



**DEPARTMENT OF LICENSING AND REGULATORY AFFAIRS**  
**DIRECTOR'S OFFICE**  
**OCCUPATIONAL HEALTH STANDARDS**

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(By authority conferred upon the occupational health standards commission by section 24 of Act No. 154 the Public Acts of 1974, as amended, being §408.1024 of the Michigan Compiled Laws)

Rules of the occupational health standards commission entitled "Occupational Health Standards" are amended by adding R 325.50301 to R 325.50348 to read as follows:

**PART 504. DIVING OPERATIONS**

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**GENERAL PROVISIONS**

**R 325.50301 Applicability.**

**Rule 301.** These rules apply to diving and related support operations. These rules do not apply to any diving operation performed solely for recreational instruction purposes using open-circuit, compressed-air SCUBA and conducted within the no-decompression limits.

**R 325.50302 Deviations from rules; emergencies, duty to notify.**

**Rule 302.** An employer may deviate from the requirements of these rules to the extent necessary to prevent or minimize a situation that is likely to cause death, serious

physical harm, or major environmental damage, provided that the employer complies with the following:

- (a) Notifies the department of labor within 72 hours of the onset of the emergency situation indicating the nature of the emergency and extent of the deviation from these rules.
- (b) Upon request from the department of labor or the department of public health, submits such information in writing.

#### **R 325.50303 Duties as employer.**

**Rule 303.** An employer shall be responsible for compliance with the following:

- (a) All provisions of these rules of general applicability.
- (b) All requirements pertaining to specific diving modes to the extent diving operations are conducted in such modes.

#### **R 325.50304 Definitions; A to C.**

**Rule 304.** As used in these rules:

- (a) "Acfm" means actual cubic feet per minute.
- (b) "ATA" means atmosphere absolute.
- (c) "Bell" means an enclosed compartment, a pressurized, closed bell, or an unpressurized, open bell, that allows the diver to be transported to and from the underwater work area and which may be used as a temporary refuge during a diving operation.
- (d) "Bottom time" means the total elapsed time, measured in minutes, from the time when a diver leaves the surface in descent to the time that the diver begins ascent.
- (e) "Bursting pressure" means the pressure at which a pressurized device would fail structurally.
- (f) "Cylinder" means a pressure vessel for the storage of gases.

#### **R 325.50305 Definitions; D.**

**Rule 305.** As used in these rules:

- (a) "Decompression chamber" means a pressure vessel for human occupancy such as a surface decompression chamber, pressurized bell, or deep diving system used to decompress a diver and to treat decompression sickness.
- (b) "Decompression sickness" means a condition with a variety of symptoms that may result from gas or bubbles in the tissues of a diver after pressure reduction.
- (c) "Decompression table" means a profile or set of profiles of depth-time relationships for ascent rates and breathing mixtures to be followed after a specific depth-time exposure or exposures.
- (d) "Dive location" means a surface or vessel from which a diving operation is conducted.
- (e) "Dive-location reserve breathing gas" means volume tank or an independent supply of air or mixed gas at the dive location sufficient under standard operating conditions to allow the diver to reach the surface.
- (f) "Dive team" means divers and support employees involved in a diving operation, including the designated person in charge.
- (g) "Diver" means an employee in the water using underwater apparatus that supplies compressed breathing gas at the ambient pressure.
- (h) "Diver-carried reserve breathing gas" means a diver-carried supply of air or mixed gas sufficient under standard operating conditions to allow the diver to reach the surface, a bell, or to be rescued by a standby diver.

- (i) "Diving mode" means a type of diving requiring specific equipment, procedures, and techniques, such as SCUBA, surface-supplied air, or mixed gas.

#### **R 325.50306 Definitions; F to M.**

**Rule 306.** As used in these rules:

- (a) "Fsw" means feet of seawater or equivalent static pressure head.
- (b) "Heavy gear" means diver-worn deep-sea dress, including helmet, breast-plate, dry suit, and weighted shoes.
- (c) "Hyperbaric conditions" means pressure conditions in excess of surface pressure.
- (d) "Inwater stage" means a suspended underwater platform that supports a diver in the water.
- (e) "Liveboating" means the practice of supporting a surface-supplied air or mixed gas diver from a vessel that is underway.
- (f) "Mixed gas diving" means a diving mode in which a diver is supplied in the water with a breathing gas other than air.

#### **R 325.50307 Definitions; N to S.**

**Rule 307.** As used in these rules:

- (a) "No-decompression limits" means a combination of the depth of a dive and bottom time that permits a diver to return to the surface without decompression, as expressed in the U. S. navy diving manual. The U. S. navy diving manual, volume No. 1, air diving, 1973, as amended to December, 1975, and volume No. 2, mixed gas diving, 1973, as amended through December, 1975, are incorporated herein by reference and may be inspected at the Lansing office of the Michigan department of public health. The manual may be purchased at a cost of \$3.25 for each volume by ordering from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, or from the Michigan Department of Public Health, 3500 North Logan, Box 30035, Lansing, Michigan 48909.
- (b) "Psig" means pounds per square inch, gauge.
- (c) "Qualified employee" means one who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project.
- (d) "SCUBA diving" means a diving mode independent of surface supply in which a diver uses open circuit, self-contained, underwater breathing apparatus.
- (e) "Standby diver" means a diver at the dive location available and in a sufficient state of readiness to assist a diver in the water.
- (f) "Surface-supplied air diving" means a diving mode in which the diver in the water is supplied from the dive location with compressed air for breathing.

#### **R 325.50308 Definitions; T to W.**

**Rule 308.** As used in these rules:

- (a) "Treatment table" means a depth-time and breathing gas profile used in the treatment of decompression sickness.
- (b) "Umbilical" means the composite hose bundle between a dive location and a diver or bell, or between a diver and a bell, which may supply a diver or bell with breathing gas, communications, power, and heat, and may include a safety line.
- (c) "Volume tank" means a pressure vessel connected to the outlet of a compressor and used as an air reservoir.

- (d) "Working pressure" means the maximum pressure to which a pressure containment device may be exposed under standard operating conditions.

**R 325.50309 Dive team; training and experience.**

**Rule 309.** (1) An employer shall assure that a dive team member has the experience and training necessary to perform assigned tasks in a safe and healthful manner. The training and experience shall include the following:

- (a) The use of tools, equipment, and systems relevant to assigned tasks.
- (b) Techniques of the assigned diving mode.
- (c) Diving operations and emergency procedures.
- (d) Familiarity with the contents of the safe practices manual required by rule 317.

(2) All dive team members shall be trained in cardiopulmonary resuscitation and first aid by American Red Cross or equivalent organization.

(3) A dive team member who is exposed to or controls the exposure of others to hyperbaric conditions shall be trained in diving-related physics and physiology.

**R 325.50310 Dive team; supervisor designation; assignments; hyperbaric exposure.**

**Rule 310.** (1) An employer or an employee designated by the employer shall be at the dive location in charge of all aspects of the diving operation affecting the health of a dive team member.

(2) The designated person in charge shall have experience and training in the conduct of the assigned diving operation.

(3) Each dive team member shall be assigned tasks in accordance with the employee's experience or training, except that limited additional tasks may be assigned to an employee undergoing training if these tasks are performed under the direct supervision of an experienced dive team member.

(4) An employer shall not require a dive team member to be exposed to hyperbaric conditions against the employee's will, except when necessary to complete decompression or treatment procedures.

(5) An employer shall not permit a dive team member to dive or be otherwise exposed to hyperbaric conditions for the duration of any temporary physical impairment or condition that is known to the employer and is likely to adversely affect the health of a dive team member.

**R 325.50311 Medical examination; duty to determine fitness; availability of reports; performance of examination.**

**Rule 311.** (1) An employer shall determine by medical examination whether a dive team member who is, or is likely to be, exposed to hyperbaric conditions is medically fit to perform an assigned task in a safe and healthful manner.

(2) An employer shall make available to each dive team member who is, or is likely to be, exposed to hyperbaric conditions, all medical examinations required by these rules at the employer's cost except as provided in rule 316(2).

(3) All medical examinations required by these rules shall be performed by, or under the direction of, a physician.

**R 325.50312 Medical examinations; frequency; following injury or illness.**

**Rule 312.** A medical examination shall be provided as follows:

- (a) Prior to initial hyperbaric exposure with an employer, unless an equivalent medical examination has been given within the preceding 12 months, and the employer has obtained the results of the examination and, has obtained an opinion from the examining

- physician of an employee's medical fitness to dive or to be otherwise exposed to hyperbaric conditions.
- (b) At 1-year intervals from the date of initial examination or last equivalent examination.
  - (c) After an injury or illness requiring hospitalization of more than 24 hours.

**R 325.50313 Medical examinations; information provided to examining physician.**

**Rule 313.** An employer shall provide the following information to the examining physician:

- (a) A copy of rules 311 to 316, including table I, and the guide to the determination of hyperbaric fitness, which may be obtained from the Michigan department of public health, 3500 North Logan, Box 30035, Lansing, Michigan 48909.
- (b) A summary of the nature and extent of hyperbaric conditions to which the dive team member will be exposed, including diving modes and types of work to be assigned.

**R 325.50314 Medical examinations; contents; following injury or illness.**

**Rule 314.** (1) Medical examinations conducted initially and annually shall consist of the following:

- (a) Medical history.
- (b) Diving-related work history.
- (c) Basic physical examination.
- (d) The tests required by table I.
- (e) Any additional tests the physician considers necessary.

(2) Medical examinations conducted after an injury or illness requiring hospitalization of more than 24 hours shall be appropriate to the nature and extent of the injury or illness as determined by the examining physician.

**TABLE I.  
TESTS FOR DIVING MEDICAL EXAMINATION**

Test	Initial Examination	Annual Reexamination
Chest X-ray	X	X
Visual acuity	X	X
Color blindness	X	
EKG: standard 12L	X	X*
Hearing test	X	X
Hematocrit or hemoglobin	X	X
Sickle cell index	X	
White blood count	X	X
Urinalysis	X	X

\*To be given to the employee annually, at age 35 and over.

**R 325.50315 Medical examinations; physician's report; employee copy.**

**Rule 315.** (1) After any medical examination required by the rules in this part, an employer shall obtain a written report prepared by the examining physician that includes the following:

- (a) The results of the medical examination.
- (b) The examining physician's opinion of the employee's fitness to be exposed to hyperbaric conditions,

including any recommended restrictions or limitations to such exposure.

(2) The employer shall provide an employee with a copy of the physician's written report.

**R 325.50316 Medical examinations; determination of employee fitness; restrictions; second opinion; third opinion, assignment pending determination.**

**Rule 316.** (1) An employer shall determine the extent and nature of a dive team member's fitness to engage in diving or to be otherwise exposed to hyperbaric conditions consistent with the recommendations in the examining physician's report.

(2) If the examining physician has recommended a restriction or limitation on the dive team member's exposure to hyperbaric conditions, and the affected employee does not concur, a second physician may be retained to render a medical opinion on the nature and extent of the restriction or limitation, if any. The second physician shall be provided the information required by rule 313.

(3) If the recommendation of the second opinion differs from that of the first examining physician, and if the employer and employee are unable to agree on the nature and extent of the restriction or limitation, an opinion from a third physician selected by the first 2 physicians shall be obtained at the employer's cost. The employer's determination of the dive team member's fitness shall be consistent with the medical opinion of the third physician unless the employer and employee reach an agreement that is otherwise consistent with the recommendation or opinion of not less than 2 of the physicians involved.

(4) Nothing in this procedure shall be construed to prohibit either a dive team member from accepting, or an employer from offering, an assignment that is otherwise consistent with at least 1 medical opinion while a final determination on the employee's fitness is pending.

**R 325.50317 Safe practices manual; availability; contents.**

**Rule 317.** (1) An employer shall develop and maintain a safe practices manual that shall be made available to each dive team member at the dive location.

- (a) Operating procedures and checklists for diving operations.
- (b) Assignments and responsibilities of the dive team members.
- (c) Equipment procedures and checklists.
- (d) Emergency procedures for fire, equipment failure, adverse environmental conditions, and medical illness and injury.

**R 325.50318 Pre-dive procedures; emergency aid.**

**Rule 318.** A list shall be kept at the dive location including a telephone or call number for each of the following:

- (a) An operational decompression chamber, if not at the dive location.
- (b) Accessible hospitals.
- (c) Available physicians.
- (d) Available means of transportation.
- (e) The nearest U. S. coast guard rescue coordination center.

**R 325.50319 Pre-dive procedures; required first aid kit; first aid handbook; oxygen inhalation unit.**

**Rule 319.** (1) A first aid kit, appropriate for the diving operation and approved by a physician, shall be available at the dive location.

(2) When used in a decompression chamber or bell, the first aid kit shall be suitable for use under hyperbaric conditions.

(3) In addition to other first aid supplies, an American Red Cross standard first aid handbook or equivalent, and an oxygen inhalation unit shall be available at the dive location.

**R 325.50320 Pre-dive procedures; health planning and assessment.**

**Rule 320.** (1) Planning of a diving operation shall include an assessment of the safety and health aspects of the following:

- (a) Diving mode.
- (b) Surface and underwater conditions and hazards.
- (c) Breathing gas supply, including reserves.
- (d) Thermal protection.
- (e) Diving equipment and systems.
- (f) Dive team assignments and physical fitness of dive team members, including any impairment known to the employer.
- (g) Repetitive dive designation or residual inert gas status of dive team members.
- (h) Decompression and treatment procedures, including altitude corrections.
  - (i) Decompression tables.
  - (j) Emergency procedures.

(2) Decompression tables, repetitive tables, and no-decompression tables, as appropriate, shall be at the dive location.

**R 325.50321 Pre-dive procedures; coordination with other activities.**

**Rule 321.** To minimize hazards to the dive team, a diving operation shall be coordinated with other activities in the vicinity that are likely to interfere with the diving operation.

**R 325.50322 Pre-dive procedures; employee briefing; physical fitness inquiry.**

**Rule 322.** (1) A dive team member shall be briefed on all of the following:

- (a) The tasks to be undertaken.
- (b) Operating procedures for the diving mode.
- (c) Any unusual hazards or environmental conditions likely to affect the safety of the diving operation.
- (d) Any modifications of operating procedures necessitated by the specific diving operation.

(2) Prior to making individual dive team member assignments, an employer shall inquire into a dive team member's current state of physical fitness, and indicate to the dive team member the procedure for reporting physical problems or adverse physiological effects during and after the dive.

**R 325.50323 Pre-dive procedures; communication system.**

**Rule 323.** An operational 2-way voice communication system shall be provided as follows:

- (a) At the dive location to obtain emergency assistance.
- (b) Between each surface-supplied air or mixed gas diver and a dive team member at the dive location and bell.
- (c) Between the bell and the dive location.

**R 325.50324 Pre-dive procedures; equipment inspection.**

**Rule 324.** The breathing gas supply system, including reserve breathing gas supplies, masks, helmets, and gauges, and timekeeping devices, thermal protection, and bell handling mechanism, when appropriate, shall be inspected prior to each dive.

**R 325.50325 Diving procedures; dive profiles.**

**Rule 325.** A depth-time profile, including, when appropriate, any breathing gas changes shall be maintained at the dive location for each diver during the dive, including decompression.

**R 325.50326 Termination of dive.**

**Rule 326.** The working interval of a dive shall be terminated when any of the following occurs:

- (a) A diver requests termination.
- (b) A diver fails to respond correctly to communications or signals from a dive team member.
- (c) Communications are lost and cannot be quickly reestablished between the diver and a dive team member at the dive location, and between the designated person in charge and the person controlling the vessel in a liveboating operation.
- (d) A diver begins to use diver-carried reserve breathing gas or the dive-location reserve breathing gas.
- (e) When a scheduled work interval has expired.

**R 325.50327 Post-dive procedures generally.**

**Rule 327.** An employer shall comply with the following requirements, which are applicable after each diving operation:

- (a) Check the physical condition of the diver.
- (b) Instruct the diver to report any physical problems or adverse physiological effects including symptoms of decompression sickness.
- (c) Advise the diver of the location of a decompression chamber that is ready for use.
- (d) Alert the diver to the potential hazards of flying after diving.
- (e) Instruct the diver to remain awake and in the vicinity of the dive location for not less than 1 hour after a dive that requires a decompression chamber.

**R 325.50328 Post-dive procedures; recording and maintaining information.**

**Rule 328.** (1) The following information shall be recorded and maintained for each diving operation:

- (a) Names of dive team members, including designated person in charge.
- (b) Date, time, and location.
- (c) Diving modes used.
- (d) General nature of work performed.
- (e) Approximate underwater and surface conditions, such as visibility, water temperature, wind velocity, and current.
- (f) Maximum depth and bottom time for each diver.

(2) For each dive for which a decompression chamber is required, the following additional information shall be recorded and maintained;

- (a) Depth-time and breathing gas profiles.
- (b) Decompression table designation, including any modification.
- (c) Elapsed time since last pressure exposure, if less than 24 hours, or repetitive dive designation for each diver.

(3) For each dive in which decompression sickness is suspected or symptoms are evident, the following additional information shall be recorded and maintained:

- (a) Description of decompression sickness symptoms, including depth and time of onset.
- (b) Description and results of treatment.

**R 325.50329 Post-dive procedures; decompression procedure assessment; corrective action; written evaluation.**

**Rule 329.** (1) An employer shall investigate and evaluate each incident of decompression sickness based on the recorded information, consideration of the past performance of decompression table used, and individual susceptibility.

(2) Appropriate corrective action shall be taken by an employer to reduce the probability of recurrence of decompression sickness.

(3) A written evaluation of the decompression procedure assessment, including any corrective action taken, shall be prepared by the employer within 45 days of the incident of decompression sickness.

**R 325.50330 SCUBA diving; restrictions.**

**Rule 330.** SCUBA diving shall not be conducted:

- (a) At depths greater than 130 fsw.
- (b) At depths greater than 100 fsw or outside the no-decompression limits unless a decompression chamber is ready for use.
- (c) Against currents exceeding 1 knot unless line-tended.
- (d) In enclosed or physically confining spaces unless line-tended.

**R 325.50331 SCUBA diving; procedures.**

**Rule 331.** (1) A diver shall be line-tended from the surface, or accompanied by another diver in the water in continuous visual or physical contact during the diving operation.

(2) A standby diver shall be available while a line-tended diver is in the water. The standby diver shall be dressed to enter the water except for fins, mask, and breathing apparatus, which shall be readily available.

(3) A diver shall be stationed at the underwater point of entry when line-tended diving is conducted in enclosed or physically confining spaces.

(4) Each diver shall be equipped with the following functioning equipment:

- (a) A low-air supply warning device, or
- (b) An independent reserve cylinder with a separate regulator or connected to the underwater breathing apparatus.

**R 325.50332 Surface-supplied air diving generally.**

**Rule 332.** (1) Surface-supplied air diving shall not be conducted at depths deeper than 190 fsw, except that dives with bottom times of 30 minutes or less may be conducted to depths of 220 fsw.

(2) A decompression chamber shall be ready for use at the dive location for any dive outside the no-decompression limits or deeper than 100 fsw.

(3) A bell shall be used for dives with an inwater decompression time greater than 120 minutes, except when heavy gear is worn or diving is conducted in physically confining spaces.

**R 325.50333 Surface-supplied air diving; procedures.**

**Rule 333.** (1) Each diver shall be continuously tended while in the water.

(2) A diver shall be stationed at the underwater point of entry when diving is conducted in enclosed or physically confining spaces.

(3) Each diving operation shall have a primary breathing gas supply sufficient to support divers for the duration of the planned dive, including decompression.

(4) For dives deeper than 100 fsw or outside the no-decompression limits, the following procedures shall apply:

- (a) A separate dive team member shall tend each diver in the water.
- (b) A standby diver shall be available while a diver is in the water. A standby surface-supplied diver shall be

dressed to enter the water except for helmet or mask and weights which shall be readily available. A standby SCUBA diver shall be dressed in accordance with rule 331(2).

- (c) A diver-carried reserve breathing gas supply shall be provided for each diver except when heavy gear is worn.
- (d) A dive-location on-line reserve breathing gas supply shall be provided.
- (5) For heavy-gear diving deeper than 100 fsw or outside the no-decompression limits, the following procedures shall apply:
  - (a) An extra breathing gas hose capable of supplying breathing gas to the diver in the water shall be available to the standby diver.
  - (b) An inwater stage shall be provided to a diver in the water.
  - (6) Except when heavy gear is worn or where physical space does not permit, a diver-carried reserve breathing gas supply shall be provided whenever a diver is prevented by the configuration of the dive area from ascending directly to the surface.

**R 325.50334 Mixed gas diving generally.**

**Rule 334.** Mixed gas diving shall be conducted only when the following occur:

- (a) A decompression chamber when required by rule 341(1)(c) is ready for use at the dive location.
- (b) A bell is used at depths greater than 220 fsw or when the dive involves in water decompression time of greater than 120 minutes, except when heavy gear is worn or when diving in physically confining spaces.
- (c) A pressurized bell is used at depths greater than 300 fsw, except when diving is conducted in physically confining spaces.

**R 325.50335 Mixed gas diving; procedures; required equipment.**

**Rule 335.** (1) A separate dive team member shall tend each diver in the water.

- (2) A standby diver shall be available while a diver is in the water.
- (3) A diver shall be stationed at the underwater point of entry when diving is conducted in an enclosed or physically confining space.
- (4) Each diving operation shall have a primary breathing gas supply sufficient to support divers for the duration of the planned dive including decompression.
- (5) Each diving operation shall have a dive-location on-line reserve breathing gas supply.
- (6) When heavy gear is worn the following shall be provided:
  - (a) An extra breathing gas hose capable of supplying breathing gas to a diver in the water shall be available to the standby diver.
  - (b) An inwater stage shall be provided to a diver in the water.
- (7) An inwater stage shall be provided for a diver without access to a bell for a dive deeper than 100 fsw or outside the no-decompression limits.
- (8) When a pressurized bell is used, 1 dive team member in the bell shall be available and tend the diver who is in the water.
- (9) Except when heavy gear is worn or where physical space does not permit, a diver-carried reserve breathing gas supply shall be provided for each diver who engages in the following:
  - (a) Diving deeper than 100 fsw or outside the no-decompression limits.

- (b) Prevented by the configuration of the dive area from directly ascending to the surface.

**R 325.50336 Liveboating; prohibitions.**

**Rule 336.** A diving operation involving liveboating shall not be conducted during any of the following conditions:

- (a) With an inwater decompression time of greater than 120 minutes.
- (b) Using surface-supplied air at depths deeper than 190 fsw, except that a dive with bottom time of 30 minutes or less may be conducted to depths of 220 fsw.
- (c) Using mixed gas at depths greater than 220 fsw.
- (d) In rough seas with a wave height of more than 3 feet.
- (e) In other than daylight hours.

**R 325.50337 Liveboating; procedures.**

**Rule 337.** (1) The propeller of the vessel shall be stopped before a diver enters or exits the water.

(2) A device shall be used that minimizes the possibility of entanglement of a diver's hose in the propeller of the vessel.

(3) Two-way voice communication between the designated person in charge and the person controlling the vessel shall be used while a diver is in the water.

(4) A standby diver shall be available while a diver is in the water. The standby diver shall be dressed in accordance with rule 333(4)(b).

(5) A diver-carried reserve breathing gas supply shall be carried by each diver engaged in a liveboating operation.

**R 325.50338 Equipment; record of service.**

**Rule 338.** Equipment modification, repair, test, calibration or maintenance service shall be recorded by means of a tagging or logging system, and include the date and nature of work performed, and the name or initials of the person performing the work.

**R 325.50339 Equipment; air compressor system; required equipment; location; supplied air; testing output; valves.**

**Rule 339.** (1) A compressor used to supply air to a diver shall be equipped with a volume tank with a check valve on the inlet side, a pressure gauge, a relief valve, and a drain valve.

(2) An air compressor intake shall be located away from an area containing exhaust or other contaminants.

(3) Respirable air supplied to a diver shall not contain the following:

- (a) A level of carbon monoxide (CO) greater than 20 ppm.
- (b) A level of carbon dioxide (CO<sub>2</sub>) greater than 1,000 ppm.
- (c) A level of oil mist greater than 5 milligrams per cubic meter.
- (d) A noxious or pronounced odor.

(4) The output of an air compressor system shall be tested for air purity every 6 months by means of samples taken at the connection to the distribution system, except that non-oil lubricated compressors need not be tested for oil mist.

(5) Slow opening on-off valves shall be used when the system operating pressure exceeds 500 psig.

**R 325.50340 Equipment; buoyancy control; exhaust valve; buoyancy compensator; flotation device.**

**Rule 340.** (1) A helmet or mask connected directly to the dry suit or other buoyancy-changing equipment shall be equipped with an exhaust valve.

(2) A dry suit or other buoyancy-changing equipment not directly connected to the helmet or mask shall be equipped with an exhaust valve.

(3) When used for SCUBA diving, a buoyancy compensator shall have an inflation source separate from the breathing gas supply.

(4) Except when the diver is wearing a variable volume suit, an inflatable flotation device capable of maintaining the diver at the surface in a face-up position, having a manually activated inflation source independent of the breathing supply, an oral inflation device, and an over-pressure relief device or exhaust valve shall be used for SCUBA diving.

**R 325.50341 Decompression chambers; availability and location.**

**Rule 341.** (1) A decompression chamber capable of recompressing a diver at the surface to a minimum of 165 fsw (6 ATA) shall be available to the dive location when any of the following occur:

(a) Surface-supplied air dives are conducted between 100 fsw and 220 fsw and require less than 30 minutes in-water decompression time, except that inspection or research dives within no decompression limits may be conducted to 130 fsw.

(b) Surface-supplied air dives between 100 fsw and 220 fsw require an in-water decompression time of 30 minutes or greater.

(c) Mixed gas dives are conducted beyond 130 fsw.

(2) A decompression chamber capable of recompressing a diver at the surface to the maximum depth of the dive shall be available to the dive location for dives greater than 220 fsw.

(3) A decompression chamber shall be located within 15 minutes surface travel time from the dive location for dives described in subrule (a) and within 5 minutes surface travel time from the dive location for all other dives.

**R 325.50342 Decompression chambers; operation; qualified employee; required equipment; inspection.**

**Rule 342.** (1) A qualified employee shall be available to operate the decompression chamber for not less than 1 hour after a dive for which a decompression chamber is required. The qualified employee may be a dive team member or another employee qualified to operate the decompression chamber.

(2) The decompression chamber operator shall have available at the chamber location necessary treatment tables, treatment gas appropriate to the diving mode, and sufficient gas to conduct treatment.

(3) A muffler on each decompression intake and exhaust line and the suction guard on the exhaust line shall be regularly inspected and maintained.

(4) A 2-way voice communication system shall be provided between the occupants of other separately pressurized compartments and a dive team member at the chamber location.

(5) A decompression chamber shall be maintained and operated to minimize sources of ignition and combustible materials in each compartment.

**R 325.50343 Decompression chambers; construction requirements.**

**Rule 343.** (1) A decompression chamber manufactured after October 20, 1977, shall be built, stamped, and maintained in accordance with ASME code, Section VIII, 1974, and the addenda thereto through December 31, 1976, and the PVHO-1, 1977 edition, which are incorporated herein by reference and may be inspected at the Lansing office of the Michigan department of public health. Section VIII of the ASME code may be purchased at a cost of \$100.00 and the PVHO-1 may be purchased at a cost of \$10.00 by ordering from the American Society of Mechanical Engineers, United Engineering Center, 345 East Forty-Seventh Street, New York, New York, 10017, or from the Michigan Department of Public Health, 3500 North Logan, Box 30035, Lansing, Michigan, 48909.

(2) A decompression chamber manufactured prior to October 20, 1977, shall be maintained in conformity with the code requirements to which it was built, or their equivalent.

(3) A decompression chamber shall be of dual lock construction and shall be large enough to accommodate a diver and a person or persons to render treatment.

(4) A decompression chamber shall be equipped with all of the following:

(a) An interior and exterior pressure gauge for each compartment designed for human occupancy.

(b) A built-in breathing system with a minimum of 1 mask per occupant.

(c) A means to maintain the oxygen level in the chamber atmosphere below 25% by volume.

(d) A viewport that allows all bunks to be seen from the exterior for their entire length.

(e) Illumination sufficient to light the interior to allow viewing of the occupants, the reading of gauges by an occupant, and operation of installed systems within each compartment.

(f) A sound-powered telephone system or other emergency backup communications systems.

(g) A means of operating all installed man-way locking devices from both sides of a closed hatch.

(h) A capability to supply breathing mixtures at the maximum rate required by all occupants sufficient to maintain the interior atmosphere below 2% surface equivalent carbon dioxide by volume.

(i) A means of over-riding and controlling from the exterior all interior breathing and pressure supply controls.

(5) Electrical equipment installed inside the chamber shall be explosion-proof.

**R 325.50344 Equipment; gauges and timekeeping devices.**

**Rule 344.** (1) Gauges indicating diver depth that can be read at the dive location shall be used for all surface-supplied dives.

(2) Each depth gauge shall be dead-weight tested or calibrated against a master reference gauge initially and every 6 months thereafter, and when there is a discrepancy greater than plus or minus 2% of full scale between any 2 equivalent gauges.

(3) A timekeeping device shall be available and monitored at each surface-supplied dive location.

(4) A cylinder pressure gauge capable of being monitored by the diver during the dive shall be worn by each SCUBA diver.

(5) A timekeeping device shall be worn by each SCUBA diver in a position to be monitored by the diver.

**R 325.50345 Equipment; masks and helmets.**

**Rule 345.** (1) Surface-supplied air and mixed gas masks and helmets shall have the following:

- (a) A non-return valve at the attachment point between helmet or mask and hose that shall close readily and positively.
- (b) An exhaust valve.

(2) Surface-supplied air masks and helmets shall have a minimum ventilation rate capability of 4.5 acfm at any depth at which they are operated or the capability of maintaining the diver's inspired carbon dioxide partial pressure below 0.02 ATA when the diver is producing carbon dioxide at the rate of 1.6 standard liters per minute.

**R 325.50346 Equipment; oxygen service; cleaning; shut on valves.**

**Rule 346.** (1) Equipment used with oxygen or mixtures containing over 40% by volume oxygen shall be designed for oxygen service.

(2) Components, except umbilicals, exposed to oxygen or mixtures containing 40% by volume shall be cleaned of flammable materials before use.

(3) Oxygen systems over 125 psig and compressed air systems over 500 psig shall have slow-opening shut off valves.

**R 325.50347 Occupational injuries; recording and reporting.**

**Rule 347.** (1) An employer shall record and report occupational injuries and illnesses in accordance with requirements of Part 11, Recording and Reporting of Occupational Injuries and Illnesses, being R 408.22101 et seq., of the Michigan Administrative Code, administered and enforced by the Michigan department of labor.

(2) In addition, an employer shall record the occurrence of any diving-related injury or illness that requires any dive team member to be hospitalized for 24 hours or more, specifying the circumstances of the incident and the extent of any injuries or illnesses.

**R 325.50348 Recordkeeping; availability of records.**

**Rule 348.** (1) Upon the request of the director of the department of labor or the director of the department of public health, an employer shall make available for inspection and copying any record or document required by these rules.

(2) Upon request by an employee, former employee, or authorized representative, an employer shall make available for inspection and copying any record or document required by these rules that pertains to the individual employee or former employee.

(3) Records and documents required by these rules shall be retained by the employer for the following period:

- (a) Dive team member physician's report--5 years.
- (b) Safe practices manual--current document only.
- (c) Depth-time profile--until completion of the recording of the dive, or until completion of decompression procedure assessment where there has been an incident of decompression sickness.
- (d) Recording of dive--1 year, except 5 years where there has been an incident of decompression sickness.
- (e) Decompression procedure assessment evaluation -- 5 years.
- (f) Record of hospitalization--5 years.

**GUIDE TO HYPERBARIC FITNESS**

The following disorders may restrict or limit occupational exposure to hyperbaric conditions depending on severity, presence of residual effects, response to therapy, number of occurrences, diving mode, or degree and duration of isolation:

History of seizure disorder other than early febrile convulsions.

Malignancies (active) unless treated and without recurrence for 5 years.

Chronic inability to equalize sinus or middle ear pressure, or both.

Cystic or cavitory disease of the lungs.

Impaired organ function caused by alcohol or drug use.

Conditions requiring continuous medication for control (e.g., antihistamines, steroids, barbiturates, mood altering drugs, or insulin).

Meinere's disease.

Hemoglobinopathies.

Obstructive or restrictive lung disease.

Vestibular end organ destruction.

Pneumothorax.

Cardiac abnormalities (e. g., pathological heart block, valvular disease, intraventricular conduction defects other than isolated right bundle branch block, angina pectoris, arrhythmia, coronary artery disease).

Juxtra-articular osteonecrosis.

Pregnancy.



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