

DEPT. OF INDUSTRY, LABOR & HUMAN RELATIONS 51
Ind 42

STATE OF WISCONSIN
DEPARTMENT OF INDUSTRY, LABOR AND HUMAN RELATIONS
SAFETY AND BUILDINGS DIVISION
201 East Washington Avenue
Post Office Box 7969
Madison, Wisconsin 53707

Record of Repair or Alteration
Completed on:

Power Boiler Wis. Reg. No. _____
Heating Boiler NB No. _____
Pressure Vessel Serial No. _____
Miniature Boiler Other _____

Mfd. by: _____

Work completed by contractor _____
(Name)

Address: _____
(Zip)

Located in the plant of _____
(Name of owner)

Address: _____
(Zip)

Description of repair: _____

(Use reverse side for sketch description of repair or alteration.)

Hydrostatic Test psi _____

Repair or alterations were made in accordance with the requirements of the Wisconsin Department of Industry, Labor and Human Relations, Wis. Adm. Code Chapter Ind 42. The welding was completed by _____

(Name of Welder and Social Security No.)
who has made the test requirements of said rules.

Signed by _____
(Welding Process) (Contractor Representative)

Dated _____
(Welding Procedure)

I, the undersigned, have inspected the work described in the report and state that to the best of my knowledge and belief, this work has been done in accordance with the requirements of Wis. Adm. Code Chapter Ind 42. By signing this certificate, neither the inspector nor the inspector's employer makes any warranty, expressed or implied, concerning the work described in this report. Furthermore, neither the inspector nor the inspector's employer shall be liable in any manner for any personal injury or property damage or loss of any kind arising from or connected with this inspection, except such liability as may be provided in a policy of insurance which the inspector's insurance company may issue upon said object and then only in accordance with the terms of said policy.

Authorized Inspector—Wis. Com. No. _____ Employed by _____

Date _____

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(a) *Exceptions.* The following items are exempt from the reporting requirements of Ind 42.01 (5):

1. The welded repair of tubes, or the alteration or replacement of tubes in boilers or pressure vessels;
2. Piping, nozzels, valves and fittings of 2-inch nominal pipe sizes and smaller.

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61; r. and recr., Register, May, 1974, No. 221, eff. 6-1-74; am. (1) and (2), cr. (3), Register, May, 1978, No. 269, eff. 6-1-78; r. and recr., Register, June, 1980, No. 294, eff. 7-1-80.

Ind 42.02 Hydrostatic test or nondestructive testing. If, in the opinion of the authorized inspector, a hydrostatic test is necessary, such a test shall be applied at a pressure of at least the operating pressure, but not to exceed 150% of the maximum allowable working pressure. In lieu of a hydrostatic test, if approved by the authorized inspector, radiographic testing, ultrasonic testing, or other applicable nondestructive testing of the repair may be utilized. Such tests shall be applied after the repair has been completed.

Note: Where water is used in a hydrostatic test, the temperature of the water should not be less than 70° F and the maximum temperature during inspection should not exceed 120° F. If a test is conducted at 1-½ times the maximum allowable working pressure (MAWP) and the owner specifies a temperature higher than 120° F, the pressure should be reduced to the (MAWP) and the temperature to 120° F for the close examination.

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61; r. and recr., Register, May, 1974, No. 221, eff. 6-1-74.

Ind 42.03 Design of riveted patches. **History:** Cr. Register, April, 1961, No. 64, eff. 5-1-61; r. Register, June, 1980, No. 294, eff. 7-1-80.

Ind 42.04 Material for riveted patches. **History:** Cr. Register, April, 1961, No. 64, eff. 5-1-61; r. Register, June, 1980, No. 294, eff. 7-1-80.

Ind 42.05 Welding procedure. Anyone undertaking repairs or alterations shall have available at the job site a written welding procedure specification acceptable to the authorized inspector that shall be followed in making the necessary repair and also a record of procedure qualification tests. Welding procedure specifications shall have been prepared and qualified in accordance with the requirements of section IX of the ASME code (table 41.10-A).

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61; r. and recr., Register, June, 1980, No. 294, eff. 7-1-80.

Ind 42.06 Welders. (1) **WELDER QUALIFICATIONS.** Anyone undertaking repairs or alterations shall have available at the job site records of welder qualification tests showing that each welder to be employed on the work has satisfactorily passed tests as prescribed in section IX of the ASME code (table 41.10-A).

(2) **WELDING TESTS; RESPONSIBILITY; INSPECTOR'S DUTY.** Preparation of welding procedure specifications and the conducting of tests of procedures and welders shall be the responsibility of the party undertaking repairs or alterations. Before repairs or alterations are started, it shall be the duty of the inspector to be satisfied by examination of the written welding procedure and records of qualification tests that procedures and welders have been properly qualified as required in section IX of the ASME code (table 41.10-A). Witnessing of the tests by the inspector

b. The depth of the repair shall not be greater than $\frac{3}{8}$ -inch or 10% of the base metal thickness, whichever is less, and the individual area shall not be greater than 10 square inches.

c. When the temper bead method is used, it shall require the approval of the department. The inspector shall assure that the method has been qualified in accordance with the guidelines of section IX of the ASME code (table 41.10-A).

3. *Method details.* a. Step 1. The weld area shall be preheated and maintained at a minimum temperature of 350° F during welding. The maximum interpass temperature shall be 450° F.

b. Step 2. The initial layer of weld metal shall be deposited over the entire area with $\frac{1}{8}$ -inch maximum diameter electrode. Approximately one-half the thickness of this layer shall be removed by grinding before depositing subsequent layers. Subsequent layers shall be deposited with a $\frac{5}{32}$ -inch maximum diameter electrode in a manner to ensure tempering of the prior beads and their heat affected zones.

c. Step 3. Heat input shall be controlled within a specified range.

d. Step 4. The weld area shall be maintained at a temperature of 400-500° F for a minimum period of 2 hours after completion of the weld repair.

(4) JOINTS BETWEEN AUSTENITIC STAINLESS STEELS. Postweld heat treatment is neither required nor prohibited for joints between austenitic stainless steels. It shall not be attempted except in accordance with the recommendations of the manufacturer of the material or the requirements of s. Ind 41.10.

Note: See ASME code, section VIII, division 1, paragraph UHA-105.

(5) PEENING. In lieu of postweld heat treatment of carbon steels, peening or other methods acceptable to the authorized inspector may be used.

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61; r. and recr., Register, June, 1980, No. 294, eff. 7-1-80.

Ind 42.14 Stress relieving operations. **History:** Cr. Register, April, 1961, No. 64, eff. 5-1-61; r. Register, June, 1980, No. 294, eff. 7-1-80.

Ind 42.15 Welded patches. (1) FLUSH OR BUTT WELDED PATCHES. (a) The weld around a flush patch shall be a full penetration weld and the accessible surfaces shall be ground flush where required by the applicable section of the ASME code (table 41.10-A). Flush welded patches shall be subjected to an appropriate nondestructive examination which shall be consistent with the original construction requirements. See Figure 9 for acceptable methods.

(b) In some situations it is necessary to weld a flush patch on a tube, such as when replacing tube sections and accessibility around the complete circumference of the tube is restricted, or when it is necessary to repair a small bulge. This is referred to as a window patch. Suggested methods for window patches are shown in Figure 10.

(2) LAPPED AND FILLET WELDED PATCHES. Lapped and fillet welded patches may be applied to stayed plates provided they are not exposed to radiant heat. Lapped and fillet welded patches may be applied on the

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pressure side of the sheet in unstayed areas, provided the maximum diameter of the opening so repaired does not exceed 16 times the thickness of the plate, but in no case larger than 8 inches in diameter. See Figure 11 for acceptable methods.

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61; am. (2), Register, May, 1974, No. 221, eff. 6-1-74; r. and recr., Register, June, 1980, No. 294, eff. 7-1-80.

Ind 42.16 Stays. Threaded stays may be replaced by welded-in stays provided that, in the judgment of the inspector, the plate adjacent to the stayhold has not been materially weakened by wasting away. All requirements of the ASME code (table 41.10-A) governing welded-in stays shall be met, except that stress relieving other than thermal may be used as provided in s. Ind 42.13.

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61; r. and recr., Register, June, 1980, No. 294, eff. 7-1-80.

Ind 42.17 Additional acceptable repair methods. Repairs and repair methods not covered in this chapter may be used if acceptable to the inspector. Some additional methods are illustrated in Figures 12 and 13.

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61; r. and recr., Register, June, 1980, No. 294, eff. 7-1-80.

(2) The requirements of s. Ind 42.01 (2) (b), (c) and (d) shall be met and an alteration report shall be submitted in accordance with s. Ind 42.01 (5).

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61; r. and recr. Register, June, 1980, No. 294, eff. 7-1-80.

PART IV

SECONDHAND VESSELS—PORTABLE BOILERS

Ind 42.25 Application. Sections Ind 42.25 through Ind 42.33 shall apply to secondhand boilers, secondhand pressure vessels installed after July 1, 1960 on which both the ownership and location were changed, and shall also apply to portable boilers (See Ind 42.33).

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61; am. Register, May, 1974, No. 221, eff. 6-1-74.

Ind 42.26 Code constructed vessels. Secondhand vessels which were constructed and stamped according to some edition of the ASME Boiler and Pressure Vessel Code or other recognized pressure vessel codes acceptable to the department may be installed and operated at or below the working pressure stamped on the vessel.

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61; am., Register, May, 1974, No. 221, eff. 6-1-74; am., Register, June, 1980, No. 294, eff. 7-1-80.

Ind 42.27 Existing vessels. Secondhand boilers which were constructed and installed in Wisconsin under the provisions of ss. Ind 41.60 through Ind 41.99 may be reinstalled if the working pressure is recalculated with a factor of safety of 6. Secondhand pressure vessels which do not meet the requirements of Ind 42.26 may be reinstalled if the working pressure is recalculated with a factor of safety of 6, using Ind 41.63 through Ind 41.65 and Ind 41.71 through Ind 41.75 for such calculations.

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61; am., Register, May, 1974, No. 221, eff. 6-1-74.

Ind 42.28 Vessels from out of state. Secondhand vessels from out of state shall meet the requirements of s. Ind 42.26. A copy of the manufacturer's data report shall be furnished to the department for each vessel indicating that it was manufactured originally to the requirements of an earlier edition of the applicable ASME code. If a vessel has been repaired or altered since its fabrication, a copy of the manufacturer's data report, welded repair report or alteration report shall be furnished to the department.

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61; am., Register, June, 1980, No. 294, eff. 7-1-80.

Ind 42.29 Lap seam boilers. Second hand boilers which have lap seam construction and which are larger than 36 inches in diameter shall be limited to a maximum allowable working pressure of not more than 15 pounds per square inch.

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61.

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Ind 42.30 Prohibited boilers. The installation of second hand boilers which have the longitudinal joint exposed to the intense heat of the furnace is prohibited.

Note: The locomotive or inside welt strap will not be considered as strengthening or changing the original type of boiler joint.

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61.

Ind 42.31 Inspection and testing. (1) Every secondhand vessel shall be inspected and given a hydrostatic pressure test at one and one-half times the working pressure at its new point of installation location before it is placed in operation. The test shall be witnessed by an authorized inspector.

(2) When the department determines that a hydrostatic test at one and one-half times the working pressure is not possible or desirable, the department may accept alternate means to determine if the vessel is safe for its intended use.

Note: Where water is used in a hydrostatic test, the temperature of the water should not be less than 70° F and the maximum temperature during inspection should not exceed 120° F. If a test is conducted at 1-½ times the maximum allowable working pressure (MAWP) and the owner specifies a temperature higher than 120° F, the pressure should be reduced to the (MAWP) and the temperature to 120° F for the close examination.

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61; am. (1) (intro.), (2) and (3), Register, May, 1974, No. 221, eff. 6-1-74; r. and recr., Register, June, 1980, No. 294, eff. 7-1-80.

Ind 42.32 Installation. All secondhand pressure vessels exclusive of vessels used for the storage and transportation of liquefied petroleum gases, anhydrous ammonia, and all refrigerant containing vessels when reinstalled shall comply with the ASME codes listed in s. Ind 41.10 in regard to fittings, appliances, valves, connections, settings and supports. (The excluded vessels are subject to the provisions of other applicable administrative codes.)

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61; am., Register, May, 1974, No. 221, eff. 6-1-74.

Ind 42.33 Portable boilers. A portable boiler, when brought into this state for use, shall be given the inspection and test specified in s. Ind 42.31 and the allowable working pressure shall be calculated using ss. Ind 41.60 through Ind 41.99 unless it meets either of the following requirements:

(1) The boiler was constructed and stamped according to s. Ind 42.26 code constructed vessels.

(2) The boiler is insured by a boiler insurance company.

History: Cr. Register, April, 1961, No. 64, eff. 5-1-61.

PART V

INSPECTION AND REPAIR OF PRESSURE VESSELS IN PETROLEUM REFINERIES

Ind 42.35 Application. Sections Ind 42.35 through Ind 42.63 shall apply to the inspection, repair, evaluation for continued use, and the meth-