

STATE OF MICHIGAN



JOHN ENGLER, Governor

DEPARTMENT OF ENVIRONMENTAL QUALITY

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HOLLISTER BUILDING, PO BOX 30473, LANSING MI 48909-7973

INTERNET: www.deq.state.mi.us

RUSSELL J. HARDING, Director

REPLY TO:

DRINKING WATER & RADIOLOGICAL
PROTECTION DIVISION
3423 N MARTIN L KING JR BLVD
PO BOX 30630
LANSING, MI 48909-8130

December 5, 2000

TO: Water Well Drilling Contractors
Pump Installers

FROM: Michael S. Gaber, Chief
Well Construction Unit
Ground Water Supply Section
Drinking Water and Radiological Protection Division

SUBJECT: Electrical Code Requirements for Water Well Pump Installations

As a service to the water well industry, the attached summary of state electrical code requirements that apply to water well pump installations is provided. The Electrical Division, Bureau of Construction Codes, Department of Consumer and Industry Services assisted our agency with its preparation.

Permit requirements, material specifications, and procedures that well drillers and pump installers need to follow to comply with the Michigan Electrical Administrative Act (1956 PA 217) and electrical code are covered.

If you have any questions, please contact me.

MSG:ckp

Enclosure

cc: Tom Kriegish, Chief, Electrical Division, DCIS
Local Health Departments

ELECTRICAL CODE REQUIREMENTS FOR WELL & PUMP INSTALLATIONS

Introduction

The electrical wiring of a water well and pump installation is regulated by the Michigan Electrical Administrative Act (MEAA) (1956 PA 217) for licensing and exceptions, rather than the Michigan Water Well Construction and Pump Installation Code (Part 127, 1978 PA 368). Registered Water Well Drilling and Pump Installation Contractors are exempt from having an electrical license for residential single-family installations only.

Local and state electrical inspectors have authority for enforcement of electrical code provisions. Local health department officials who inspect water wells should refer electrical code violations to the electrical inspector or building official having jurisdiction.

Permits for the electrical circuit for the pump are required to be obtained from the electrical code official. Permits may be obtained by registered well drillers and pump installers.

Electrical hook-ups for water wells serving the public and all other wells that do not serve a single-family dwelling (such as agricultural irrigation wells, fire protection wells, and nonpotable industrial wells) must be performed by a licensed electrical contractor.

The MEAA and the state electrical code are implemented by:

***Michigan Department of Consumer and Industry Services
Bureau of Construction Codes
Electrical Division
2501 Woodlake Circle, Second Floor
Okemos, MI 48864
(517) 241-9320***

Mailing Address: P.O. Box 30254, Lansing, MI 48909

Michigan's electrical code is the National Electrical Code 1999, with special Michigan amendments. The NEC 1999 and NEC Handbook 1999 are available from the National Fire Protection Association, Batterymarch Park, P.O. Box 9146, Quincy, MA 02269-9959, phone 1-800-344-3555.

The following electrical code requirements apply to a typical submersible pump installation at a single-family dwelling.

I. Electrical cable from submersible pump to wellhead:

- A. Cable Material: Type UF with surface marking of "submersible water pump cable" or "pump cable."
- B. Cable protection: The cable inside the casing shall be protected from damage by the use of cable guards, or by securely attaching the cable to the drop pipe.

II. Underground electrical cable from well to house:

- A. Cable Material:
 - 1. Direct bury - Type UF or USE.
 - 2. Inside a raceway or conduit - Type RHW, TW, THW, THHW, THWN, XHHW, or ZW.
- B. Conduit Raceway:
 - 1. The electrical cable or wiring on the outside of the casing shall be protected by a rigid conduit from the well cap/seal to a point belowgrade.
 - a. The rigid conduit must be securely attached to the well cap/seal and must extend belowgrade to the minimum depth required for the cable (See #3 below).
 - b. The rigid conduit must be provided with an electrical bushing or fitting at the point where the cable enters and leaves the conduit. This bushing or fitting protects against cable damage due to abrasion.
 - 2. Types of conduit approved for submersible pump installations:
 - a. Rigid Metal Conduit - must be galvanized.
 - b. Rigid Nonmetallic Conduit - must be grey (color designated for electrical components) PVC plastic, schedule 40 or 80.
 - c. Intermediate Metal Conduit

3. Minimum depth of bury:

<u>Feeder/raceway type</u>	<u>depth</u>	<u>Minimum</u> <u>of bury</u>
Direct bury cable w/no raceway		24
inches		
Rigid metal conduit from well to building		6
inches		
Rigid nonmetallic conduit from well to building		18
inches		
Any of the above under a driveway or parking area ..		18
inches		

4. Splices and taps - Direct bury conductors or cables, when underground, shall be permitted to be spliced and tapped without the use of splice boxes. The splices and taps shall be made by approved methods and with identified materials.

III. **Cables under a building:** - Underground cables under a building must be installed in a raceway.

IV. **Cables through a foundation or basement wall:**

A. Type UF cable shall not be embedded in poured cement, concrete, or aggregate.

B. The cable must be protected from damage by the use of rigid conduit with approved bushings. The conduit shall be sealed after cable installation to prevent the passage of moisture through the conduit.

V. **Cable from the foundation or basement inside wall to the first point of attachment in the building:**

A. The cable must be enclosed in conduit. The conduit may be any one of the following types:

1. Intermediate Metal Conduit
2. Rigid Metallic Conduit
3. Rigid Nonmetallic Conduit
4. Electrical Metallic Tubing
5. Flexible Metallic Tubing
6. Flexible Metal Conduit
7. Liquidtight Flexible Metal Conduit
8. Liquidtight Flexible Nonmetallic Conduit

B. The conduit shall be used only with those types of fittings identified for such use.

VI. Grounding Requirements:

- A. Submersible pumps - The frame of the submersible pump motor must be bonded to the equipment grounding conductor installed with the branch circuit.
- B. Steel casing with submersible pump.
 - 1. Where a submersible pump is used in steel well casing, the well casing shall be bonded to the pump circuit equipment grounding conductor.
 - 2. The casing may be grounded by one of the following methods:
 - a. With the use of a "U" bolt type electrical grounding clamp (a water bond clamp) on the outside of the casing. The ground wire extends from the grounding clamp into the conduit on the outside of the casing and then into the well cap for bonding to the branch circuit equipment grounding conductor. An inhibitor paste should be used on the grounding clamp and casing at the bonding location to prevent corrosion,

OR

- b. For those pitless adapters using a support pipe hanging from the top of the casing, a grounding lug may be tapped into the support bridge resting on the top edge of the casing. The ground wire would extend from the grounding lug in the bridge to the equipment ground wire.
 - 3. Clamp-on saddle type pitless adapters should not be used as the point of attachment (bonding) for the casing grounding conductor. Dielectric corrosion may cause failure of the pitless adapter "U" bolt or damage to the saddle of the adapter.
 - 4. Holes **shall not** be drilled into the casing wall for grounding lug installation. Drilling a hole in the well casing violates R 325.1627 of Part 127, 1978 PA 368.
- C. Metal well cap/seals - Where a submersible pump is used, and the well cap/seal is metal, the cap/seal shall be grounded as follows:
 - 1. The grounding conductor shall be installed such that the cap can be loosened and removed without disconnecting the grounding conductor.
 - 2. A grounding lug shall be provided on the inside of the well cap. The grounding lug shall be aluminum or copper.

3. The well cap/seal grounding conductor shall be bonded to one of the following:
 - a. The pump circuit equipment grounding conductor.
 - b. The equipment grounding bus of the panelboard supplying the submersible pump.
 - c. A steel casing which has been grounded as required in VI-B above.