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STATE OF WISCONSIN            )  
  ) SS  
DEPARTMENT OF INDUSTRY,        )  
LABOR AND HUMAN RELATIONS    )

TO ALL TO WHOM THESE PRESENTS SHALL COME, GREETINGS:

I, Stephen J. Reilly, Executive Secretary of the Department of Industry, Labor and Human Relations, and costodian of the official records of said Department, do hereby certify that the attached rules to Wisconsin Administrative Code Chapters 41 and 42, Boiler and Pressure Vessel Code, were adopted by the Department of Industry, Labor and Human Relations on January 5, 1971.

I further certify that said copy has been compared by me with the original on file in this Department and that the same is a true copy thereof and of the whole of such original.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the official seal of the Department at the Capitol, in the City of Madison, this 11 day of January, A.D., 1971.

*Stephen J. Reilly*  
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Stephen J. Reilly, Executive Secretary

ORDER OF THE

DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS

Pursuant to authority vested in the Department of Industry, Labor and Human Relations by Section 101.01 to 101.29 Wis. Stats., the Department of Industry, Labor and Human Relations hereby amends, repeals, recreates and adopts revisions to Chapter 41 Boiler and Unfired Pressure Vessel Code, Wisconsin Administrative Code.

The rules attached hereto shall become effective on the first day of the month following publication in the Wisconsin Administrative Code as provided in Section 227.

Subsection 41.03 (1), (2) and (3) are amended to read:

(1) No boiler or pressure vessel shall be operated at a pressure in excess of the maximum operating pressure stated on its current certificate of operation.

(2) No unauthorized person shall remove or tamper with any connected safety device nor shall any person adjust a connected safety valve to a greater relieving pressure than that allowed for the vessel as stated on its current certificate of operation.

(3) Boiler and pressure vessels shall be so installed that there will be sufficient room between the vessel and any ceiling, wall, partition, or floor to facilitate the connection and operation of valves, pipes, and other appurtenances and shall be installed in a manner that will not block any inspection opening.

Subsection 41.04 (1) and (2) are amended to read:

(1) Whenever a boiler or pressure vessel fails and causes injury to any person the owner or user shall report the facts involved to the Department of Industry, Labor and Human Relations within the following 24 hours. The owner or user shall not remove or disturb the vessel or any of its parts nor permit any such removal or disturbance prior to receiving authorization from the Department of Industry, Labor and Human Relations, except for the purpose of saving human life or further property damage.

(2) The owner shall report any major repairs of a boiler or pressure vessel

as provided in Part VII "Repairs, Additions, Alterations and Special Rules."

✓ Section 41.05 is amended to read:

Ind 41.05 Reporting boiler and pressure vessel locations.

(1) The owner or user of any boiler or pressure vessel shall report the location of such vessels unless either of the following conditions are met:

- (a) The vessels are exempt from periodic inspections. See section Ind 41.21 by the Department of Industry, Labor and Human Relations
- (b) The vessels are subjected to periodic inspection by the Department of Industry, Labor and Human Relations, a city, an insurance company, or a company authorized to make its own inspections.

✓ Section 41.06 is repealed and recreated to read:

✓ Ind 41.06 Identification of boilers and pressure vessels.

(1) The owner or user of a boiler or pressure vessel shall number each vessel in some permanent manner and in an accessible location.

(2) Boilers and pressure vessels subject to periodic inspections (see Ind 41.20) shall be identified by a registration number supplied by the Department of Industry, Labor and Human Relations. The registration number shall be affixed by an authorized inspector. The state tag shall be attached to the vessel at a location which can be easily viewed.

Section 41.08 is repealed and recreated to read:

Ind 41.08 Certificate of competency as inspector.

(1) CERTIFICATE REQUIRED. An inspection report covering a boiler or pressure vessel may be recognized and accepted only when the inspector holds a valid certificate of competency issued by the Department of Industry, Labor and Human Relations.

(2) ELIGIBILITY.

- (a) The applicant for a certificate of competency as a boiler or pressure vessel inspector shall be an employe of the state, a municipality, an insurance company, or a corporation or company authorized to make its own inspections.
- (b) The applicant shall be at least 25 years of age. He shall have had at least 3 years of experience in one or more of the following endeavors: construction, repairing, inspecting, or operating engineer in charge of high pressure steam boilers or pressure vessels.
- (c) A degree in mechanical engineering may be accepted as the equivalent of 2 years practical experience.
- (d) The applicant's employer shall certify that applicant's statement of experience is correct.

(3) APPLICATIONS AND RENEWALS.

- (a) Fees for examination and reciprocal certificates of competency shall be submitted with applications and in the amount specified in Wis. Adm. Code chapter Ind 69.
- (b) Renewal fees shall be submitted with the request for renewal and in the amount specified in chapter Ind 69.
- (c) A request for renewal shall be filed with the Department of Industry, Labor and Human Relations on or before January 1 of the calendar year for which the certificate is to be valid.
- (d) Applications for examinations and applications for renewals by employes of the state and employes of the city of Milwaukee require no fee.

(4) EXAMINATIONS.

- (a) Certificates of competency for a boiler or pressure vessel inspector may be issued by the Department of Industry, Labor and Human Relations to eligible applicants passing the examinations prescribed by and conducted by the department.
- (b) Holders of certificates, who do not apply for renewal in any 3 year period may be required to pass a scheduled examination.

(5) ANNULMENTS AND REVOCATIONS.

- (a) A certificate becomes invalid when the holder terminates his employment with the employer of record at the time of issue. A renewal may be obtained under the provisions of this section provided applicant meets eligibility requirements.
- (b) A certificate may be annulled or revoked when incompetency or negligence is determined after investigation.

(6) RECIPROCAL COMMISSIONS.

- (a) A reciprocal certificate of competency may be granted by the Department of Industry, Labor and Human Relations to a boiler or pressure vessel inspector under the following conditions:
- (b) The inspector shall be employed by a boiler insurance company licensed to do business in Wisconsin. The boiler insurance company shall make the application for a reciprocal commission to the Department of Industry, Labor and Human Relations.
- (c) The inspector shall hold a commission issued by the National Board of Boiler and Pressure Vessel Inspectors or a certificate of competency from a city or state which has adopted the A.S.M.E. Boiler and Pressure Vessel Code and which holds a written examination similar to that required by Wisconsin.

- (d) The inspector shall appear before an examining board appointed by the Department of Industry, Labor and Human Relations to review his qualifications as an inspector.

Subsection Ind 41.11 (6) (Note) is amended to read:

Note: Blow-off equipment designed in accordance with the boiler blow-off equipment code issued by the National Board of Boiler and Pressure Vessel Inspectors, 1968 edition, will meet the requirements of this section. Other methods of designing blow-off equipment may be used if approved by the Department of Industry, Labor and Human Relations.

(Available for inspection at the office of the Department of Industry, Labor and Human Relations and the secretary of state's office and the office of the revisor of statutes or may be procured for personal use from the National Board of Boiler and Pressure Vessel Inspectors, 1155 North High Street, Columbus, Ohio.)

Section Ind 41.12 (1) and (Table 1) is repealed and recreated to read:

Ind 41.12; Vessels supplied through pressure reducing valves.

(1) The following formula shall be used for determining the sizes of safety and relief valves on pressure vessels such as pressure cookers, indirect hot water heaters, equipment in heating systems, etc., which are supplied through pressure reducing valves from boilers carrying a higher steam pressure. Where a pressure reducing valve is supplied by a boiler, the capacity of the safety valve or valves on the low pressure side of the system need not exceed the capacity of the boiler.

$$RVC = 1/3 \times OC \times VSPA$$

Where RVC = relief valve capacity, lbs. of steam per hour.

OC = orifice capacity, lbs. of steam per hour per sq. in. (See Table 1.)

VSPA = valve size pipe area, sq. in. (See Table 2.)

SEE TABLE NEXT PAGE

TABLE 2.--INTERNAL PIPE AREA

Nominal pipe size, inches	STANDARD		
	Actual external diameter, inches	Approx. internal diameter, inches	Approx. internal area, square inches
3/8 -----	0.675	0.49	0.19
1/2 -----	0.840	0.62	0.30
3/4 -----	1.050	0.82	0.53
1 -----	1.315	1.05	0.86
1-1/4 -----	1.660	1.38	1.50
1-1/2 -----	1.900	1.61	2.04
2 -----	2.375	2.07	3.36
2-1/2 -----	2.875	2.47	4.78
3 -----	3.5	3.07	7.39
3-1/2 -----	4.0	3.55	9.89
4 -----	4.5	4.03	12.73
5 -----	5.563	5.05	19.99
6 -----	6.625	6.07	28.89
8 -----	8.625	8.07	51.15
10 -----	10.750	10.19	81.55
12 -----	12.750	12.09	114.80

Note: In applying these rules, the area of the pipe is always based upon standard weight pipe and the inlet size of the pressure-reducing valve.



TABLE 1 ORIFICE RELIEVING CAPACITIES, POUNDS PER HOUR PER SQUARE INCH

Outlet pres., psig	Pressure-reducing valve inlet pressure, psig															
	400	350	300	250	200	175	150	125	100	85	75	60	50	40	30	25
250	21000	17100	10800	...	...	...	...	...	...	...	...	...	...	...	...	...
200	21350	18250	15350	10900	...	...	...	...	...	...	...	...	...	...	...	...
175	21350	18250	16000	12600	7250	...	...	...	...	...	...	...	...	...	...	...
150	21350	18250	16200	13400	9540	6750	...	...	...	...	...	...	...	...	...	...
125	21350	18250	16200	13600	10800	8780	6220	...	...	...	...	...	...	...	...	...
110	21350	18250	16200	13600	11000	9460	7420	4550	...	...	...	...	...	...	...	...
100	21350	18250	16200	13600	11000	9760	7970	5630	...	...	...	...	...	...	...	...
85	21350	18250	16200	13600	11000	9760	8480	6640	4070	...	...	...	...	...	...	...
75	21350	18250	16200	13600	11000	9760	8480	7050	4980	3150	...	...	...	...	...	...
60	21350	18250	16200	13600	11000	9760	8480	7200	5750	4540	3520	...	...	...	...	...
50	21350	18250	16200	13600	11000	9760	8480	7200	5920	5000	4230	2680	...	...	...	...
40	21350	18250	16200	13600	11000	9760	8480	7200	5920	5140	4630	3480	2470	...	...	...
30	21350	18250	16200	13600	11000	9760	8480	7200	5920	5140	4630	3860	3140	2210	...	...
25	21350	18250	16200	13600	11000	9760	8480	7200	5920	5140	4630	3860	3340	2580	1485	...
15	21350	18250	16200	13600	11000	9760	8480	7200	5920	5140	4630	3860	3340	2830	2320	1800
10	21350	18250	16200	13600	11000	9760	8480	7200	5920	5140	4630	3860	3340	2830	2320	2060
5	21350	18250	16200	13600	11000	9760	8480	7200	5920	5140	4630	3860	3340	2830	2320	2060

NOTE: The following formulas shall be used in connection with this table to calculate the required relieving capacity of safety valves installed on the low-pressure side of pressure-reducing valves. Use the formula that requires the larger relieving capacity.

$$W = \sqrt{\frac{1}{3}} AC \text{ or } W = \sqrt{\frac{1}{3}} A_1 C$$

- where:  $W$  = required safety valve relieving capacity.  
 $A$  = internal area of the pipe size of the pressure-reducing valve (use pipe areas of Table 2).  
 $A_1$  = internal area of the pipe size of the by-pass line around the pressure-reducing valve.  
 $C$  = orifice relieving capacity, pounds of steam per hour per square inch, for the given inlet and outlet pressures of the pressure-reducing valve (from this Table).

Note: Most pressure reducing valves are arranged with a valved bypass which also acts as a potential steam source hazard in case the bypass is left open.

Where such valved bypass is used, the following formula shall be used to determine the steam flow rate through the bypass.

$$RVC = 1/2 \times OC \times BPA$$

Where REVC = relief valve capacity, lbs. of steam per hour.

OC = orifice capacity, lbs. of steam per hour per square inch. (See Table 1.)

BPA = Bypass pipe area, sq. inch. (See Table 2.)

The larger of the relief valve capacities calculated by the above 2 formulas shall be used for selecting the relief valve for the vessel.

Example: Suppose a high pressure boiler operating at 125 psi distributes steam to a series of 40 psi A.S.M.E. constructed retorts through a 1-1/2 inch size pressure reducing valve provided with a glove-valved 1 inch bypass. Determine the proper A.S.M.E. relief valve protection for the retorts. Utilizing data in tables and the first of the 2 formulas above:

$$W = 1/3 \times 7200 \times 2.04 = 4896 \text{ lbs. steam per hour.}$$

Checking the bypass steam flow according to the second formula gives:

$$W = 1/2 \times 7200 \times 0.86 = 3100 \text{ lbs. steam per hour.}$$

The potential steam flow through the pressure reducing valve is 4896 lbs. per hour rated capacity or

$$4896 \times 1000 \text{ or } 4,896,000 \text{ BTU per hour.}$$

Section Ind 41.13 is created to read:

Ind 41.13 Maintenance.

(1) All boilers shall be installed and maintained in such a manner as to prevent excessive corrosion and deterioration.

(2) The inspector shall note conditions during internal inspection, external inspection, or hydrostatic pressure test and shall order such changes or repairs as will place the boiler in a safe working condition.

Note: Section VII, A.S.M.E. Boiler and Pressure Vessel Code "Recommended Rules for Care of Boilers" is an excellent guide for boiler owners and operators.

Section Ind 41.21 is repealed and recreated to read:

Ind 41.21 Vessels exempt from periodic inspections:

(1) The following boilers and pressure vessels will not be subject to periodic inspection, but in individual cases any such vessel will be subject to inspection by or on order of the department upon complaint of any person or upon initiative of the department when there is reasonable cause to suspect that the construction, installation, maintenance or operation of the vessel is not in keeping with the general purpose and intent of this code:

- (a) Boilers or pressure vessels which receive regular inspections by United States government inspectors.
- (b) Steam boilers or pressure vessels having an internal or external operating pressure not exceeding 15 psi with no limitations to size. Hot water boilers and their expansion tanks having an internal operating pressure not exceeding 30 psi with no limitations to size.
- (c) Boilers used exclusively for agricultural purposes.
- (d) Miniature boilers.
- (e) Pressure vessels having an inside diameter not exceeding 6 inches with no limitation to pressure.
- (f) Pressure vessels having a volume of less than 5 cubic feet and an operating pressure of less than 250 psi.

- (g) Pressure vessels with a volume of less than 1-1/2 cubic feet with no limit on pressure.
- (h) Pressure vessels which are used in accordance with the regulations of the U.S. Department of Transportation.
- (i) Air receivers having a volume not to exceed 12 cubic feet and an operating pressure of less than 225 psi.
- (j) Hot water supply boilers and hot water storage tanks.
- (k) Vessels used for the storage or processing of cold water including those with air cushions.

Section Ind 41.22 is repealed and recreated to read:

Ind 41.22 Preparation for internal inspection.

The owner or user of a boiler or a pressure vessel subject to inspection shall prepare the vessel for internal inspection after due notice from the inspector. To prepare a vessel for an internal inspection all manhole plates, all wash-out plugs, and a sufficient number of handhole plates to permit a satisfactory inspection shall be removed. The shell and heads shall be thoroughly cleaned and exposed when so requested. Each steam boiler shall be thoroughly drained of water and all fire side surfaces cleaned before an internal inspection is made.

Section Ind 41.23 is repealed and recreated to read:

Ind 41.23 Insurance company inspections.

(1) Periodic inspections of boilers and pressure vessels by insurance companies may be accepted by the Department of Industry, Labor and Human Relations under the following conditions:

- (a) The boiler and pressure vessel inspectors employed by the insurance company shall hold certificates of competency issued by the Department of Industry, Labor and Human Relations.

- (b) The insurance company shall report inspections of boilers and pressure vessels to the Department of Industry, Labor and Human Relations as required in section Ind 41.26.
- (c) The inspection procedures used by the insurance company shall conform to the regulations of this code.
- (d) The insurance company shall report to the Department of Industry, Labor and Human Relations within 30 days when insurance coverage is started or discontinued on a boiler or pressure vessel. The reason for discontinuing the coverage shall be given on the report.

Section Ind 41.24 is repealed and recreated to read:

Ind 41.24 Inspections by cities.

(1) Periodic inspections of boiler and pressure vessels by cities of the first class may be accepted by the Department of Industry, Labor and Human Relations under the following conditions:

- (a) The boiler and pressure vessel inspectors employed by the city shall hold certificates of competency issued by the Department of Industry, Labor and Human Relations.
- (b) The city shall keep a record of such periodic inspections.
- (c) The inspection procedures used by the city shall conform to the regulations of this code.

Section Ind 41.25 is repealed and recreated to read:

Ind 41.25 Companies or corporations allowed to make inspections.

(1) Periodic inspections by companies or corporations of boilers or pressure vessels which they own or operate may be accepted by the Department of Industry, Labor and Human Relations under the following conditions:

- (a) The boiler and pressure vessel inspectors employed by the company or corporation shall hold certificates of competency issued by the Department of Industry, Labor and Human Relations.
- (b) The company or corporation shall report inspections of boilers and pressure vessels to the Department of Industry, Labor and Human Relations as required in section Ind 41.26.
- (c) The inspection procedures used by the company or corporation shall conform to the regulations of this code.

Subsection Ind 41.26 (1) (Intro-par.) is amended to read:

Ind 41.26

(1) Reports of periodic internal or external inspections of boilers and pressure vessels shall be sent to the Department of Industry, Labor and Human Relations within 30 days from the date of the inspection.

Section Ind 41.27 is repealed and recreated to read:

Ind 41.27 Reporting of Inspection.

(1) An internal or external boiler inspection that conforms to periodic inspection requirements (Ind 41.20) shall be reported to the Department of Industry, Labor and Human Relations on inspection form SB 210 or National Board of Boiler and Pressure Vessel Inspectors standard form.

(2) A pressure vessel inspection that conforms to periodic inspection requirements (Ind 41.20) shall be reported to the Department of Industry, Labor and Human Relations on inspection form SB 209 or National Board of Boiler and Pressure Vessel Inspectors standard form.

- (a) Multiple Vessels on a Single Report. A group of pressure vessels of the same design and use that are interconnected or are operated so as to form a unit, machine, or apparatus may be included in a

single report. The report shall contain the number, description, and use of the vessel and shall be reported to the Department of Industry, Labor and Human Relations on inspection form SB 209 or National Board of Boiler and Pressure Vessel Inspectors standard form.

(3) The inspection report shall be legible and complete as possible. A manufacturer's data report of boiler or pressure vessel shall be available to inspector for first inspection.

Section 41.51 is repealed and recreated to read.

Ind 41.51 Wisconsin special vessels.

(1) Where it is not possible or practical to construct a boiler or pressure vessel in strict compliance with the A.S.M.E. codes listed in section Ind 41.50, the Department of Industry, Labor and Human Relations may grant a modification to the owner or user to permit the installation of the vessel as a Wisconsin special within the State of Wisconsin under the following conditions:

(a) When the method of designing or constructing the vessel is not covered by the A.S.M.E. codes, the department may approve the installation of the vessel if adequate proof of comparable safety of the design or construction is shown.

1. Complete plans, calculations, and specifications in duplicate shall be submitted to and approved by the department before the vessel is installed.

(b) When the vessel is to be built by an owner for his own use, the department may waive the stamping required by the A.S.M.E. codes listed in section Ind 41.50.

1. Complete plans, calculations, and specifications in duplicate

shall be submitted to and approved by the department before the vessel is installed.

(c) When a small number of vessels is to be built by a manufacturer, the department may waive the stamping required by the A.S.M.E. codes listed in section Ind 41.50.

1. Complete plans, calculations and specifications in duplicate shall be submitted to and approved by the department before the vessel is installed.

(2) The provisions of this section shall not apply to Wisconsin special vessels accepted by the Department of Industry, Labor and Human Relations before the effective date of this section.

Section Ind 41.52 is amended to read:

✓ Ind 41.52 U.S. Department of Transportation--Federal Highway Division.

Pressure vessels carrying the stamping of the D.O.T. will be considered comparable to a vessel meeting the requirements of section Ind 41.50. When such vessels are used in the State of Wisconsin, it shall be the responsibility of the owner of the vessels to have the construction records of the vessels available for inspection by the Department of Industry, Labor and Human Relations.

DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS

  
Stephen J. Reilly, Executive Secretary