

## Chapter Ind 12

## WORK UNDER COMPRESSED AIR

	Application	Temperature, electricity and sanitation
Ind 12.01	Application of orders	Ind 12.30 Temperature, electricity and sanitation
	Definitions	Compressor plant, air supply and telephone communication
Ind 12.04	Definitions	Ind 12.40 Compressor plant, air supply and telephone communication
	General provisions	Bulkheads and screens
Ind 12.05	General provisions	Ind 12.50 Bulkheads and screens
	Compression	Fire prevention
Ind 12.10	Compression rate	Ind 12.70 Fire prevention
	Decompression	Medical care of employees
Ind 12.15	Normal condition	Ind 12.80 Medical attendance
Ind 12.16	Repetitive exposures	Ind 12.81 Medical facilities
Ind 12.17	Decanting	Ind 12.82 Physical examination
Man locks and special decompression chamber		Ind 12.83 Reporting of illness of employees
Ind 12.20	Man locks	Ind 12.84 Treatment of decompression illness and air embolism
Ind 12.21	Man lock attendant	Ind 12.85 Medical records
Ind 12.22	Man lock attendant station	Ind 12.86 Forms
Ind 12.23	Lock register	
Ind 12.25	Special decompression chamber	

## Article 1.

## APPLICATION

Ind 12.01 Application of orders. The following rules shall apply whenever men are employed in compressed air, exclusive of diving work. Machines, equipment, processes, and operations not specifically covered by these rules, shall be governed by other applicable administrative codes.

(1) EXCEPTIONS. (a) In cases of practical difficulty and unnecessary hardship, the department of industry, labor and human relations may grant a *variance* to literal requirements of this code and may permit the use of alternate devices or methods provided the variance proposed is clearly equal to code requirements in purpose and intent. A petition for modification must be filed with the department of industry, labor and human relations for any code variance sought.

(b) In cases of practical difficulty and unnecessary hardship, the department of industry, labor and human relations may grant a *waiver* of certain rules in this code when the rules apply to work in progress under contracts existing prior to the effective date of this code. Such waivers shall remain in effect for not more than 6 months.

**History:** Cr. Register, August, 1971, No. 188, eff. 9-1-71.

Register, February, 1972, No. 194  
Work Under Compressed Air

## Article 2.

## DEFINITIONS

**Ind 12.04 Definitions.** The following definitions shall apply in the application of these rules. The singular number includes the plural and the plural the singular.

(1) **AIR MASTER.** That competent individual designated by the employer and licensed by the department of industry, labor and human relations in immediate charge of the work.

(2) **BULKHEAD.** An airtight structure separating the working chamber from free air or from another chamber under a lesser pressure than the working pressure.

(3) **COMBINATION LOCK.** An air lock which serves both as materials and man lock.

(4) **COMPRESSED AIR CAISSON.** A vertical structure extended below the water or earth surface through which men may descend through a lock into an air pressure greater than atmospheric. The pressurized atmosphere opposes the water pressure and permits men to work at the bottom of the caisson.

(5) **DECANTING.** A method used for decompressing under certain circumstances. In this procedure the workers are brought to atmospheric pressure with a very high gas tension in the tissues and then immediately recompressed in a second and separate chamber or lock. The period of time that the workers spend at atmospheric pressure between the decompression following the shift and recompression must not exceed 5 minutes.

(6) **EMPLOYER.** The contractor, firm, corporation or other organization carrying out the work.

(7) **FREE AIR.** Normal atmospheric pressure.

(8) **HIGH AIR.** Air pressure used to supply power to pneumatic tools and devices.

(9) **LOW AIR.** Air supplied to pressurize working chambers and locks.

(10) **MAN LOCK.** A chamber through which men pass from one air pressure environment into another.

(11) **MATERIALS LOCK.** A chamber through which materials and equipment pass from one air pressure environment into another.

(12) **MEDICAL LOCK.** A special chamber in which men are treated for decompression illness. It may also be used in preemployment physical examinations to determine the adaptability of the prospective employe to changes in pressure.

(13) **PRESSURE.** A force acting on a unit area. Usually shown as pounds per square inch (psi).

(a) *Absolute pressure* (psia). The sum of the atmospheric pressure and gauge pressure (psig).

(b) *Atmospheric pressure.* The pressure of air at sea level, usually 14.7 psia (one atmosphere), or 0 psig.

illness or illness of unknown or doubtful cause, the wearer shall be taken to the medical lock without delay. Each compressed air employe shall be instructed by the employer to have his identification bracelet in his personal possession at all times, both on and off the job. A permanent record of identification used and issued shall be kept on file.

(7) **POSTING OF INSTRUCTIONS.** The instructions contained in appendix C entitled, "Suggestions for the Guidance of Compressed Air Workers," as well as such other instructions as may be deemed necessary, shall be printed and posted conspicuously under a transparent, protective covering, in the change house, and in each man lock.

(8) **PERIODIC INSPECTION.** The air master shall designate competent individuals to inspect all emergency equipment and structures on the job site at *least once each workday* when work in compressed air is in progress. Reports of such inspection shall be recorded.

(9) **AVAILABILITY OF RULES AND REGULATIONS.** This safety code and other rules and regulations which may be applicable shall be kept on the job site in the custody of the air master.

(10) **SOLITARY EMPLOYMENT.** No employe shall be permitted to work alone.

(11) **ENTERING AND LEAVING THE WORKING CHAMBER.** (a) Persons entering or leaving the working chamber are subject to the provisions of this code. When working chambers are at pressures greater than atmospheric, the air master shall train competent individuals, hereinafter called *man lock attendants*, to operate the air locks through which men may pass. No persons shall be permitted to enter the working chamber except through a working man lock or combination lock.

(b) *Use of explosives:* The use of explosives in compressed air shall be governed by the rules of blasting in compressed air as specified in Wis. Adm. Code, chapter Ind 5 "Explosives."

**NOTE:** Every reasonable effort should be taken to insure the safety of workmen in all situations whether or not covered by these rules.

**History:** Cr. Register, August, 1971, No. 188, eff. 9-1-71.

#### Article 4.

### COMPRESSION

**Ind 12.10 Compression rate.** During the compression of workmen, the pressure shall not be increased to more than 5 psig within the first minute. The pressure shall be held at 5 psig and again at 8 psig sufficiently long to determine if any individuals are experiencing discomfort. After the first minute the pressure is to be raised uniformly and at a rate not to exceed 10 psi per minute. If any workman complains of discomfort, the pressure shall be held to determine if the symptoms are relieved. If after 5 minutes the discomfort does not disappear, the lock attendant shall gradually reduce the pressure until the workman signals that the discomfort has ceased. If he does not indicate that the discomfort has disappeared, the lock attendant shall reduce the pressure to atmospheric and the workman shall be released from the lock.

**History:** Cr. Register, August, 1971, No. 188, eff. 9-1-71.

Register, February, 1972, No. 194  
Work Under Compressed Air

## Article 5.

**DECOMPRESSION**

**Ind 12.15 Normal condition.** (1) A normal condition is one during which exposure to compressed air is limited to a single continuous working period followed by a single decompression in any given 24-hour period; the total time of exposure to compressed air during the single continuous working period is not interrupted by exposure to normal atmospheric pressure, and a second exposure to compressed air does not occur until at least 12 consecutive hours of exposure to normal atmospheric pressure has elapsed since the workman has been under pressure.

(2) Decompression for normal condition shall be in accordance with the decompression tables. (See decompression table No. 1 and No. 2 in appendix A.)

**History:** Cr. Register, August, 1971, No. 188, eff. 9-1-71.

**Ind 12.16 Repetitive exposures.** In the event it is necessary for an employe to be in compressed air more than 3 times in a 24-hour period, the *air master* shall be responsible for the establishment of methods and procedures of decompression applicable to repetitive exposure tables. (See repetitive exposure tables No. 3, 4 and 5 in appendix B.)

**History:** Cr. Register, August, 1971, No. 188, eff. 9-1-71; am. Register, February, 1972, No. 194, eff. 3-1-72.

**Ind 12.17 Decanting.** If decanting is to be used, the appointed physician shall submit his procedures to the department of industry, labor and human relations for approval before anyone is permitted to be decompressed by decanting methods.

**History:** Cr. Register, August, 1971, No. 188, eff. 9-1-71.

## Article 6.

**MAN LOCKS AND SPECIAL DECOMPRESSION CHAMBER**

**Ind 12.20 Man locks.** (1) Except in emergency, no person employed in compressed air shall be permitted to pass from the working chamber to atmospheric pressure until after decompression in accordance with the procedures in either appendix A, appendix B, or as provided in section Ind 12.17.

(2) Time of decompression shall be posted in each man lock or special decompression chamber.

(3) Except where air pressure is below 12 psig and there is no danger of rapid flooding, all caissons having a working area greater than 150 square feet and each bulkhead in tunnels of 14 feet or more in diameter, or equivalent area, shall have at least 2 locks in perfect working condition, 1 of which shall be used exclusively as a man lock, the other as a materials lock. Where only a combination man and materials lock is required, this single lock shall be of sufficient capacity to hold the men constituting 2 successive shifts.

(4) The man lock shall be large enough so that those using it are not compelled to be in a cramped position, and shall not have less than 5 feet clear head room at the center and a minimum of 30 cubic feet of air space per occupant.

Register, February, 1972, No. 194  
Work Under Compressed Air

**Ind 12.82 Physical examination.** (1) No person shall be permitted to enter the working chamber unless he has been examined by the physician. At the option of the air master this provision may be waived for casual visitors having previous knowledge and experience with compressed air work.

(2) In this event Form SB-249 must be completed and signed by the visitor prior to entering compressed air. If any question on this form is answered in the affirmative, entry shall be denied.

(3) This provision shall be waived for emergency entry, exit, inspection and enforcement by fire departments and other emergency services.

(4) The physical examination shall include the following:

(a) Serological test for syphilis.

(b) Blood test for sickle cell anemia trait. No person with this trait may be employed under compressed air.

(c) X-rays of the chest, anterior views of both shoulders, both hips and anterior and lateral views of both knees. These films must be interpreted by a radiologist intimately familiar with the lesions of aseptic necrosis. Pelvic and gonad shielding shall be used for X-ray of the hips.

**NOTE:** The physician may recommend that persons in the following categories not be employed in compressed air:

Persons who cannot readily equalize air pressure in their ears.

Persons who are addicted to the excessive use of intoxicants.

Persons addicted to the use of narcotics.

Persons with an impairing physical deformity or abnormality, including gross obesity.

Persons with a disease of the ear.

Persons with any systemic disease which may be aggravated by exposure to, or work in, compressed air, or which may represent a danger to the person, or to others in compressed air.

(5) Physician's recommendation. The recommendation of the physician as to employability shall be in writing, and shall be signed by the physician. A copy of the recommendation shall be submitted to the air master and shall be kept on file in the air master's office. Forms SB-247-A and SB-248 shall be completed. Copies shall be kept in the retained physician's file.

(6) Valid period of physician's recommendation. The physician's recommendation shall be valid for a period of 14 days from the date of physical examination.

(7) Temporary recommendation. When work in compressed air is urgently required to be done, during a period when the retained physician has not been appointed or is otherwise unavailable, the required physical examination may be performed by any physician licensed to practice in the state or district exercising jurisdiction, who may then issue a temporary recommendation as to employability. A physical examination shall be performed by the retained physician at the earliest practicable date.

(8) Periodic reexamination. Each person reported by the physician to be physically qualified for employment in compressed air shall be reexamined by the physician within one year of the date of the preceding physical examination, or sooner as the physician may deem necessary, to determine whether or not he continues to be physically qualified for such work. A new recommendation as to the employ-

ability shall be prepared as provided for in subsection Ind 12.82 (5). Forms SB-247 and SB-247-A shall be completed for this examination. Completed forms shall be submitted to the employer and the air master. Copies shall be kept in the retained physician's file.

(9) Reexamination due to absence from work. Each person working in compressed air who has been absent from work for 10 or more consecutive working days shall be reexamined by the retained physician to determine whether or not he is yet physically qualified to resume work in compressed air. A new recommendation as to employability shall be prepared as provided for in section Ind 12.82 (5).

**Note:** Forms SB-247, SB-247-A and SB-248 are available from Industry, Labor and Human Relations, Post Office Box 2209, Madison, Wisconsin, 53701.

**History:** Cr. Register, August, 1971, No. 188, eff. 9-1-71; am. (8), Register, February, 1972, No. 194, eff. 3-1-72.

**Ind 12.83 Reporting of illness of employes.** (1) Each person employed in compressed air shall be instructed by the retained physician to recognize the symptoms of decompression illness and to report immediately to the first aid room for examination and treatment upon noticing any symptom of decompression illness.

(2) Each person employed in compressed air shall be instructed by the retained physician to report to him when suffering from a cold, sore throat, earache, or other ailment which may be aggravated or which may result in harm to the person when exposed to compressed air.

(3) After each such report to the retained physician, a new recommendation as to employability shall be prepared as provided for in section Ind 12.82 (5).

**History:** Cr. Register, August, 1971, No. 188, eff. 9-1-71.

**Ind 12.84 Treatment of decompression illness and air embolism.** (1) Treatment of decompression illness and air embolism shall be rendered promptly as directed by the retained physician. Recompression in the medical lock or working chamber shall be performed only at the direction of the retained physician. Breathable gases such as oxygen or helium/oxygen mixtures shall be administered only at the direction of the retained physician. Treatment for decompression sickness shall be carried out on U.S. Navy Low Pressure Oxygen Treatment tables V and VI (appendix D) or their equivalent as a minimum directed by the retained physician. Treatment for air embolism shall be carried out on U.S. Navy Low Pressure Oxygen Treatment tables 5A and 6A or their equivalent as a minimum directed by the retained physician.

(2) Use of medical lock. No person shall be treated in a medical lock except at the direction of the retained physician.

**History:** Cr. Register, August, 1971, No. 188, eff. 9-1-71; am. (1), Register, February, 1972, No. 194, eff. 3-1-72.

**Ind 12.85 Medical records.** (1) **GENERAL.** The retained physician shall maintain a complete medical record of all physical examinations and reexaminations performed. The retained physician shall, in addition, maintain a complete medical record, on such forms and in such manner as the department of industry, labor and human relations

Register, February, 1972, No. 194  
Work Under Compressed Air

may prescribe, of the incidence of decompression illness, or other illness or injury which may incapacitate a person for work, and the loss of life which may occur during the construction of tunnels, shafts, or caissons under compressed air. The medical record shall include a description of the treatment provided. The medical records shall be available for inspection by authorized representatives of the department of industry, labor and human relations. A copy of the medical record shall be forwarded to the department of industry, labor and human relations within 48 hours following the occurrence of any decompression illness, accident, injury, or death to any person, stating as fully as possible the cause of such decompression illness, accident, injury or death, the place where the ill or injured person