 (S4S) Southern Yellow Pine (Modulus of Rupture 7,400 p.s.i.)) for wood; ANSI G 41.5-1970, American National Standard Specifications for Structural Steel, for structural steel; and ANSI B 125.1-1970, American National Standard Specifications for Welded and ((~~Steamless~~)) Seamless Steel Pipe, for pipe.

(a) For wood railings, the posts must be of at least 2-inch by 4-inch nominal stock spaced not to exceed 6 feet; the top and intermediate rails must be of at least 2-inch by 4-inch nominal stock. If top rail is made of two right-angle pieces of 1-inch by 4-inch stock, posts may be spaced on 8-foot centers, with 2-inch by 4-inch intermediate rail.

(b) For pipe railings, posts and top and intermediate railings must be at least 1 1/2 inches nominal diameter (outside diameter) with posts spaced not more than 8 feet on centers.

(c) For structural steel railings, posts and top and intermediate rails must be of 2-inch by 2-inch by 3/8-inch angles

or other metal shapes of equivalent bending strength with posts spaced not more than 8 feet on centers.

(d) The anchoring of posts and framing of members for railings of all types shall be of such construction that the completed structure must be capable of withstanding a load of at least 200 pounds applied in any direction at any point on the top rail.

(e) Other types, sizes, and arrangements of railing construction are acceptable provided they meet the following conditions:

(i) A smooth-surfaced top rail at a height above floor, platform, runway, or ramp level of from 36 to 42 inches nominal;

(ii) A strength to withstand at least the minimum requirement of 200 pounds top rail pressure;

(iii) Protection between top rail and floor, platform, runway, ramp, or stair treads, equivalent at least to that afforded by a standard intermediate rail;

(iv) Elimination of overhang of rail ends unless such overhang does not constitute a hazard; such as, baluster railings, scrollwork railings, paneled railings.

(4) You must ensure that a standard toeboard is a minimum of 4 inches nominal in vertical height from its top edge to the level of the floor, platform, runway, or ramp. It must be securely fastened in place and with not more than 1/4-inch clearance above floor level. It may be made of any substantial material either solid or with openings not over one inch in greatest dimension.

Where material is piled to such height that a standard toeboard does not provide protection, paneling from floor to intermediate rail, or to top rail must be provided.

(5) You must ensure that a handrail consists of a lengthwise member mounted directly on a wall or partition by means of brackets attached to the lower side of the handrail so as to offer no obstruction to a smooth surface along the top and both sides of the handrail. The handrail must be of rounded or other section that will furnish an adequate handhold for anyone grasping it to avoid falling. The ends of the handrail should be turned in to the supporting wall or otherwise arranged so as not to constitute a projection hazard.

(a) The height of handrails must be not more than 34 inches nor less than 30 inches from upper surface of handrail to surface of tread in line with face of riser or to surface of ramp.

(b) The size of handrails must be: When of hardwood, at least 2 inches in diameter; when of metal pipe, at least 1 1/2 inches in diameter. The length of brackets must be such as will give a clearance between handrail and wall or any projection thereon of at least 1 1/2 inches. The spacing of brackets shall not exceed 8 feet.

(c) The mounting of handrails must be such that the completed structure is capable of withstanding a load of at least 200 pounds applied in any direction at any point on the rail.

(6) You must ensure that all handrails and railings are provided with a clearance of not less than 1 1/2 inches between the handrail or railing and any other object.

(7) Floor opening covers may be of any material that meets the following strength requirements:

(a) Trench or conduit covers and their supports, when located in plant roadways, must be designed to carry a truck rear-axle load of at least twenty thousand pounds.

(b) Manhole covers and their supports, when located in plant roadways, must comply with local standard highway requirements if any; otherwise, they must be designed to carry a truck rear-axle of at least twenty thousand pounds.

(c) The construction of floor opening covers may be of any material that meets the strength requirements. Covers projecting not more than one inch above the floor level may be used providing all edges are chamfered to an angle with the horizontal of not over thirty degrees. All hinges, handles, bolts, or other parts must set flush with the floor or cover surface.

(8) You must ensure that skylight screens are of such construction and mounting that they are capable of withstanding a load of at least 200 pounds applied perpendicularly at any one area on the screen. You must also ensure that they are of such construction and mounting that under ordinary loads or impacts, they will not deflect downward sufficiently to break the glass below them. The construction must be of grillwork with openings not more than 4 inches long or of slatwork with openings not more than 2 inches wide with length unrestricted.

(9) You must ensure that wall opening barriers (rails, rollers, picket fences, and half doors) are of such construction and mounting that, when in place at the opening, the barrier is capable of withstanding a load of at least 200 pounds applied in any direction (except upward) at any point on the top rail or corresponding member.

(10) You must ensure that wall opening grab handles are not less than 12 inches in length and are so mounted as to give 1 1/2 inches clearance from the side framing of the wall opening. The size, material, and anchoring of the grab handle must be such that the completed structure is capable of withstanding a load of at least 200 pounds applied in any direction at any point of the handle.

(11) You must ensure that wall opening screens are of such construction and mounting that they are capable of withstanding a load of at least 200 pounds applied horizontally at any point on the near side of the screen. They may be of solid construction, of grillwork with openings not more than 8 inches long, or of slatwork with openings not more than 4 inches wide with length unrestricted.

AMENDATORY SECTION (Amending WSR 15-24-100, filed 12/1/15, effective 1/5/16)

WAC 296-24-76511 Angle of stairway rise. (1) You must ensure that fixed stairs are installed at angles to the horizontal of between 30 degrees and 50 degrees. Any uniform combination of rise/tread dimensions may be used that will result in a stairway at any angle to the horizontal within the permissible range. Table D-1 gives rise/tread dimensions which will produce a stairway within the permissible range, stating the angle to the horizontal produced by each combination. However, the rise/tread combinations are not limited to those given in Table D-1.

(2) Because of space limitations a permanent stairway sometimes has to be installed at an angle above the 50 degree

critical angle. Such installations are commonly called inclined ladders or ship's ladders, which you must ensure have handrails on both sides and open risers. You must ensure that they are capable of sustaining a live load of 100 pounds per square foot with a safety factor of 4. The following preferred and critical angles from the horizontal must be considered for inclined ladders and ship's ladders:

(a) 35 to 60 degrees - Preferred angle from horizontal.

(b) 60 to 70 degrees - Critical angle from horizontal.

TABLE D-1

Angle to Horizontal	Rise (in inches)	Tread Run (in inches)
30°35'	6 1/2	11
32°08'	6 3/4	10 3/4
33°41'	7	10 1/2
35°16'	7 1/4	10 1/4
36°52'	7 1/2	10
38°29'	7 3/4	9 3/4
40°08'	8	9 1/2
41°44'	8 1/4	9 1/4
43°22'	8 1/2	9
45°00'	8 3/4	8 3/4
46°38'	9	8 1/2
48°16'	9 1/4	8 1/4
49°54'	9 1/2	8

AMENDATORY SECTION (Amending WSR 15-24-100, filed 12/1/15, effective 1/5/16)

WAC 296-24-76513 Stair treads. Each tread and the top landing of a stairway, where risers are used, should have a nose which extends 1/2 inch to one inch beyond the face of the lower riser. Noses should have an even leading edge. You must ensure that all treads are reasonably slip-resistant and the nosings are of nonslip finish. Welded bar grating treads without nosings are acceptable providing the leading edge can be readily identified by personnel descending the stairway and provided the tread is serrated or is of definite nonslip design. You must ensure that rise height and tread width are uniform throughout any flight of stairs including any foundation structure used as one or more treads of the stairs.

((~~**TABLE D-1**~~

~~Angle to horizontal~~	~~Rise (in inches)~~	~~Tread run (in inches)~~
~~30°35'~~	~~6 1/2~~	~~11~~
~~32°08'~~	~~6 3/4~~	~~10 3/4~~
~~33°41'~~	~~7~~	~~10 1/2~~
~~35°16'~~	~~7 1/4~~	~~10 1/4~~
~~36°52'~~	~~7 1/2~~	~~10~~
~~38°29'~~	~~7 3/4~~	~~9 3/4~~
~~40°08'~~	~~8~~	~~9 1/2~~
~~41°44'~~	~~8 1/4~~	~~9 1/4~~
~~43°22'~~	~~8 1/2~~	~~9~~
~~45°00'~~	~~8 3/4~~	~~8 3/4~~
~~46°38'~~	~~9~~	~~8 1/2~~
~~48°16'~~	~~9 1/4~~	~~8 1/4~~
~~49°54'~~	~~9 1/2~~	~~8~~))

AMENDATORY SECTION (Amending WSR 15-24-100, filed 12/1/15, effective 1/5/16)

WAC 296-24-88050 Appendix C—Personal fall arrest system (Part I—Mandatory; Parts II and III—Nonmandatory). (1) **Use of the Appendix.**

Part I of Appendix C sets out the mandatory criteria for personal fall arrest systems used by all employees using powered platforms. Part II sets out nonmandatory test procedures which may be used to determine compliance with applicable requirements contained in Part I of this Appendix. Part III provides nonmandatory guidelines which are intended to assist employers in complying with these provisions.

PART I

Personal fall arrest systems (mandatory)—(1) Scope and application. This section establishes the application of and performance criteria for personal fall arrest systems which are required for use by all employees using powered platforms under ((~~WAC 296-24-88035~~)) chapter 296-870 WAC, Powered platforms.

(2) **Definitions.**

Anchorage. A secure point of attachment for lifelines, lanyards, or deceleration devices which is capable of withstanding the forces specified in the applicable sections of chapter 296-24 WAC, and independent of the means of supporting or suspending the employee.

Buckle. Any device for holding the body harness closed around the employee's body.

Competent person. An individual knowledgeable of fall protection equipment, including the manufacturers recommendations and instructions for the proper use, inspection, and maintenance; and who is capable of identifying existing and potential fall hazards; and who has the authority to take prompt corrective action to eliminate those hazards; and who is knowledgeable of the rules contained in this section regarding the erection, use, inspection, and maintenance of fall protection equipment and systems.

Connector. A device which is used to couple (connect) parts of the personal fall arrest system and positioning device systems together. It may be an independent component of the system, such as a carabiner, or it may be an integral component of part of the system (such as a buckle or dee-ring sewn into a body belt or body harness, or a snap-hook spliced or sewn to a lanyard or self-retracting lanyard).

Deceleration device. Any mechanism, such as a rope grab, ripstitch lanyard, specially woven lanyard, tearing or deforming lanyards, automatic self retracting-lifeline/lanyard, etc., which serves to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.

Deceleration distance. The additional vertical distance a falling employee travels, excluding lifeline elongation and free fall distance, before stopping, from the point at which the deceleration device begins to operate. It is measured as the

distance between the location of an employee's full body harness attachment point at the moment of activation (at the onset of fall arrest forces) of the deceleration device during a fall, and the location of that attachment point after the employee comes to a full stop.

Equivalent. Alternative designs, materials or methods to protect against a hazard which the employer can demonstrate will provide an equal or greater degree of safety for employees than the methods, materials or designs specified in the standard.

Free fall. The act of falling before a personal fall arrest system begins to apply force to arrest the fall.

Free fall distance. The vertical displacement of the fall arrest attachment point on the employee's body harness between onset of the fall and just before the system begins to apply force to arrest the fall. This distance excludes deceleration distance, and lifeline lanyard elongation, but includes any deceleration device slide distance or self-retracting lifeline/lanyard extension before they operate and fall arrest forces occur.

Full body harness. A configuration of connected straps to distribute a fall arresting force over at least the thighs, shoulders and pelvis, with provisions for attaching a lanyard, lifeline, or deceleration device.

Lanyard. A flexible line of webbing, rope, or cable used to secure a body belt or harness to a lifeline or an anchorage point usually 2, 4, or 6 feet long.

Lifeline. A vertical line from a fixed anchorage or between two horizontal anchorages, independent of walking or working surfaces, to which a lanyard or device is secured. Lifeline as referred to in this text is one which is part of a fall protection system used as back-up safety for an elevated worker.

Personal fall arrest system. A system used to arrest an employee in a fall from a working level. It consists of an anchorage, connectors, body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these.

Qualified. One who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems related to the subject matter, the work, or the project.

Rope grab. A fall arrester that is designed to move up or down a lifeline suspended from a fixed overhead or horizontal anchorage point, or lifeline, to which the belt or harness is attached. In the event of a fall, the rope grab locks onto the lifeline rope through compression to arrest the fall. The use of a rope grab device is restricted for all restraint applications.

Self-retracting lifeline/lanyard. A deceleration device which contains a drum-wound line which may be slowly extracted from, or retracted onto, the drum under slight tension during normal employee movement, and which after onset of a fall, automatically locks the drum and arrests the fall.

Snap-hook. A self-closing connecting device with a gatekeeper latch or similar arrangement that will remain closed until manually opened. This includes single action snap hooks that open when the gatekeeper is depressed and double action snap hooks that require a second action on a gatekeeper before the gate can be opened.

Tie-off. The act of an employee, wearing personal fall protection equipment, connecting directly or indirectly to an anchorage. It also means the condition of an employee being connected to an anchorage.

(3) **Design for system components.**

(a) Connectors must be drop forged, pressed or formed steel, or made of equivalent materials.

(b) Connectors must have a corrosion-resistant finish, and all surfaces and edges must be smooth to prevent damage to interfacing parts of the system.

(c) Lanyards and vertical lifelines which tie-off one employee must have a minimum breaking strength of 5,000 pounds (22.2 kN).

(d) Self-retracting lifelines and lanyards which automatically limit free fall distance to 2 feet (0.61 m) or less must have components capable of sustaining a minimum static tensile load of 3,000 pounds (13.3 kN) applied to the device with the lifeline or lanyard in the fully extended position.

(e) Self-retracting lifelines and lanyards which do not limit free fall distance to 2 feet (0.61 m) or less, ripstitch lanyards, and tearing and deforming lanyards must be capable of sustaining a minimum tensile load of 5,400 pounds (23.9 kN) applied to the device with the lifeline or lanyard in the fully extended position.

(f) Dee-rings and snap-hooks must be capable of sustaining a minimum tensile load of 5000 pounds (22.2 N).

(g) Dee-rings and snap-hooks must be 100% proof-tested to a minimum tensile load of 3600 pounds (16 kN) without cracking, breaking, or taking permanent deformation.

(h) Snap-hooks must be sized to be compatible with the member to which they are connected so as to prevent unintentional disengagement of the snap-hook by depression of the snap-hook keeper by the connected member, or must be a locking type snap-hook designed and used to prevent disengagement of the snap-hook by the contact of the snap-hook keeper by the connected member.

(i) Horizontal lifelines, where used, must be designed, and installed as part of a complete personal fall arrest system, which maintains a safety factor of at least 2, under the supervision of a qualified person.

(j) Anchorages to which personal fall arrest equipment is attached must be capable of supporting at least 5,000 pounds (22.2 kN) per employee attached, or must be designed, installed, and used as part of a complete personal fall arrest system which maintains a safety factor of at least two, under the supervision of a qualified person.

(k) Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body harnesses, must be made from synthetic fibers or wire rope.

(4) **System performance criteria.**

(a) Personal fall arrest systems must, when stopping a fall:

(i) Limit maximum arresting force on an employee to 1,800 pounds (8 kN) when used with a body harness;

(ii) Bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet (1.07 m); and

(iii) Must have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet (1.8 m), or the free fall distance permitted by the system, whichever is less.

(b)(i) When used by employees having a combined person and tool weight of less than 310 pounds (140 kg), personal fall arrest systems which meet the criteria and protocols contained in subsections (2), (3), and (4) in Part II of this Appendix must be considered as complying with the provisions of (a) of this subsection.

(ii) When used by employees having a combined tool and body weight of 310 pounds (140 kg) or more, personal fall arrest systems which meet the criteria and protocols contained in subsections (2), (3), and (4) of Part II may be considered as complying with the provisions of (a) of this subsection provided that the criteria and protocols are modified appropriately to provide proper protection for such heavier weights.

(5) **Care and use.**

(a) Snap-hooks, unless of a locking type designed and used to prevent disengagement from the following connections, must not be engaged:

(i) Directly to webbing, rope or wire rope;

(ii) To each other;

(iii) To a dee-ring to which another snap-hook or other connector is attached;

(iv) To a horizontal lifeline; or

(v) To any object which is incompatibly shaped or dimensioned in relation to the snap-hook such that the connected object could depress the snap-hook keeper a sufficient amount to release itself.

(b) Devices used to connect to a horizontal lifeline which may become a vertical lifeline must be capable of locking in either direction on the lifeline.

(c) Personal fall arrest systems must be rigged such that an employee can neither free fall more than 6 feet (1.8 m), nor contact any lower level.

(d) The attachment point of the body harness must be located in the center of the wearer's back near shoulder level, or above the wearer's head.

(e) When vertical lifelines are used, each employee must be provided with a separate lifeline.

(f) Personal fall arrest systems or components must be used only for employee fall protection.

(g) Personal fall arrest systems or components subjected to impact loading must be immediately removed from service and must not be used again for employee protection unless inspected and determined by a competent person to be undamaged and suitable for reuse.

(h) The employer must provide for prompt rescue of employees in the event of a fall or must assure the self-rescue capability of employees.

(i) Before using a personal fall arrest system, and after any component or system is changed, employees must be trained in accordance with the requirements of WAC 296-24-88030(1), in the safe use of the system.

(6) **Inspections.** Personal fall arrest systems must be inspected prior to each use for mildew, wear, damage and other deterioration, and defective components must be removed from service if their strength or function may be adversely affected.

PART II

Test methods for personal fall arrest systems
(nonmandatory)

(1) **General.** Subsections (2), (3), (4) and (5) of this Part II set forth test procedures which may be used to determine compliance with the requirements in subsection (4) of Part I of this Appendix.

(2) **General conditions for all tests in Part II.**

(a) Lifelines, lanyards and deceleration devices should be attached to an anchorage and connected to the body harness in the same manner as they would be when used to protect employees.

(b) The anchorage should be rigid, and should not have a deflection greater than .04 inches (1 mm) when a force of 2,250 pounds (10 kN) is applied.

(c) The frequency response of the load measuring instrumentation should be 120 Hz.

(d) The test weight used in the strength and force tests should be a rigid, metal, cylindrical or torso-shaped object with a girth of 38 inches plus or minus 4 inches (96 cm plus or minus 10 cm).

(e) The lanyard or lifeline used to create the free fall distance should be supplied with the system, or in its absence, the least elastic lanyard or lifeline available to be used with the system.

(f) The test weight for each test should be hoisted to the required level and should be quickly released without having any appreciable motion imparted to it.

(g) The system's performance should be evaluated taking into account the range of environmental conditions for which it is designed to be used.

(h) Following the test, the system need not be capable of further operation.

(3) **Strength test.**

(a) During the testing of all systems, a test weight of 300 pounds plus or minus 5 pounds (135 kg plus or minus 2.5 kg) should be used. (See subsection (2)(d) of this part.)

(b) The test consists of dropping the test weight once. A new unused system should be used for each test.

(c) For lanyard systems, the lanyard length should be 6 feet plus or minus 2 inches (1.83 m plus or minus 5 cm) as measured from the fixed anchorage to the attachment on the body belt or body harness.

(d) For rope-grab-type deceleration systems, the length of the lifeline above the centerline of the grabbing mechanism to the lifeline's anchorage point should not exceed 2 feet (0.61 m).

(e) For lanyard systems, for systems with deceleration devices which do not automatically limit free fall distance to 2 feet (0.61 m) or less, and for systems with deceleration devices which have a connection distance in excess of one foot (0.3 m) (measured between the centerline of the lifeline and the attachment point to the body harness), the test weight should be rigged to free fall a distance of 7.5 feet (2.3 m) from a point that is 1.5 feet (46 cm) above the anchorage point, to its hanging location (6 feet below the anchorage). The test weight should fall without interference, obstruction,

or hitting the floor or ground during the test. In some cases a nonelastic wire lanyard of sufficient length may need to be added to the system (for test purposes) to create the necessary free fall distance.

(f) For deceleration device systems with integral lifelines or lanyards which automatically limit free fall distance to 2 feet (0.61 m) or less, the test weight should be rigged to free fall a distance of 4 feet (1.22 m).

(g) Any weight which detaches from the harness should constitute failure for the strength test.

(4) **Force test.**

(a) **General.** The test consists of dropping the respective test weight specified in (b)(i) or (c)(i) of this subsection once. A new, unused system should be used for each test.

(b) **For lanyard systems.**

(i) A test weight of 220 pounds plus or minus three pounds (100 kg plus or minus 1.6 kg) should be used. (See subsection (2)(d) above.)

(ii) Lanyard length should be 6 feet plus or minus 2 inches (1.83 m plus or minus 5 cm) as measured from the fixed anchorage to the attachment on the body harness.

(iii) The test weight should fall free from the anchorage level to its hanging location (a total of 6 feet (1.83 m) free fall distance) without interference, obstruction, or hitting the floor or ground during the test.

(c) **For all other systems.**

(i) A test weight of 220 pounds plus or minus 3 pounds (100 kg plus or minus 1.6 kg) should be used. (See subsection (2)(d) above.)

(ii) The free fall distance to be used in the test should be the maximum fall distance physically permitted by the system during normal use conditions, up to a maximum free fall distance for the test weight of 6 feet (1.83 m), except as follows:

(A) For deceleration systems which have a connection link or lanyard, the test weight should free fall a distance equal to the connection distance (measured between the centerline of the lifeline and the attachment point to the body harness).

(B) For deceleration device systems with integral lifelines or lanyards which automatically limit free fall distance to 2 feet (0.61 m) or less, the test weight should free fall a distance equal to that permitted by the system in normal use. (For example, to test a system with a self-retracting lifeline or lanyard, the test weight should be supported and the system allowed to retract the lifeline or lanyard as it would in normal use. The test weight would then be released and the force and deceleration distance measured).

(d) A system fails the force test if the recorded maximum arresting force exceeds 2,520 pounds (11.2 kN) when using a body harness.

(e) The maximum elongation and deceleration distance should be recorded during the force test.

(5) **Deceleration device tests.**

(a) **General.** The device should be evaluated or tested under the environmental conditions, (such as rain, ice, grease, dirt, type of lifeline, etc.), for which the device is designed.

(b) **Rope-grab-type deceleration devices.**

(i) Devices should be moved on a lifeline 1,000 times over the same length of line a distance of not less than one foot (30.5 cm), and the mechanism should lock each time.

(ii) Unless the device is permanently marked to indicate the type(s) of lifeline which must be used, several types (different diameters and different materials), of lifelines should be used to test the device.

(c) Other self-activating-type deceleration devices. The locking mechanisms of other self-activating-type deceleration devices designed for more than one arrest should lock each of 1,000 times as they would in normal service.

PART III

Additional nonmandatory guidelines for personal fall arrest systems. The following information constitutes additional guidelines for use in complying with requirements for a personal fall arrest system.

(1) **Selection and use considerations.** The kind of personal fall arrest system selected should match the particular work situation, and any possible free fall distance should be kept to a minimum. Consideration should be given to the particular work environment. For example, the presence of acids, dirt, moisture, oil, grease, etc., and their effect on the system, should be evaluated. Hot or cold environments may also have an adverse affect on the system. Wire rope should not be used where an electrical hazard is anticipated. As required by the standard, the employer must plan to have means available to promptly rescue an employee should a fall occur, since the suspended employee may not be able to reach a work level independently.

Where lanyards, connectors, and lifelines are subject to damage by work operations such as welding, chemical cleaning, and sandblasting, the component should be protected, or other securing systems should be used. The employer should fully evaluate the work conditions and environment (including seasonal weather changes) before selecting the appropriate personal fall protection system. Once in use, the system's effectiveness should be monitored. In some cases, a program for cleaning and maintenance of the system may be necessary.

(2) **Testing considerations.** Before purchasing or putting into use a personal fall arrest system, an employer should obtain from the supplier information about the system based on its performance during testing so that the employer can know if the system meets this standard. Testing should be done using recognized test methods. Part II of this Appendix C contains test methods recognized for evaluating the performance of fall arrest systems. Not all systems may need to be individually tested; the performance of some systems may be based on data and calculations derived from testing of similar systems, provided that enough information is available to demonstrate similarity of function and design.

(3) **Component compatibility considerations.** Ideally, a personal fall arrest system is designed, tested, and supplied as a complete system. However, it is common practice for lanyards, connectors, lifelines, deceleration devices, and body harnesses to be interchanged since some components wear out before others. The employer and employee should realize that not all components are interchangeable. For

instance, a lanyard should not be connected between a body harness and a deceleration device of the self-retracting type since this can result in additional free fall for which the system was not designed. Any substitution or change to a personal fall arrest system should be fully evaluated or tested by a competent person to determine that it meets the standard, before the modified system is put in use.

(4) **Employee training considerations.** Thorough employee training in the selection and use of personal fall arrest systems is imperative. As stated in the standard, before the equipment is used, employees must be trained in the safe use of the system. This should include the following: Application limits; proper anchoring and tie-off techniques; estimation of free fall distance, including determination of deceleration distance, and total fall distance to prevent striking a lower level; methods of use; and inspection and storage of the system. Careless or improper use of the equipment can result in serious injury or death. Employers and employees should become familiar with the material in this Appendix, as well as manufacturer's recommendations, before a system is used. Of uppermost importance is the reduction in strength caused by certain tie-offs (such as using knots, tying around sharp edges, etc.) and maximum permitted free fall distance. Also, to be stressed are the importance of inspections prior to use, the limitations of the equipment, and unique conditions at the worksite which may be important in determining the type of system to use.

(5) **Instruction considerations.** Employers should obtain comprehensive instructions from the supplier as to the system's proper use and application, including, where applicable:

(a) The force measured during the sample force test;

(b) The maximum elongation measured for lanyards during the force test;

(c) The deceleration distance measured for deceleration devices during the force test;

(d) Caution statements on critical use limitations;

(e) Application limits;

(f) Proper hook-up, anchoring and tie-off techniques, including the proper dee-ring or other attachment point to use on the body harness for fall arrest;

(g) Proper climbing techniques;

(h) Methods of inspection, use, cleaning, and storage; and

(i) Specific lifelines which may be used. This information should be provided to employees during training.

(6) **Inspection considerations.** As stated in WAC 296-24-88050(6), personal fall arrest systems must be regularly inspected. Any component with any significant defect, such as cuts, tears, abrasions, mold, or undue stretching; alterations or additions which might affect its efficiency; damage due to deterioration; contact with fire, acids, or other corrosives; distorted hooks or faulty hook springs; tongues unfitted to the shoulder of buckles; loose or damaged mountings; nonfunctioning parts; or wearing or internal deterioration in the ropes must be withdrawn from service immediately, and should be tagged or marked as unusable, or destroyed.

(7) **Rescue considerations.** As required by WAC 296-24-88050 (5)(h) when personal fall arrest systems are used, the employer must assure that employees can be promptly rescued or can rescue themselves should a fall occur. The availability of rescue personnel, ladders or other rescue equipment should be evaluated. In some situations, equipment which allows employees to rescue themselves after the fall has been arrested may be desirable, such as devices which have descent capability.

(8) **Tie-off considerations.**

(a) One of the most important aspects of personal fall protection systems is fully planning the system before it is put into use. Probably the most overlooked component is planning for suitable anchorage points. Such planning should ideally be done before the structure or building is constructed so that anchorage points can be incorporated during construction for use later for window cleaning or other building maintenance. If properly planned, these anchorage points may be used during construction, as well as afterwards.

(b) Employers and employees should at all times be aware that the strength of a personal fall arrest system is based on its being attached to an anchoring system which does not significantly reduce the strength of the system (such as a properly dimensioned eye-bolt/snap-hook anchorage). Therefore, if a means of attachment is used that will reduce the strength of the system, that component should be replaced by a stronger one, but one that will also maintain the appropriate maximum arrest force characteristics.

(c) Tie-off using a knot in a rope lanyard or lifeline (at any location) can reduce the lifeline or lanyard strength by 50% or more. Therefore, a stronger lanyard or lifeline should be used to compensate for the weakening effect of the knot, or the lanyard length should be reduced (or the tie-off location raised) to minimize free fall distance, or the lanyard or lifeline should be replaced by one which has an appropriately incorporated connector to eliminate the need for a knot.

(d) Tie-off of a rope lanyard or lifeline around an "H" or "I" beam or similar support can reduce its strength as much as 70% due to the cutting action of the beam edges. Therefore, use should be made of a webbing lanyard or wire core lifeline around the beam; or the lanyard or lifeline should be protected from the edge; or free fall distance should be greatly minimized.

(e) Tie-off where the line passes over or around rough or sharp surfaces reduces strength drastically. Such a tie-off should be avoided or an alternative tie-off rigging should be used. Such alternatives may include use of a snap-hook/dee-ring connection, wire rope tie-off, an effective padding of the surfaces, or an abrasion-resistance strap around or over the problem surface.

(f) Horizontal lifelines may, depending on their geometry and angle of sag, be subjected to greater loads than the impact load imposed by an attached component. When the angle of horizontal lifeline sag is less than 30 degrees, the impact force imparted to the lifeline by an attached lanyard is greatly amplified. For example, with a sag angle of 15 degrees, the force amplification is about 2:1 and at 5 degrees sag, it is about 6:1. Depending on the angle of sag, and the line's elasticity, the strength of the horizontal lifeline and the anchorages to which it is attached should be increased a number of times over that of the lanyard. Extreme care should be taken in considering a horizontal lifeline for multiple tie-offs. The reason for this is that in multiple tie-offs to a horizontal

lifeline, if one employee falls, the movement of the falling employee and the horizontal lifeline during arrest of the fall may cause other employees to also fall. Horizontal lifeline and anchorage strength should be increased for each additional employee to be tied-off. For these and other reasons, the design of systems using horizontal lifelines must only be done by qualified persons. Testing of installed lifelines and anchors prior to use is recommended.

(g) The strength of an eye-bolt is rated along the axis of the bolt and its strength is greatly reduced if the force is applied at an angle to this axis (in the direction of shear). Also, care should be exercised in selecting the proper diameter of the eye to avoid accidental disengagement of snap-hooks not designed to be compatible for the connection.

(h) Due to the significant reduction in the strength of the lifeline/lanyard (in some cases, as much as a 70% reduction), the sliding hitch knot should not be used for lifeline/lanyard connections except in emergency situations where no other available system is practical. The "one-and-one" sliding hitch knot should never be used because it is unreliable in stopping a fall. The "two-and-two," or "three-and-three" knot (preferable), may be used in emergency situations; however, care should be taken to limit free fall distance to a minimum because of reduced lifeline/lanyard strength.

(9) **Vertical lifeline considerations.** As required by the standard, each employee must have a separate lifeline when the lifeline is vertical. The reason for this is that in multiple tie-offs to a single lifeline, if one employee falls, the movement of the lifeline during the arrest of the fall may pull other employees' lanyards, causing them to fall as well.

(10) **Snap-hook considerations.**

(a) Required by this standard for all connections, locking snap-hooks incorporate a positive locking mechanism in addition to the spring loaded keeper, which will not allow the keeper to open under moderate pressure without someone first releasing the mechanism. Such a feature, properly designed, effectively prevents roll-out from occurring.

(b) As required by the standard WAC 296-24-88050 (5)(a) the following connections must be avoided (unless properly designed locking snap-hooks are used) because they are conditions which can result in roll-out when a nonlocking snap-hook is used:

• Direct connection of a snap-hook to a horizontal lifeline.

• Two (or more) snap-hooks connected to one dee-ring.

• Two snap-hooks connected to each other.

• A snap-hook connected back on its integral lanyard.

• A snap-hook connected to a webbing loop or webbing lanyard.

• Improper dimensions of the dee-ring, rebar, or other connection point in relation to the snap-hook dimensions which would allow the snap-hook keeper to be depressed by a turning motion of the snap-hook.

(11) **Free fall considerations.** The employer and employee should at all times be aware that a system's maximum arresting force is evaluated under normal use conditions established by the manufacturer, and in no case using a free fall distance in excess of 6 feet (1.8 m). A few extra feet of free fall can significantly increase the arresting force on the employee, possibly to the point of causing injury. Because of this, the free fall distance should be kept at a minimum, and, as required by the standard, in no case greater than 6 feet (1.8 m). To help assure this, the tie-off attachment point to the lifeline or anchor should be located at or above the connection point of the fall arrest equipment to harness. (Since otherwise additional free fall distance is added to the length of the connecting means (i.e. lanyard).) Attaching to the working surface will often result in a free fall greater than 6 feet (1.8 m). For instance, if a 6 foot (1.8 m) lanyard is used, the total free fall distance will be the distance from the working level to the body harness attachment point plus the 6 feet (1.8 m) of lanyard length. Another important consideration is that the arresting force which the fall system must withstand also goes up with greater distances of free fall, possibly exceeding the strength of the system.

(12) **Elongation and deceleration distance considerations.** Other factors involved in a proper tie-off are elongation and deceleration distance. During the arresting of a fall, a lanyard will experience a length of stretching or elongation, whereas activation of a deceleration device will result in a certain stopping distance. These distances should be available with the lanyard or device's instructions and must be added to the free fall distance to arrive at the total fall distance before an employee is fully stopped. The additional stopping distance may be very significant if the lanyard or deceleration device is attached near or at the end of a long lifeline, which may itself add considerable distance due to its own elongation. As required by the standard, sufficient distance to allow for all of these factors must also be maintained between the employee and obstructions below, to prevent an injury due to impact before the system fully arrests the fall. In addition, a minimum of 12 feet (3.7 m) of lifeline should be allowed below the securing point of a rope grab type deceleration device, and the end terminated to prevent the device from sliding off the lifeline. Alternatively, the lifeline should extend to the ground or the next working level below. These measures are suggested to prevent the worker from inadvertently moving past the end of the lifeline and having the rope grab become disengaged from the lifeline.

(13) **Obstruction considerations.** The location of the tie-off should also consider the hazard of obstructions in the potential fall path of the employee. Tie-offs which minimize the possibilities of exaggerated swinging should be considered.

(14) **Other considerations.** Because of the design of some personal fall arrest systems, additional considerations may be required for proper tie-off. For example, heavy deceleration devices of the self-retracting type should be secured overhead in order to avoid the weight of the device having to be supported by the employee. Also, if self-retracting equipment is connected to a horizontal lifeline, the sag in the lifeline should be minimized to prevent the device from sliding down the lifeline to a position which creates a swing hazard during fall arrest. In all cases, manufacturer's instructions should be followed.

REPEALER

The following section of the Washington Administrative Code is repealed:

WAC 296-24-63499	Appendix D—Availability of publications incorporated by references in WAC 296-24-58505—Fire brigades.

AMENDATORY SECTION (Amending WSR 15-24-102, filed 12/1/15, effective 1/5/16)

WAC 296-56-60103 Terminals handling intermodal containers or roll-on roll-off operations. (1) You must make sure every intermodal container is legibly and permanently marked with:

(a) The weight of the container when empty, in pounds;

(b) The maximum cargo weight the container is designed to carry, in pounds; and

(c) The sum of the maximum weight of the container with cargo, in pounds (gross container capacity).

(2) You must make sure no container is hoisted by any crane or derrick unless the following conditions have been met:

(a) You must ascertain from the carrier whether a container to be hoisted is loaded or empty. Empty containers must be identified before loading or discharge in such a manner as will inform every supervisor and foreman on the site and in charge of loading or discharging, and every crane or other hoisting equipment operator and signalman, if any, that the container is empty. Methods of identification may include cargo plans, manifests or markings on the container.

(b) In the case of a loaded container:

(i) The actual gross weight must be plainly marked so as to be visible to the crane operator, other hoisting equipment operator, signalman, and to every supervisor and foreman on the site and in charge of the operation; or

(ii) The cargo stowage plan or equivalent permanently recorded display serving the same purpose, containing the actual gross weight and the serial number or other positive identification of that specific container, must be provided to the crane or other hoisting equipment operator and signalman, if any, and to every supervisor and foreman on the site and in charge of the operation.

(c) Every outbound loaded container which is received at a marine terminal ready to load aboard a vessel without further consolidation or loading must be weighed to obtain the actual gross weight before being hoisted.

(d) When container weighing scales are located at a marine terminal, any outbound container with a load consolidated at that terminal must be weighed to obtain an actual weight before being hoisted.

(i) If the terminal has no scales, the actual gross weight may be calculated on the basis of the container's contents and the container's empty weight. The weights used in the calculation must be posted conspicuously on the container, with the name of the person making the calculation and the date.

(ii) Container weights must be subject to random sample weight checks at the nearest weighing facility. In cases where such weight checks or experience otherwise indicate consistently inaccurate weights, the weight of containers so calculated at the source from which the inaccurate weights originated must no longer be recognized as true gross weights. Such containers must not be hoisted unless actual gross weights have been obtained by weighing.

(e) The following containers are exempted from the requirements of (c) and (d) of this subsection:

(i) Open type vehicle containers.

(ii) The container is marked on the outside in such a manner that an employee can readily discern that the container is carrying vehicles.

(iii) Containers built specifically for the carriage of compressed gases.

(iv) The container carries only completely assembled vehicles and no other cargo.

(v) The vehicles were loaded into the container at the marine terminal.

(f) The weight of loaded inbound containers from foreign ports must be determined by weighing or by the method of calculation described in (d)(ii) of this subsection or by shipping documents.

(g) Any scale used within Washington state to weigh containers for the purpose of the requirements of this section must meet the accuracy standards of the state or local public authority in which the scale is located.

(3) You must make sure no container is hoisted if its actual gross weight exceeds the weight marked as required in subsection (1)(c) of this section, or if it exceeds the capacity of the crane or other hoisting device intended to be used.

(4) You must make sure there are marked or designated areas set aside within a container or roll-on roll-off terminal for passage of employees to and from active cargo transfer points, except where you provide transportation to and from those points.

((~~(a)~~)) (5) You must direct employees to stay clear of the area beneath a suspended container. ((~~(b)~~)) Employees must stay clear of the area beneath a suspended container.

((~~(5)~~)) (6) You must make sure each employee working in the immediate area of container handling equipment or in the terminal's traffic lanes wears a high visibility vest (or equivalent protection).

Note to subsection ((~~(5)~~)) (6) of this section: High visibility vests or equivalent protection means high visibility/retroreflective materials which are intended to provide conspicuity of the user by day through the use of high visibility (fluorescent) material and in the dark by vehicle headlights through the use of retroreflective material. The minimum area of material for a vest or equivalent protection is .5m(2)(760 in.(2)) for fluorescent (background) material and .13m(2)(197 in.(2)) for retroreflective material. Vests or equivalent protection, such as high visibility/retro-reflective coveralls, that are available for industrial use, may also be acceptable.

((~~(6)~~)) (7) You must make sure containers are handled using lifting fittings or other arrangements suitable and intended for the purposes as set forth in (a) and (c) of this subsection, unless when damage to an intermodal container makes special means of handling necessary.

(a) Loaded intermodal containers of twenty feet (6.1 m) or more in length must be hoisted as follows:

(i) When hoisting by the top fittings, the lifting forces must be applied vertically from at least four top fittings or by means which will safely lift the container without damage. The lifting fittings provided must be used.

(A) The container being lifted is an ISO closed box container;

(B) The condition of the box is sound;

(C) The speed of hoisting and lowering is moderated when heavily ladened containers are encountered;

(D) The lift angle is at eighty to ninety degrees;

(E) The distance between the lifting beam and the load is at least eight feet and 2.4 inches (2.5 m); and

(F) The length of the spreader beam is at least 16.3 feet (5 m) for a twenty-foot container, and at least 36.4 feet (11.1 m) for a forty-foot container.

(ii) If hoisted from bottom fittings, the hoisting connections must bear on the fittings only, making no other contact with the container. The angles of the four bridle legs must not be less than thirty degrees to the horizontal in the case of forty foot (12.2 m) containers, thirty-seven degrees in the case of thirty foot (9.1 m) containers, or forty-five degrees in the case of twenty foot (6.1 m) containers.

(iii) Lifting containers by fork lift trucks or by grappling arms from above or from one side may be done only if the container is designed for this type of handling.

(b) Other means of hoisting may be used only if the containers and hoisting means are designed for such use.

(c) When using intermodal container spreaders that employ lanyards for activation of load disengagement, all possible precautions must be taken to prevent accidental release of the load. Intermodal container spreader twistlock systems must be designed and used so that a suspended load cannot accidentally be released.

(d) Flat bed trucks or container chassis used to move intermodal containers must be equipped with pins, flanges, or other means to prevent the container from shifting.

(e) Flat bed, low boy trailers (mafis) and other similar equipment used to transport containers must be marked with their cargo capacities and must not be overloaded.

(f) Each tractor must have all brake air lines connected when pulling trailers equipped with air brakes and must have the brakes tested before commencing operations.

((~~(7)~~)) (8) You must inspect intermodal containers for defects in structural members or fittings before handling. Any intermodal container found to be unsafe must be identified as such, promptly removed from service and repaired before being returned to service.

((~~(8)~~)) (9) You must make sure containers are not hoisted unless all engaged chassis twist locks are released.

((~~(9)~~)) (10) You must meet the following requirements for operations involving the lifting of two or more intermodal containers by the top container, also known as vertical tandem lifts (VTLs).

(a) Each employee involved in VTL operations must be trained and competent in the safety-related work practices, safety procedures, and other requirements in this section that pertain to their respective job assignments.

(b) No more than two intermodal containers may be lifted in a VTL.

(c) Before the lift begins, you must ensure that the two containers lifted as part of a VTL are empty.

Note: The lift begins immediately following the end of the prelift required by subsection ((~~(9)~~)) (10)(c) of this section. Thus, the weight may be determined during the prelift using a load indicating device meeting WAC 296-56-60085 (1)(a) on the crane being used to the lift the VTL.

(d) The lift must be performed using either a shore-based container gantry crane or another type of crane that:

(i) Has the precision control necessary to restrain unintended rotation of the containers about any axis;

(ii) Is capable of handling the load volume and wind sail potential of VTLs; and

(iii) Is specifically designed to handle containers.

(e) You must ensure that the crane operator pauses the lift when the vertically coupled containers have just been lifted above the supporting surface to assure that each interbox connector is properly engaged.

(f) Containers below deck may not be handled as a VTL.

(g) VTL operations may not be conducted when the wind speed exceeds the lesser of:

(i) Fifty-five km/h (thirty-four mph or thirty knots); or

(ii) The crane manufacturer's recommendation for maximum wind speed.

(h) You must ensure that each interbox connector used in a VTL operation:

(i) Automatically locks into corner castings on containers but only unlocks manually (manual twistlocks or latchlocks are not permitted);

(ii) Is designed to indicate whether it is locked or unlocked when fitted into a corner casting;

(iii) Locks and releases in an identical direction and manner as all other interbox connectors in the VTL;

(iv) Has been tested and certificated by a competent authority of this chapter (for interbox connectors that are a part of a vessel's gear) or WAC 296-56-60093 (for other interbox connectors):

(A) As having a load-bearing surface area of eight hundred mm\two\ when connected to a corner casting with an opening that is sixty-five mm wide; and

(B) As having a safe working load of ninety-eight kN (ten thousand kg) with a safety factor of five when the load is applied by means of two corner castings with openings that are sixty-five mm wide or equivalent devices;

(v) Has a certificate that is available for inspection and that attests that the interbox connector meets the strength criteria given in ((~~subsection (9)~~))(h)(iv) of this ((~~section~~)) subsection; and

(vi) Is clearly and durably marked with its safe working load for lifting and an identifying number or mark that will enable it to be associated with its test certificate.

(i) Reserved.

(j) You must ensure that each container and interbox connector used in a VTL and each corner casting to which a connector will be coupled is inspected immediately before use in the VTL.

(i) Each employee performing the inspection must be capable of detecting defects or weaknesses and be able to assess their importance in relation to the safety of VTL operations.

(ii) The inspection of each interbox connector must include: A visual examination for obvious structural defects, such as cracks, a check of its physical operation to determine that the lock is fully functional with adequate spring tension on each head; and a check for excessive corrosion and deterioration.

(iii) The inspection of each container and each of its corner castings must include: A visual examination for obvious structural defects, such as cracks, a check for excessive corrosion and deterioration; and a visual examination to ensure that the opening to which an interbox connector will be connected has not been enlarged, that the welds are in good condition, and that it is free from ice, mud, or other debris.

(iv) You must establish a system to ensure that each defective or damaged interbox connector is removed from service.

(v) An interbox connector that has been found to be defective or damaged must be removed from service and may not be used in VTL operations until repaired.

(vi) A container with a corner casting that exhibits any of the problems listed in ((~~subsection (9)~~))(j)(iii) of this ((~~section~~)) subsection may not be lifted in a VTL.

(k) No platform container may be lifted as part of a VTL unit.

(((~~10~~))) (11) You must meet the following requirements for transporting vertically coupled containers:

(a) Equipment other than cranes used to transport vertically connected containers must be either specifically designed for this application or evaluated by a qualified engineer and determined to be capable of operating safely in this mode of operation.

(b) You must develop, implement, and maintain a written plan for transporting vertically connected containers. The written plan must establish procedures to ensure safe operating and turning speeds and must address all conditions in the terminal that could affect the safety of VTL-related operations, including communication and coordination among all employees involved in these operations.

(((~~11~~))) (12) You must establish a safe work zone within which employees may not be present when vertically connected containers are in motion.

(a) The safe work zone must be sufficient to protect employees in the event that a container drops or overturns.

(b) The written transport plan required by subsection (((~~10~~))) (11)(b) of this section must include the safe work zone and procedures to ensure that employees are not in this zone when a VTL is in motion.

AMENDATORY SECTION (Amending WSR 15-24-102, filed 12/1/15, effective 1/5/16)

WAC 296-56-60107 Terminal facilities handling menhaden and similar species of fish. (1) You must make sure tanks in terminal areas used for receiving or storing bailwater for recirculating into vessel holds in discharging operations are opened or ventilated to minimize contamination of water circulated to the vessel.

(a) Bailwater tanks must be thoroughly drained upon completion of each day's operations and must be left open to the air. Drainage is unnecessary when bailwater has been treated to remove hydrogen sulfide-producing contaminants and the efficiency of such treatment has been established.

(b) Before employees enter a dock tank, it shall first be drained, rinsed and tested for hydrogen sulfide and oxygen deficiency. Employees must not enter the tank when the hydrogen sulfide level exceeds twenty ppm or oxygen content is less than nineteen and one-half percent, except in emergencies such as to affect a rescue in accordance with terminal's emergency action plan complying with WAC 296-56-60010 (2)(d).

(c) Tests must be conducted by designated personnel with suitable test equipment and respiratory protective equipment complying with the provisions of this chapter and chapter 296-842 WAC.

(2) You must make sure pipelines and hoses on the dock or terminal used for receiving and circulating used bailwater are completely drained upon completion of each day's operation and left open to the air.

(3) You must make sure at least four units of respiratory protective equipment consisting of supplied-air respirators or self-contained breathing apparatus complying with the requirements of chapter 296-842 WAC are available in a suitably labeled cabinet for immediate use in case of an emergency caused by oxygen deficiency or hydrogen sulfide. Any employee entering a tank in an emergency must, in addition to respiratory protective equipment, wear a lifeline and safety harness to facilitate rescue. At least two other employees, similarly equipped, must be continuously stationed outside the tank to observe and to provide rescue services.

(4) You must make sure the plant superintendent and foremen are trained and knowledgeable about the hazards of hydrogen sulfide and oxygen deficiency. They must be trained in the use of appropriate respiratory and other protective equipment, and in rescue procedures. Other supervisory plant personnel must be informed of these hazards and instructed in the necessary safety measures, including use of respiratory and rescue equipment.

(5) You must make sure supervisory personnel are on hand at dockside to supervise discharging of bailwater from vessels.