



MICHIGAN DEPARTMENT OF  
ENVIRONMENT, GREAT LAKES, AND ENERGY

## Water Well Construction and Disinfection

Small Systems Training 2020

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## Types of Drilled Wells

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## Rotary Rig

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## CABLE TOOL RIG



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## AUGER RIG



Solid Stem



Hollow Stem



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## Plastic (PVC) Well Casing



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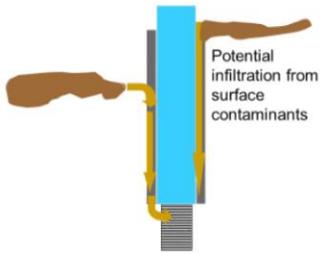
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## Well Grouting



UngROUTED wells may have contaminants travel down the casing and contaminate the water supply

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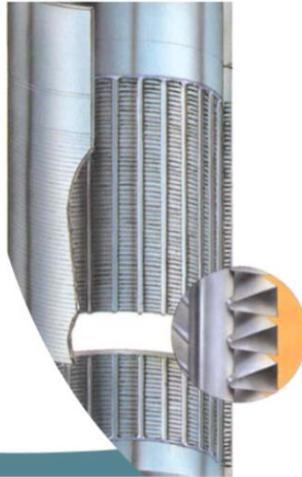
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## Screens

- Maximize % open area
- Non-clogging openings
- Corrosion resistance
- Collapse strength



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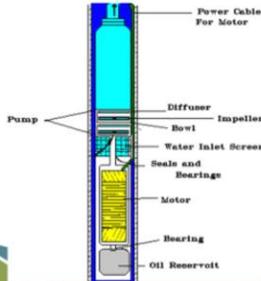
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## Typical Submersible Pump / Motor



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## Approved Installation



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## Hope this cap is vermin-proof!



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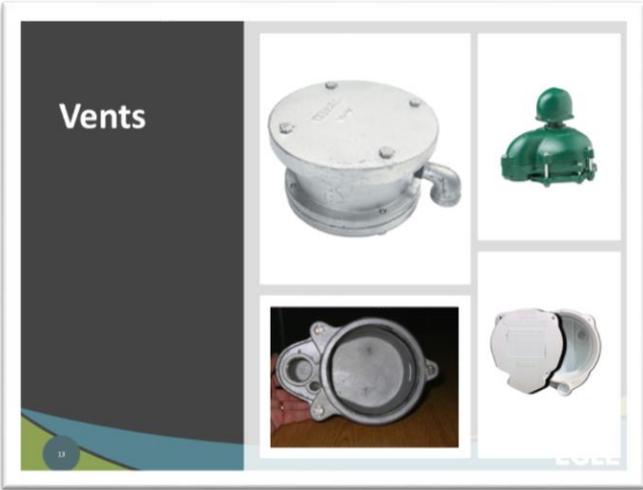
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**Well Isolation Distances**

**800 FEET**  
Private

**800 FEET**  
Type IIb & Type III

**2,000 FEET**  
Type I & Type IIa

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**Well Isolation Distances**

**300 FEET**  
Private

**300 FEET**  
Type IIb & Type III

**300 FEET**  
Type I & Type IIa

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## Well Isolation Distances



**50 FEET**

Private

**75 FEET**

Type IIb & Type III

**200 FEET**

Type I & Type IIa

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**WELL  
DISINFECTION**

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## Disinfection Process

- Water supply preparation
  - sanitary completion of new well,
  - cleaning of existing wells,
  - proper development of new wells.
- Thorough flushing of the water supply.
- Treatment with a properly prepared chlorine solution.
- Collection and analysis of water samples.



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## Disinfection Objectives

To destroy microbiological contaminants introduced during drilling, or from alterations or repairs

- Water system
  - well casing
  - water bearing formation around well screen or rock borehole
  - pressure tank
  - distribution system piping



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## Disinfection Considerations

- Depth & diameter of casing
- Type of well: drift or rock
- Well casing encrusted
- Drawdown seals present
- Pitless adapter & pump type
- Bailing needed



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## Existing Well Construction

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## Flushing

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## Screen Rehabilitation



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## Contact/Time (CT) Relationship

Amount of Chlorine Added to 100 Gallons of Water			
Chlorine Concentration (Parts per Million)	Gallons of 5.25% Sodium Hypochlorite (Liquid Bleach)	Pounds of Dry Calcium Hypochlorite (Granular)	Minimum Contact Time
50 ppm	1 2/3 cups	1/5 cup	20 hr
100 ppm	3 1/3 cups	2/5 cup	10 hr
250 ppm	6 2/3 cups	4/5 cup	4 hr
500 ppm	1 gal	0.70 lbs	2 hr
1000 ppm	2 gal	1.40 lbs	1 hr

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## Factors in Effective Disinfection

### Controllable

- Concentration
- Contact Time
- pH

### Uncontrollable

- Temperature
- Interfering Substances

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## Disinfection Methods Comparison

Method	Simple	Bulk Displacement
Who	Single Family Well	Well drilling contractor
What is disinfected	Distribution system only	Distribution system AND well casing, screen, filter pack, open borehole, surrounding formation.
Process	Straight chlorine or a small solution poured into top of well.	100s of gallons of solution are pumped deep into the well.

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## Problem Wells

- How much & what type of chlorine was used
- Did the chlorine get circulated properly
- Was the water used when it shouldn't have been
- Does the well have construction defects
- Is there crud in the well that didn't get removed prior to disinfecting
- Are there water treatment devices
- Are there packers, seals or other items



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## Who can legally disinfect wells

Activity	Driller	Pump Installer	Licensed Master Plumber	Certified Operator
Drill wells	Yes	No	No	No
Plug wells	Yes	No	No	No
Install pumping equipment	Yes	Yes	Yes	No
Disinfect wells	Yes	*No	*No	No



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Michigan Department of  
Environment, Great Lakes, and Energy

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