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GUIDELINES FOR MILKROOMS AND BULK TANK INSTALLATIONS

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ABSTRACT

This guideline provides useful information pertaining to milkrooms and bulk tank installations. The major areas of functional planning, construction details, and equipment and utilities are covered.

PREFACE

This guideline was prepared by the joint efforts of the Farm Buildings and Equipment Task Force and Plant Equipment and Procedures Task Force under the subcommittee leadership of Mike Brugger. This Guideline replaces DPC 6, **Bulk Tank Milkrooms** and DPC 13, **Bulk Milk Tank Installation**. The 1996 Revision was prepared jointly by the Farm Buildings & Equipment Task Force and the Milking Systems & Procedures Task Force with Dr. Mike Brugger, lead author.

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Milkroom and Bulk Tank Installations

FUNCTIONAL PLANNING

Introduction

This guideline addresses the design of milkrooms and installation of bulk tanks on the dairy farm. The milkroom, sometimes called the tank room or milkhouse, is the room that houses the milk bulk tank or the portion of the tank with the filling and emptying ports. The milking machine washing vats, tank washer, and related equipment are usually in this room.

The guideline provides layout information, construction suggestions, heating and cooling information, and construction options. As you begin the design process, contact your local milk inspector or regulatory official for specific information and assistance in obtaining approval for installation.

The layout and size of the milkroom is based on the amount and type of equipment installed in the room and the clearances required around the equipment. Bulkheading the bulk tank into the milkroom will substantially reduce the room size. On dairies with free stall housing and milking parlor, the milkroom is part of the total milking center.

Use and Location

SANITARY REGULATIONS[1]

> *A milkhouse or room of sufficient size shall be provided, in which the cooling, handling, and storing of milk and the washing, sanitizing, and storing of milk containers and utensils shall be conducted: except as provided for in Item 12r.*
>
> *The milkhouse shall be used for no other purpose than milkhouse operations...(5r).*
>
> *...Only articles directly related to milkroom activities shall be permitted in the milkroom. The milkroom shall be free of trash, animals and fowl.(6r)*

Usage and Accessibility

A milkroom should be used only for cooling and storing milk, and for cleaning and storing milking utensils. All other activities associated with the milking operation should be in other room(s). Other activities include storage of cleaning supplies, inflations, repair parts, and equipment supplies; utility services; refrigeration equipment; vacuum pump(s); water heater; etc. The use of separate room(s) for storage and support equipment will reduce the size of the milkroom and make keeping the milkroom clean easier.

The milkroom must be located for easy access to the milking operations and for easy access by the bulk tank truck that is often an over-the-road semi-trailer. A location and road for drive through with out backing is desired. Provide for easy entry to the milkroom by the bulk tank driver.

[1]All Sanitary regulations in this publication have been quoted from the Grade "A" Pasteurized Milk Ordinance (PMO), 1995 Revision, Recommendations of the U. S. Public Health Service/Food and Drug Administration. The references come from Section 7 pertaining to the Raw Milk Requirements or from the Appendix of this Code. Specific state or local regulations may differ from these. Milk suppliers under the Interstate Milk Shippers Program must comply with the PMO Sanitary Regulations.

Driveways

The driveway must provide easy access for the bulk truck. The driveway width, turn radius and construction may have to accommodate large semi-trailers. Considerations for a good driveway include the following:

1. Construction: Divert all surface and sub-surface water by means of ditches and/or tile drains. Remove top soil before installing the road material. Depending on the soil type, a base of 10 to 12 inches of gravel or crushed stone should be used. Large 2-3" crushed stone is preferred. Install the base in layers no more than 6" thick. Roll the material well before adding the next layer. The surface 2 - 4 inches should be smaller crushed stone with fines that will harden upon wetting and compaction. If bank-run gravel is used, the largest stones should be no greater than about one inch if the surface is to be left untreated. The gravel should contain 10 - 15 percent silt clay for good compaction. Crown the center for good drainage.

2. Curves and turn-around: Construct these areas large enough for a semi-trailer to maneuver, with approximately 50 foot radii. Where possible, provide a loop drive to avoid any backing. Where backing is required, avoid obstacles that impair vision.

3. Grade: Provide the most level grade possible for the truck to park while loading.

4. Length: Specific length is not too important. Consider the ability for maintenance and snow removal. Make long drives wide enough for vehicles to pass.

Elevations

Entrance to the milkroom at grade level provides for easy access and lower maintenance. The bulk milk tank truck pump is capable of lifting milk 6 to 10 feet so a driveway may be higher than the milkroom floor. However, this results in one to two gallons of milk in the hose that cannot be drained to the pump.

The milkroom floor should be close to the floor level of the barn or parlor to facilitate moving milking utensils. Curbs at doorways help control floor wash water.

Miscellaneous Considerations

Consider the ease of installing the milking equipment, relationship of other rooms and the ability to keep the milkroom clean. A separate equipment room for vacuum pumps and refrigeration equipment keeps the dirt and heat away from other items. A separate storage area keeps supplies clean and away from the dirt and heat. A restroom and office or break area can help with employee morale and comfort.

Since the milkroom location can affect the total farmstead layout, plan for future expansion before starting construction. Herd expansion may require an additional or larger bulk tank and related equipment. Also, consider room for the additional animals, feed storage and handling and manure storage and handling should be considered.

Size and Location

SANITARY REGULATIONS

> *Milkhouses should be large enough to provide adequate space to meet present needs and should take into account the prospect of future expansion. Installed milkroom equipment should be readily accessible to the operator. Aisles should be at least 30 inches wide, with added allowance at the outlets of bulk cooling/holding tanks, adjacent to wash and rinse vats and where operational conditions warrant. It is especially important that the space available to bulk cooling/holding tanks and CIP systems be adequate to permit their disassembly, inspection and servicing. (PMO Appendix B)*

Tank Installation

Install stationary tank rigidly without the use of removable blocks or shims under the legs. If a tank is not permanently mounted, the correct position shall be clearly and permanently marked.

Clearances for Bulk Tanks

Space around a bulk milk tank is needed for calibration, measuring and removing milk, cleaning, maintenance and inspection. Minimum clearances around a bulk tank are given in Table 1. Measure clearances from a permanently attached platform or an accessory fitting that extends the entire width or length of the tank or from the body of the tank without platforms or accessory fittings to the wall ceiling, floor or any fixed equipment. A single manhole cylindrical tank could be installed against the wall with the back end sealed with a watertight joint. Obtain prior approval from regulatory agency. A minimum of 32 inches of ceiling clearance is recommended, but more space is necessary with large tanks.

The National Bureau of Standards, Handbook 44, requires sufficient clearance over the measuring rod to completely remove and reinsert the rod in a vertical position without the rod touching any part of the building or structure. A recessed area above the measuring port can be constructed instead of raising the entire ceiling height.

Large cylindrical tanks can be bulkheaded into another room or the outdoors. This approach keeps the milkroom small that allows easier cleaning and removes the temptation to store items in the milkroom. A design that minimizes traffic through the milkroom will also aid in keeping the room clean. Vertical tanks may be used for large operations.

Table 1. Minimum bulk tank clearances.

Clearance around Bulk Milk Tanks	Distance and Direction
On wash vat side	3 feet horizontally
On cleaning side	3 feet horizontally
On other side or sides	2 feet horizontally
To vertical wall in 2-level milkroom	9 inches horizontally
To floor drain (not under tank)	18 inches horizontally
To ceiling	32 inches vertically
To floor: beneath rounded tanks	
greater than 72 inches in diameter	8 inches vertically
beneath flat bottom tanks	6 inches vertically or tank mounted & seal on a slab*
beneath other rounded tanks	4 inches vertically

*If a flat bottom tank is mounted on a slab or island, the base of the tank shall be sealed to the mounting surface.

Bulkheading Tanks

1. The manhole and vent must be located inside the milkroom.

2. Motors and agitator shafts must be properly protected when mounted outside the milkroom. Note: A change of lubricant is needed by some motors when installed outside.

3. The portion of the tank mounted outside should be in a clean area not accessible to livestock.

4. Provide adequate leg support below frost line when the tank is mounted outside.

5. Provide a lintel over the tank when the tank passes through a load-bearing wall. Tank should not be used for support.

6. The tank should not rest upon the wall through which it passes. For proper calibration, full support of a tank should be distributed to its legs.

7. The walls should be tightly sealed around the tank.

8. Single manhole tank installations require a permanently installed light[1] which can be extended through the manhole to illuminate the interior of the tank for inspection and special maintenance. This light shall be of a waterproof and shatterproof type and shall be rated as suitable for use under damp conditions.

9. Protective posts or other barriers are recommended around the exterior portion of a bulkheaded tank if vehicle or other equipment traffic will be near the tank.

10. The tank shall be equipped with an appropriate receptacle to accommodate the temperature-sensing element of an approved recording thermometer. The receptacle shall be so located that the bulb of temperature sensing element permits registration of the product temperature when the tank contains no more product than 10% of its capacity and shall be located so that the sensing element is not influenced by the cooling medium.

11. Where necessary, bulkheaded tanks should be protected from milkhouse roof run off.

12. A protective roof over the tank may be considered.

Platforms and Ladders

1. Platforms and ladders should be of hot dipped galvanized metal or other non-corrodible material. All single manhole tanks over 44 inches high, as measured from the floor to the top of the manhole flange, must have a platform at the manhole end of the tank. There shall be at least two feet of clearance around the outlet valve. Platforms shall be a minimum of 12 inches wide.

2. Ladders with flat steps, OSHA approved, permanently and securely attached to outside of tank or floor in the final installation will be acceptable instead of platforms.

3. A convenient means for access to the tank interior shall be provided. Tanks exceeding 48 inches in interior depth shall be provided with a ladder of non-corrodible material that can be inserted into the tank to facilitate access for inspection and special maintenance. Such ladders shall be provided with appropriate protection to prevent damage to the surfaces of the tank. These ladders shall be stored in the milkhouse off the floor.

Equipment and Arrangement

Ceiling height should allow the raising of any covers to a normal open position and the convenient inspection and cleaning of the interior of the tank. Whenever the ceiling height does not permit the removal of the measuring stick, an enclosed aperture at least 16 inches in diameter or width should be provided in the ceiling to allow for removal of measuring stick. Tanks with a capacity greater than 2,000 gallons must be equipped with an external gauge.

Washing, storage and auxiliary equipment within a milkroom includes wash vat or vats, a hand sink, and milking equipment storage racks or cabinets. The milk receiver, milk pump and in-line plate cooler are also

[1] The State of Maryland accepts portable tank inspection lights.

normally in a milkroom but the water heater, compressor, water pump, and water softener should be located in a utility room.

Avoid pipe, electrical or other lines over the bulk tank, especially over any tank manhole or opening. A milkroom can be arranged with washing and storage along the wall parallel to the bulk milk tank. This equipment and storage usually requires a space 2 feet wide and the length of the bulk tank. If the washing and storage area is at the end of the milkroom, a longer and narrower milkroom may be used.

Auxiliary Equipment and Utility Room

Additional rooms for equipment and storage are recommended. The vacuum pump(s), refrigeration equipment, water heater and similar equipment should be in one room. This room requires good ventilation to reduce heat buildup from the equipment. Storing supplies, milker inflations and repair parts in a separate room keeps them from being exposed to high temperatures. Include a refrigerator for storing of medicine and other items that require cool storage.

A toilet, hand sink and shower might be located nearby to minimize the plumbing. If not included now, plan the facilities for future expansion to provide these spaces.

Submit these plans along with the application for a bulk milk tank to the local sanitarian before any construction is started.

FIGURE 1 IDEAS FOR MILKROOM LAYOUT.

Fig. 1-a

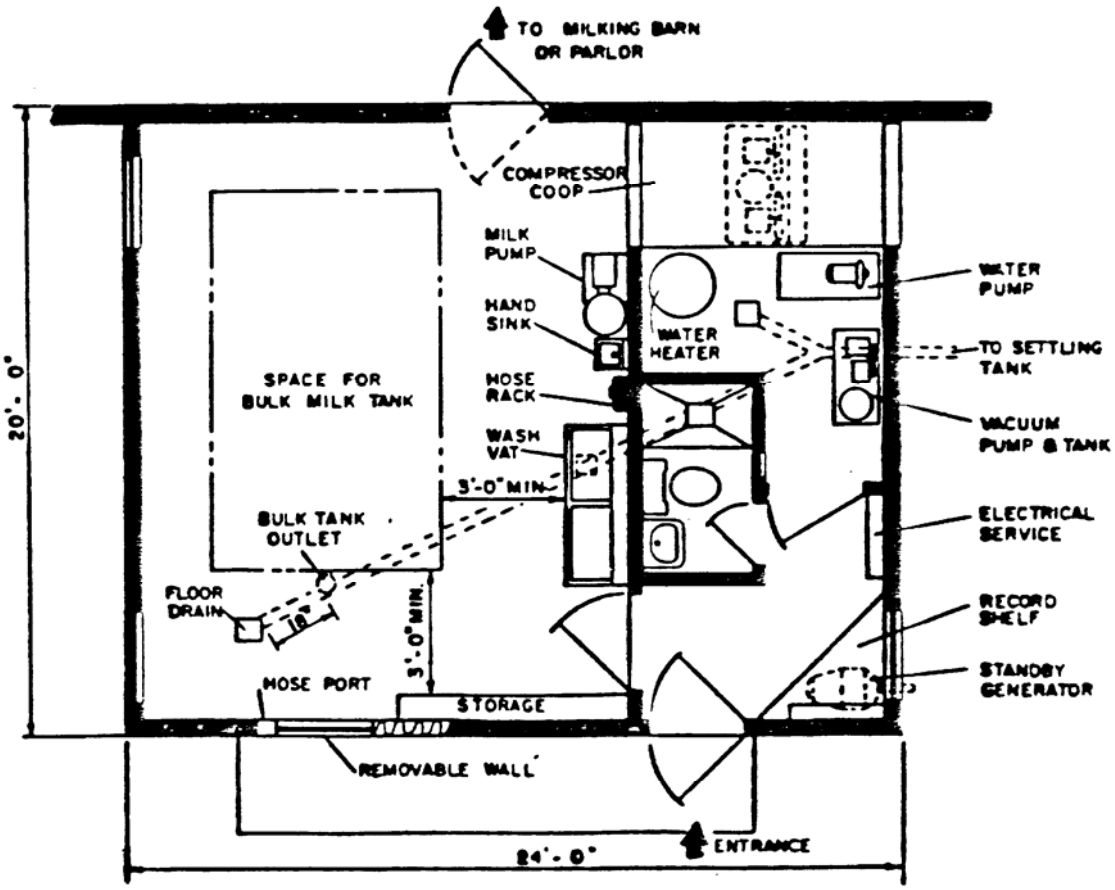


Fig. 1-b

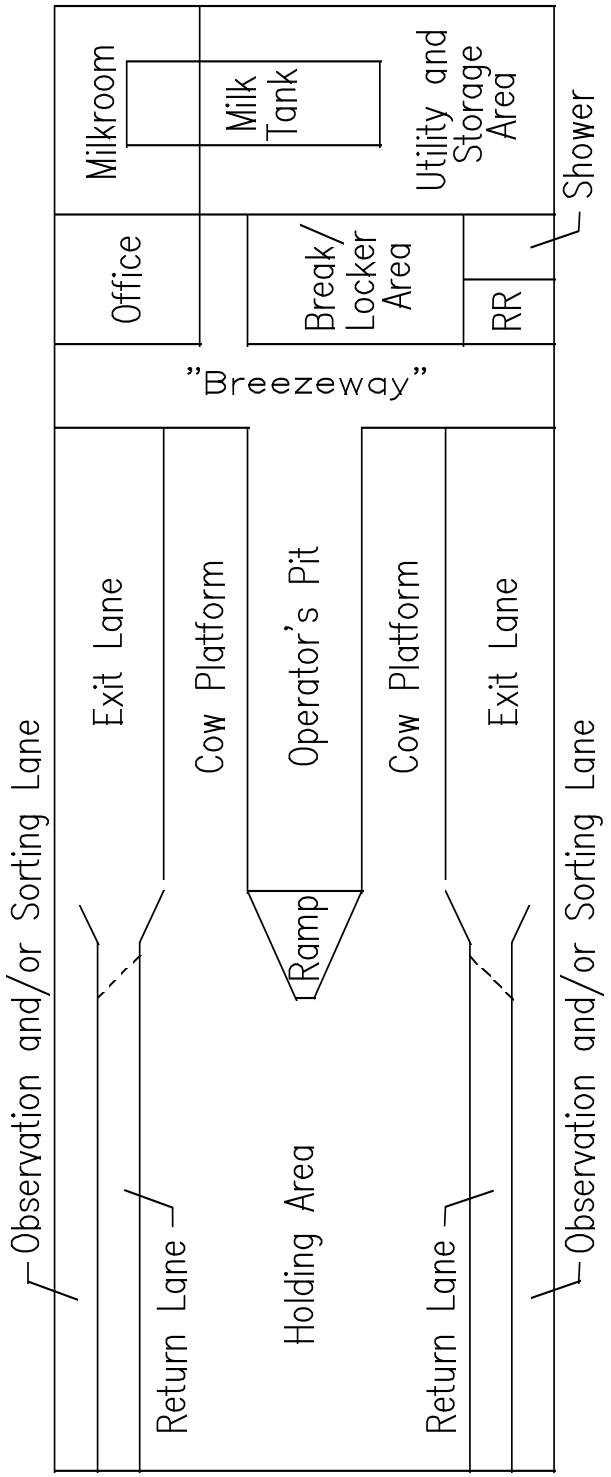
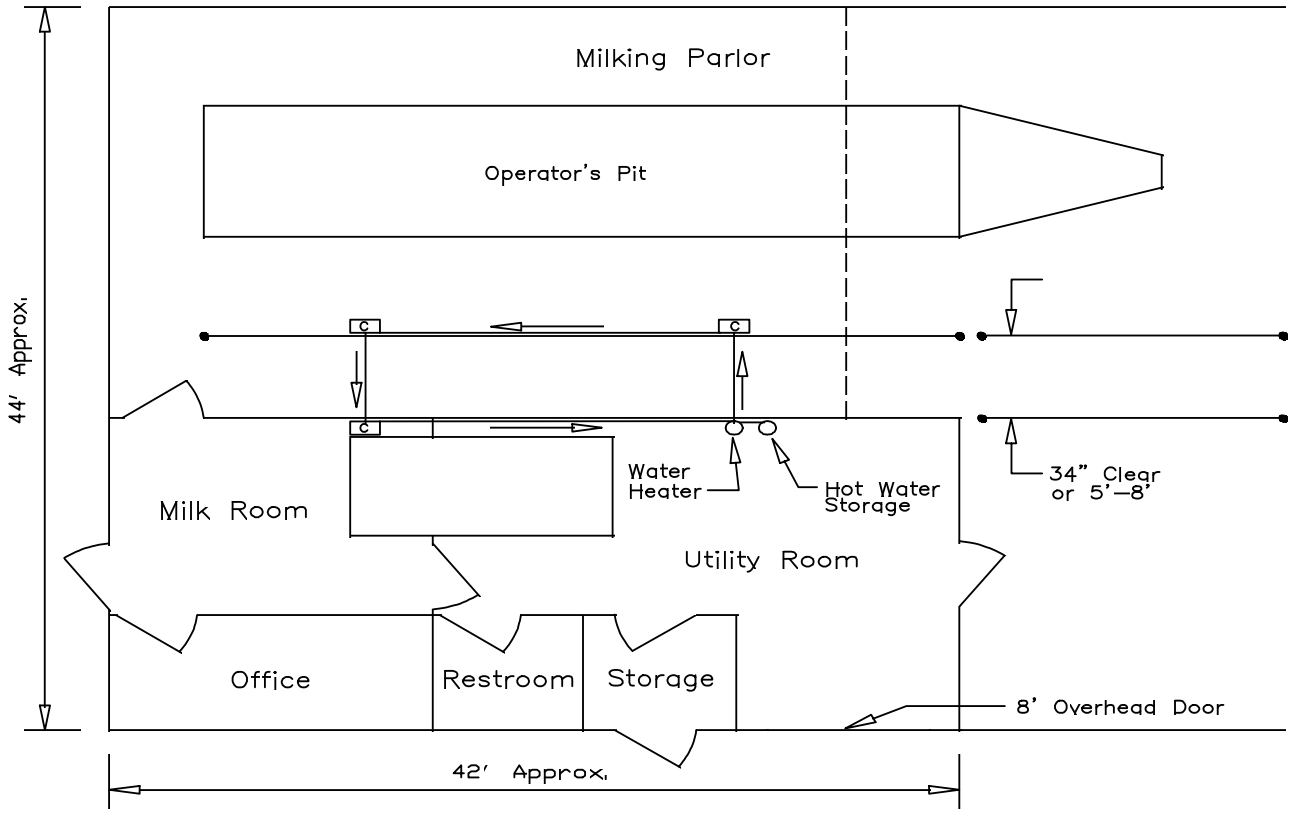

Milkroom
Milk Tank
Utility and Storage Area
Shower
Office
Break/ Locker Area
RR
"Breezeway"
Observation and/or Sorting Lane
Exit Lane
Cow Platform
Operator's Pit
Cow Platform
Exit Lane
Observation and/or Sorting Lane
Ramp
Return Lane
Holding Area
Return Lane

Fig. 1-c

Milkroom Layout With Hot Water Central Heating System



CONSTRUCTION DETAILS

Foundations

SANITARY REGULATIONS - No USPHS Requirements. Check state and local codes/regulations before starting construction.

Footings

Spread footings and foundation walls are used to keep a milkroom from settling or heaving. Perimeter drains prevent surface and ground water from getting under the floor. Cast-in-place concrete footings should rest upon undisturbed soil or rock below the depth of frost penetration. Footings are normally twice as wide as the foundation wall and as thick as the wall is wide. Keying or using reinforcing bars to anchor the foundation wall to the footer is good construction practice but is not required unless the walls are long and deep. Use 3000 psi or better concrete in the footers.

Post frame buildings have concrete under post as footings. Design diameter and thickness to transfer loads to the soil.

Walls

Foundation walls of cast-in-place concrete or concrete masonry blocks should be at least 5-1/2 inches wide. The wall shown in Figure 2 provides a stub concrete wall to keep the other wall materials away from water and a flush inside surface. With masonry blocks, the blocks in the foundation should be as wide or wider than the blocks above the floor. Figure 2 shows a masonry wall with glazed tile.

Wood walls may be stud or post frame construction. Figure 3 shows a stud frame wall section. These walls provide space for adequate insulation. A properly selected inside covering provides an easily cleanable surface. Fiberglass Reinforced Plastic either in sheets attached to an existing backing or attached to plywood are commonly used. Other options include painted metal and properly sealed exterior plywood.

FIGURE 2. SECTION SHOWING ONE EXAMPLE OF MASONRY WALL CONSTRUCTION.

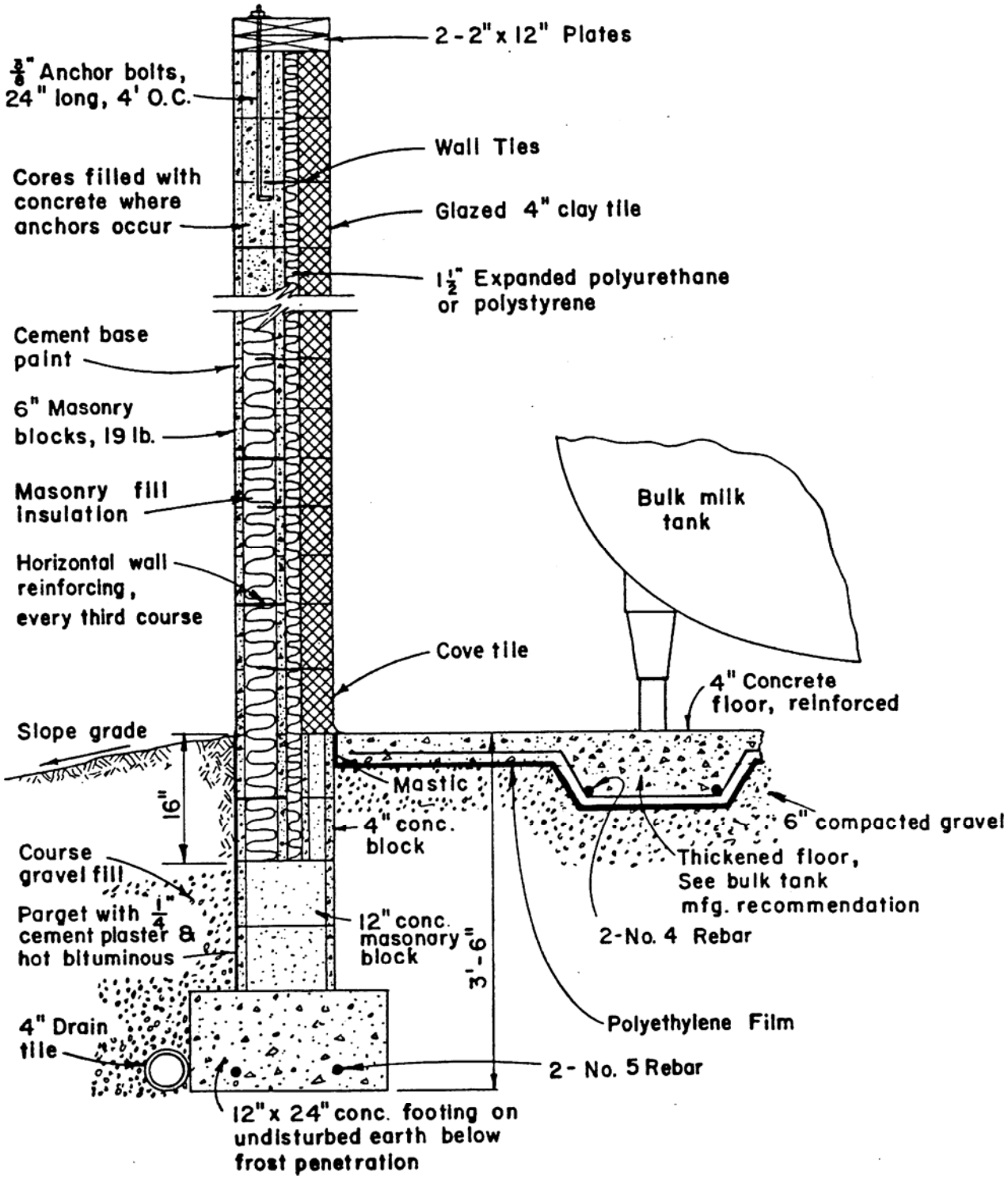
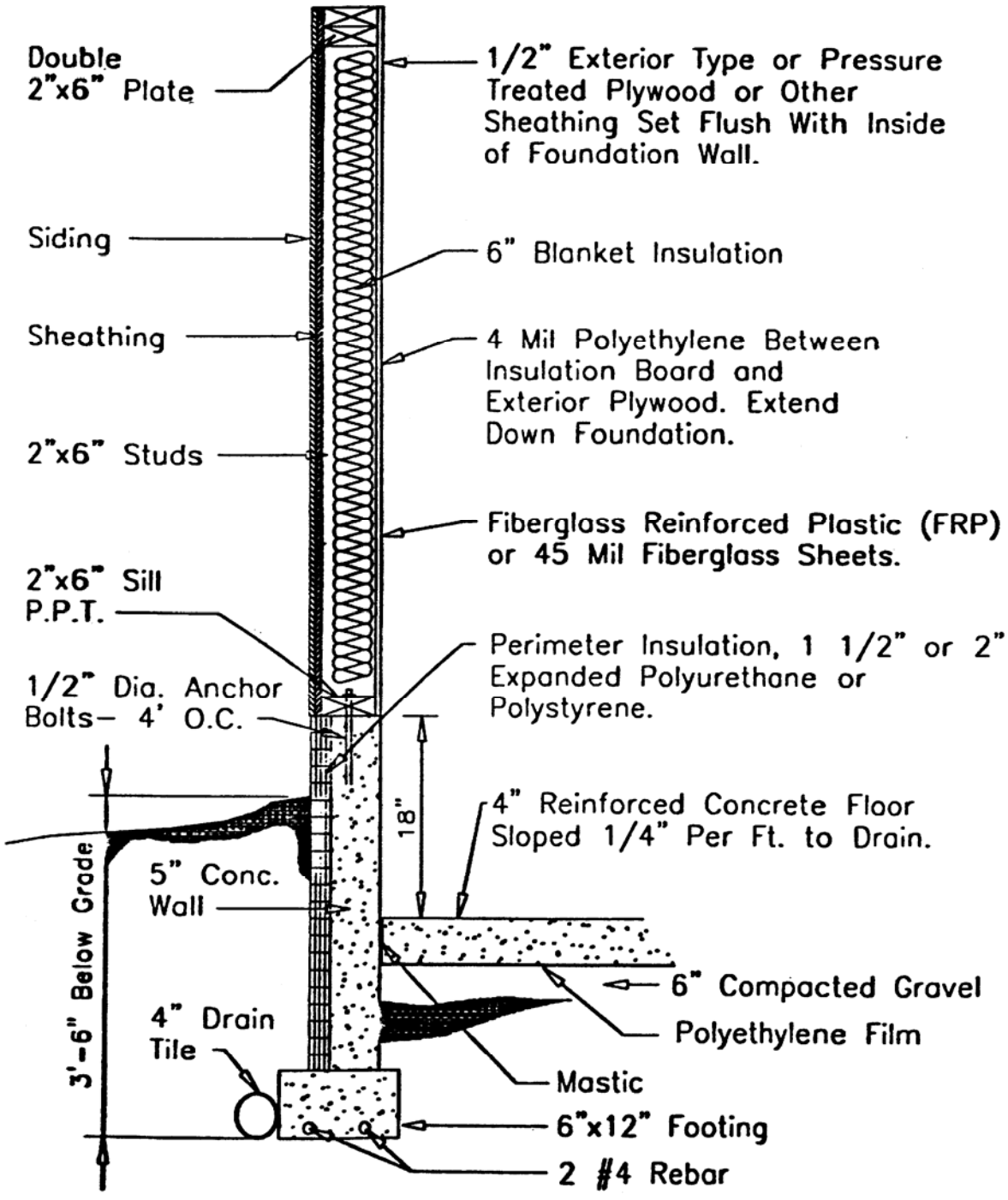


FIGURE 3. SECTION SHOWING ONE EXAMPLE OF STUD WALL CONSTRUCTION.

Section Showing One Example of Stud Wall Construction



Foundations for Bulk Tanks

A bulk milk tank with 1,000 gallons of milk may weigh over 10,000 pounds. Each of 4 support legs will carry 2,500 pounds. A 1,500-gallon tank may weigh nearly 17,000 pounds and have 8 legs, each carrying 2,100 pounds. To prevent floor failure, tank movement and inaccurate measurement of milk, provide separate footings when the load on each leg exceeds 2,000 pounds.

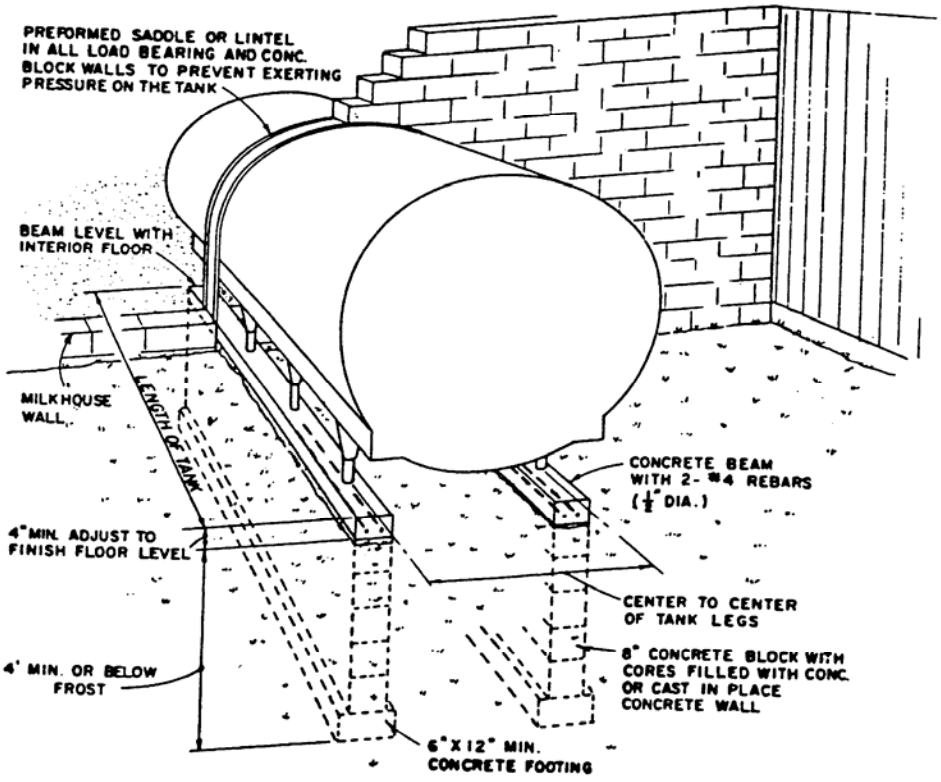
Support the legs with either piers or walls. Foundation walls provide continuous support for legs on each side of the tank. Walls are easier to construct than piers, the chance of settling is reduced and future tanks may fit easier onto the walls than piers. Figure 4 shows a foundation wall for a bulkheaded tank. If a pier is used, provide 1 square foot of cross section area for each 2,000 pounds of weight with a minimum size of 1-foot square or 14 inch diameter.

Extend all foundations below the depth of maximum frost penetration. In cold regions, this may be five feet for outside walls. For walls with heated rooms on both sides, a 2-foot depth is adequate. Keep the depth of tank foundations for bulkheaded tanks the same for the entire length of the wall.

The spread footing distributes the load to firm soil and provides lateral stability. With well-drained soil, compact sand, medium clay, compact sandy loam or loose sand and gravel, a spread footing of 12 inches wide is adequate. With poor drained soil, soft clay, silty clay or loose sand, use a 16-inch wide footing. If in doubt, consult an expert.

FIGURE 4. EXAMPLE OF BULKHEADED MILK TANK WITH WALL SUPPORT AND CONTINUOUS THRU-THE-WALL FOUNDATION.

Note: Consult with tank manufacturers on support requirements.



Floors and Drains

SANITARY REGULATIONS

> *...The milkhouse shall be provided with a smooth floor constructed of concrete or equally impervious material, graded to drain, and maintained in good repair...(5r).*
>
> *...All floor drains shall be accessible and shall be trapped if connected to a sanitary sewer system...(5r).*

Floor Construction

To be clean and cleanable, construct floors of concrete or equally impervious material, provide slope to drain(s) and maintain the floor in good repair.

A sound base beneath the concrete prevents floor settlement and cracks. Use well-drained and compacted gravel 6 to 10 inches thick or sand 6 inches thick. Place and compact the base in layers no thicker than 4 inches. Dampen the base before pouring the concrete. The minimum concrete floor thickness is 4 inches. Reinforce the floor with 10-gauge 6 inch by 6 inch welded wire mesh. Place the mesh 1-inch above the compacted base. Use a concrete mix with a minimum strength of 3,500 pounds per square inch.

Proper finishing and curing is critical for good performance of the floor. Once the concrete has started to set, float and steel trowel the surface to consolidate the concrete and provide a smooth surface. Carbide chips can be incorporated into the surface to reduce slipping in high foot traffic area.

Damp cure the floors for at least 8 days and up to 28 days to make a stronger and harder concrete slab. Spray-on curing compounds will assist in proper curing but are not as effective as damp curing. Special coatings are available from concrete distributors to improve the resistance of the concrete to acid cleaners. Since the most sever deterioration often occurs between the bulk tank outlet and the drain, consider using quarry tile in this area.

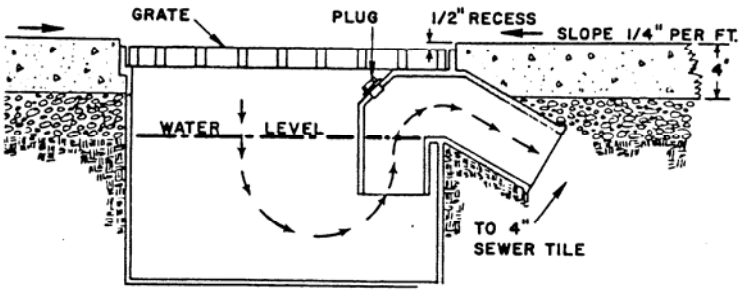
Slight dips that hold water should be eliminated. Provide a uniform 2% floor slope (1/4-inch rise for every foot of run) to the drains. Use an isolation strip topped with a moisture resistant curing silicone-rubber mastic tolerant to temperature changes to seal the joint at the corner of the floor and wall.

The discharge of wash and rinse water is hard on concrete floors. Plumbing wash vats directly into the waste piping system eliminates this source of floor deterioration.

Floor Drains

Proper selection and location of floor drains improves drainage and minimizes cleaning and maintenance problems. When possible, plumb sinks through a trap and directly into the sewer line. Place the drain for the bulk tank no closer than 18 inches to the tank outlet, but not under the tank. Provide a 2% floor slope to drain(s). A drain as shown in Figure 5 allows for easy sloping of the floor to the drain. Trap all drains to prevent entry of odors, insects or rodents. To improve wastewater drainage, recess floor drains 1/2 inch below the floor.

FIGURE 5. MILKROOM FLOOR SLOPE WITH FLOOR DRAIN AND SEDIMENT TRAP.



Floor Repair

When repairing or remodeling milkhouses consider 1) piers to support the bulk tank, and 2) epoxy-sand patches to repair the floor surfaces. Cutting holes in the floor and installing piers to match new bulk tank legs is a low cost modification for a new bulk tank.

Special epoxy patching materials are available to repair eroded concrete. Follow concrete preparation, mixing and installation directions carefully. Preparation of the concrete is critical for good performance of the patch.

Walls and Ceilings

SANITARY REGULATIONS

> *...The walls and ceilings shall be constructed of smooth material, in good repair, well painted, or finished in an equally suitable manner...(5r).*

Materials and Construction[1]

Provide an impervious splash wall at least 18 inches high to help protect wood framing and other building materials from moisture-caused decay. Provide a smooth, durable, cleanable surface throughout the remainder of the milkroom. Fiberglass reinforced plastic materials provides a very good surface. This material is available laminated onto plywood or in sheets that can be attached to solid walls such as block walls. All joints should be caulked to minimize moisture getting behind the sheets. Exterior plywood, plastic faced fiberboard, aluminum or stainless steel can also be used.

Insulate the milkroom walls and ceilings to minimize condensation and resulting mold growth on the interior surfaces. Install wall insulation to give a minimum resistance of R 12 and ceiling to a minimum of R20. In colder regions, add more insulation as construction permits, especially in the ceiling. Install a 6-ml plastic vapor barrier between the insulation and the interior wall covering. This vapor barrier is critical to keeping moisture from getting into the wall cavity and causing deterioration and paint peeling on the outside.

Masonry block walls with glazed surfaces or epoxy paints provide a smooth, cleanable, and durable surface, but they are difficult to insulate. A double wall construction with 2 inches of rigid insulation in the cavity provides acceptable insulation levels. Attaching rigid foam insulation to the blocks and covering with interior sheeting also provides adequate insulation. Filling cores with insulation is not adequate for either cinder or concrete blocks.

Ceilings should be as cleanable as the walls. Tight joints and a vapor barrier are critical in the ceiling.

Doors, Windows and Hose Ports

SANITARY REGULATIONS

> *...There shall be no direct opening into any barn, stable or into a room used for domestic purposes: Provided, that a direct opening between the milkhouse and milking barn, stable, or parlor is permitted when a tight-fitting self-closing solid door(s) hinged to be single or double acting is provided...(5r).*
>
> *The milkhouse shall have adequate natural and/or artificial light and be well ventilated...(5r).*

Doors

Direct openings between a milkroom and stable, milking barn or parlor are permissible only where tight-fitting self-closing doors are provided and where ventilation moves air from the milkroom to the stable. Where direct openings are not permitted, an open passageway or "breezeway" between the milkhouse and stable is preferred to a vestibule which may become cluttered.

Self-closing doors help keep small animals, insects, dust and odors out of the milkhouse and outward opening doors help to keep flies and other insects from entering the milkhouse.

Windows

With the window glass close to the inside wall surface and a self-draining sill, condensation and deterioration of window sash, frame and sills is reduced. A sloping sill is easily cleaned and does not become a storage shelf. Wooden sash and sills are not recommended.

[1] The State of Georgia does not allow wood frame walls on dairy farms for milkroom or milking area construction except sealed bonded wall units with bound polyester fiberglass panel surfaces or other impervious sealed surface. Some wood framing is allowed around bulkheaded tanks.

Double-glazed windows, storm sash, or glass blocks should be used to reduce heat loss and condensation in cold seasons. In warm weather or fly season, all openings including windows, doors and vents for condensing units should be screened to keep out insects.

Hose Ports

Milk is transferred from a bulk-holding/cooling tank to a transport tank through a hose port in the milkhouse wall. The hose port shall have a tight door, in good repair and be kept closed when not in use. A hose port convenient to the tank outlet should be at least 6 inches above the outside grade and inside floor. A more convenient height for the hose port is one foot above the ground. This height keeps the hose off the ground and prevents kinking the milk hose. Commercial prefabricated hose ports with self-closing doors are readily available and convenient to install. Construct an easily cleanable surface under the hose port, adjacent to the outside wall, sufficiently large to keep the milk hose on the pad to protect the hose from contamination. The pad may be an extension of the entrance step or a paved area about 4 feet square. Consider extending the pad to the working area of the truck. The pad must be constructed of an impervious and reasonably smooth material. Materials such as concrete or natural stone slabs with slight irregularities would be considered reasonably smooth for this purpose. The pad must be free of large cracks or other damage. The pad may be constructed in sections and small cracks between sections would not be considered as a construction violation. If the bulk milk truck or other vehicles will drive over the pad, heavy-duty construction may be necessary.

EQUIPMENT AND UTILITIES

Electrical Service and Lighting

SANITARY REGULATIONS

> *...The milkhouse shall have adequate natural and/or artificial light...(5r).*

Lighting

Good lighting is necessary to see to wash utensils and to accurately read the bulk tank measuring device. A light fixture should be located over the wash vats. When located directly over the wash vats, lights should be properly protected with shields to assure against glass entering the milk supply through the wash system. Do not locate lights directly over the bulk tank because milk could be contaminated due to bulb breakage and insects which are attracted to the light. Angled spot lights shining into and flooding the interior of the tanks permit better inspection of the tank interior.

Single manhole tank installations require a light which can be extended through the manhole to illuminate the interior of the tank for inspection and special maintenance. This light shall be of a waterproof and shatterproof type with a ground fault interruption device, and preferably have a retractable cord. The light should be installed close to but not directly above the opening. A cord reel or other suitable device provides for convenient stay of excess cord.[1]

Twenty foot candles of light on a working surface represents an unshielded 100 watt incandescent bulb, 3 feet from the surface or a 150 watt projector flood light 10 feet away. (For additional information about lighting, see ASAE-R344, Lighting for Dairy Farms and the Poultry Industry.)

Wiring

Locate a 220-volt grounded weatherproof electrical outlet for the milk pump on the tank truck on the outside of the milkhouse close to the hose port. See your milk hauler for the exact style of male plug used

[1] The State of Maryland accepts portable tank inspection lights.

on his truck. Locate the switch to control the power to this outlet inside the milkhouse near the outlet of the bulk tank.

Locate the electrical service entrance in a dry but convenient location such as the entrance or utility room close to a milkroom. Install all wiring according to the National Electrical Code and any other local regulations that may apply. The local power supplier or other competent authority should be consulted about the milkhouse wiring system, and sizing your electric service entrance. For emergency use, it is wise to consider a standby generator and switch gear located near the service entrance panel.

Proper wiring with thermal and overload protective devices is important for safety, proper operation and economy of all electrical equipment. Use ground fault circuit interrupts on all outlets within a foot of sinks.

Bonding

The importance of adequate bonding cannot be overemphasized. All electrical equipment and metallic surfaces such as distribution panels, motors, fans, lighting equipment, well casing, water and drain systems and posts and racks must be bonded together. Mechanically and electrically secure connections and conductors appropriate for surviving the environmental conditions are essential.

Electric Codes

All electric fixtures and circuitry must comply with local, state and federal electric codes.

Water Supply and Heating

SANITARY REGULATIONS

> *Water for milkhouse and milking operations shall be from a supply properly located, protected and operated, and shall be easily accessible, adequate, and of a safe, sanitary quality. (8r).*
>
> *...Water under pressure shall be piped in the milkhouse...(5r).*
>
> *The milkhouse shall be equipped with...adequate hot water heating facilities...(5r).*

Water Supply

A safe, water supply at point of use is needed for cleaning milking utensils and equipment. Appendix D, page 149, of the PMO, 1995 Revision, states:

> "When a properly constructed well penetrates an unconsolidated formation with good filtering properties, and when the aquifer itself is separated from sources of contamination by similar materials, research and experience have demonstrated that 50 feet is an adequate distance separating the two. Lesser distances should be accepted only after a comprehensive sanitary survey, conducted by qualified State or local health agency officials, has satisfied the officials that such lesser distances are both necessary and safe."

Formation	Minimum acceptable distance from well to source of contamination 50 feet.
Favorable (unconsolidated)	Lesser distances only on health department approval following comprehensive sanitary survey

	of proposed site and immediate surroundings.
Unknown	50 feet only after comprehensive geological survey of the site and its surroundings has established, to the satisfaction of the health agency, that favorable formations do exist.

Poor (consolidated)	Safe distances can be established only following both the comprehensive geological and comprehensive sanitary surveys. These surveys also permit determining the direction in which a well may be located with respect to sources of contamination. In no case should the acceptable distance be less than 50 feet.

PMO, 1995 Revision, page 150.

Untreated surface and ground water should be excluded from any water supply to prevent contamination. Grading and interceptor trenches should be used where necessary to prevent flooding of the water source. Well casings should be extended to 2 feet above grade to prevent entrance of surface and ground water. The annular space outside the well casing should be grouted. Below grade pump pits are not acceptable.

To protect the water supply there should be no cross connection to a non-potable water supply. Impounded waters used for emergency or cattle drinking purposes cannot be connected to water lines for milkroom use unless properly treated and individually approved in advance by proper regulatory authority. Submerged inlets cannot be used because back siphoning of contaminated water from open tanks might occur. Approved vacuum breakers properly designed, located and operable between any potential contamination and both the source and use of a potential supply can provide protection for existing submerged inlets.

No water pipe shall be located closer than 10 feet, measured horizontally to any sewer, soil pipe, or drain, which may at any time contain polluted water; and such pipes shall be separated by undisturbed or compacted earth: Provided, that when permitted by States and local health authorities, pressure water pipes may be placed in the same trench with the building drain and building sewer, or may cross such lines under the following conditions: (1) the bottom of the water pipe shall be at least 12 inches above the top of the sewer line at its highest point; (2) the water pipe shall be placed on a solid shelf excavated at one side of the common trench; (3) the number of joints in the water pipe shall be kept to a minimum; (4) the materials and joints of sewer and water pipe shall be installed in such manner and shall possess the necessary strength and durability to prevent the escape of solids, liquids, and gases under all known adverse conditions, such as corrosion, strains due to temperature changes, settlement, vibrations, and superimposed loads; and (5) where a water line must cross over a sewer line, the sewer line shall

be of cast iron with leaded or mechanical joints (or equivalent) at least 10 feet on either side of the crossing.

If surface waters must be used, a wide variety of sources, including farm ponds, lakes, streams, and the roof runoff of buildings may be considered. These sources are regarded, without exception, to be contaminated, and their use cannot be condoned unless an individually tailored treatment process can be used which will make them safe and satisfactory. Such treatment may include aeration and the use of suitable filtration or precipitation devices to remove suspended matter, in addition to routine full-time disinfection.

The milk producer or milk plant operator, who is considering surface sources of water for milking, milkhouse, and milk plant operations shall receive the advance approval of the health authority and shall comply with all applicable requirements of the State health authority on the construction, protection, and treatment of the chosen supply. (Appendix D of PMO)

For further information about water supplies, see Appendix D of PMO.

Water Needs

Table I can be used to estimate the water needs for a milking center. (See DPC 58, Sizing Dairy Farm Water Heater Systems for more information). The greatest part of the daily needs is often used in two (2) hour periods. Wells supplying 8-10 gallons per minute are desirable.

Table I provides data for estimating the water needs for cleaning and specific equipment. Manufacturers recommendations should be used where they are available and especially for larger pipelines with automatic cleaned-in-place equipment. Although a bulk milk tank may be emptied and cleaned every other day, water must be available on that day for cleaning.

The water system should fill the wash vat within five minutes. If a well cannot supply water at the rate required for filling, a storage tank should be included in the system. Size the storage tank to meet the water needs during milking and cleanup.

Water Heating

The smallest gas or fuel oil water heater that should be used is a 30-gallon heater to supply 60 gallons of hot water per day. The smallest electric heaters recommended are 52 gallon "on demand" and 80 gallons for off-peak electric rates. Caution--Water temperatures must be maintained for cleaning all milk handling equipment. Two tanks used in series can provide two stage heating with the cold water input to the smaller tank. An additional water heater with a lower thermostat setting (approx. 110°F) will provide large quantities of warm water for washing udders and can also feed the high temperature (160°F) water heater. Gas or oil fired hot water generators may be used for heating cleaning water and also for hot water heating systems. Safe water from heat exchanges or water-cooled compressors may be used to feed water heaters. This can effectively reduce fuel or energy costs.

Having hot water readily available often greatly increases its use. Too much capacity is not very expensive but too small a heater can limit the cleanliness of equipment or your comfort.

Refrigeration Heat Recovery

Sizable reductions in the energy cost of heating water can be achieved by recovering the waste heat from the refrigeration system. Because of the year round needs for hot water in a dairy, a refrigeration heat recovery unit (also called a heat exchanger) will provide the greatest beneficial use for this heat. The efficiencies of a refrigeration heat recovery unit will vary from one unit to the next. As a result, the water temperature produced by different heat exchangers may vary from 90°F (32.2°C) to 140°F (60°C)

depending on its design. The key feature to consider in the purchase of a unit is the quantity of surface contact between refrigerant and water. Larger heat exchanger surfaces will help produce higher temperature water and greater energy savings.

The refrigeration heat recovery unit must include a storage tank separate from the water heater to allow the unit to operate well. Follow manufacturer's recommendations for design and installation. Cold water should feed the bottom of the storage tank. The hot water outlet at the top of the storage tank should feed the cold water inlet of the water heater. Instead of feeding 52°F (11.1°C) water to the water heater, we now are supplying water of 100°F (37.8°C) or more.

TABLE 2. ESTIMATING WATER USAGE AND HOT WATER NEEDS FOR CLEANING MILKING EQUIPMENT AND MILKING CENTER USES

		Gal/Day Rec.			Your Farm		
		Hot	Cold	**Total**	Hot	Cold	**Total**
1	Udder washing (per cow)	0.5	0.5	1			
2	Preparation Stall (per cow)	2	2	4			
3	Backflushing milker units (per cow)		2	2			
4	Conventional Bucket Milker						
	(No. Units + 1, approx. 1/10 cows)	6	2	8			
5	Transfer System, Vacuum Wash						
	1"D. line less than 100' long	20	20	40			
	1-1/2"D. line greater than 100' long	30	30	60			
6	Transfer System, Pressure Wash						
	1"D. line less than 100' long	40	40	80			
	1-1/2"D. line greater than 100' long	50	50	100			
7	Pipeline, 1-1/2"D. line, Vacuum Wash						
	Parlor 60' long	70	30	100			
	less than 200' long	90	40	130			
	200' to 400' long	110	50	160			
	greater than 400' long	140+	60+	200+			
8	Pipeline, 2"D. line, Vacuum Wash						
	Parlor 60' long	75	35	110			
	less than 200' long	100	50	150			
	200' to 400' long	125	55	180			
	greater than 400' long	150+	70+	220+			
9	Pipeline, 3"D. line, Vacuum Wash						
	Parlor 60' long	80	40	120			
	less than 200' long	120	60	180			
	200' to 400' long	150	70	220			
	greater than 400' long	180+	90+	270+			
10	Pipeline, 1-1/2"D. line, Pressure Wash						
	Parlor 60' long	80	40	120			
	less than 200' long	120	60	180			
	200' to 400' long	100	80	240			
	greater than 400' long	200+	100+	300+			
11	Pipeline, 2"D. line, Pressure Wash						
	Parlor 60' long	90	50	140			
	less than 200' long	130	70	200			
	200' to 400' long	200	100	300			
	greater than 400' long	250+	120+	370+			
12	Bulk Milk Cooler, Manual Wash						
	per 100 gal. capacity	1	1	2			
13	Bulk Milk Cooler, Automatic Wash						
	per 100 gal. capacity	3	2	5			
14	Parlor Washing (highly variable						
	with approx. 20% hot water)	15	60	75+			
	Subtotal						
	+ 20% Reserve						
	Total						

Cleaning and Storage Facilities

SANITARY REGULATIONS

> *The milkhouse shall be equipped with a two-compartment wash vat...(5r)*
>
> *Adequate hand-washing facilities shall be provided including a lavatory fixture with running water, soap or detergent, and individual sanitary towels in the milkhouse and in or convenient to the milking barn, stable, parlor, or flush toilet. (17r)*
>
> *The product-contact surfaces of all multiuse containers, equipment, and utensils used in the handling, storage, or transportation of milk shall be cleaned after each usage. (10r)*
>
> *All containers, utensils, and equipment used in the handling, storage, or transportation of milk, unless stored in sanitizing solutions, shall be stored to assure complete drainage, and shall be protected from contamination prior to use: Provided, That milk pipelines and pipeline milking equipment such as milker claws, inflations, weigh jars, meters, milk hoses, milk receivers and milk pumps which are designed for mechanical cleaning may be stored in the milking barn or parlor provided this equipment is designed, installed and operated to protect the product and solution contact surfaces from contamination at all times. (12r)*

Washing Equipment

A two compartment wash vat is needed to conveniently wash and rinse milking utensils and equipment. Each compartment should be large enough for each portable utensil or container. If racks for in-place-cleaning of a pipeline milker system are permanently installed on a wash vat, then a third compartment is needed. Check the physical size of the components that will be washed manually before purchasing wash vats. Drop pipes to bulk tanks require brush washing.

A swing-type mixing faucet is practical and desirable to fill the two compartment wash vat. If a hose and shut off is connected to a mixing faucet, put in check valves to prevent mixing of hot and cold water in lines or tanks. An auxiliary high pressure pump and separate hi-pressure hose station coupled to a sanitizer metering device is desirable for easier cleaning. If an auxiliary high-pressure pump is used, it must be protected against causing a back siphonage in one of the following ways:

The auxiliary pump may be supplied by a separate surge tank that is isolated from the main water supply system by an air gap.

The auxiliary pump may be supplied by a separate water source that is not connected to the water supply system supplying water to the milkhouse.

An effective low-pressure cut-off switch may be installed on the suction side and immediately upstream from the pump. This switch must deactivate the pump when the pressure on the suction or feed line drops below 10 pounds per square inch.

The installation of any other device or means that will satisfactorily prevent a negative pressure on the water supply system and subsequent contamination of the water supply system.

Hand Sink

A small permanently fixed hand sink with running water, soap and a paper towel dispenser should be in the milkroom and convenient to the milking parlor or barn. This may be adjacent to the wash vats and above a hose station to simplify plumbing. All handlers of milking equipment should use the hand washing facilities.

Storage

A storage space for spare parts, detergents, sanitizers, strainer pads or socks, etc. Except for small operations, the storage should be separate rooms(s) from the milkroom. If stored in the milkroom, use wall mounted cabinet(s) large enough to store the items. Strainer pads or socks and other items that come in contact with the milk must be protected from contamination. They can be stored in a special dispenser designed to completely protect them **or** in their original container on the **top shelf** in a cabinet.

A wall mounted glass faced bulletin board keeps all documents on display dry and easily readable. Provide a bulletin board large enough to display state registration, water, blood, T.B. inspection reports and any other display material. The display should be easily accessible so the material can be kept current.

Metal racks at least 20 inches above the floor should be used to drain and store any milk containers, pails or utensils.

Toilets and Waste Disposal

SANITARY REGULATIONS

> *Every dairy farm shall be provided with one or more toilets, conveniently located and properly constructed, operated, and maintained in a sanitary manner. The waste shall be inaccessible to flies and shall not pollute the soil surface or contaminate any water supply. (7r)*
>
> *Liquid waste shall be disposed of in a sanitary manner...(5r)*

Toilets

The toilet should be convenient for workers on the dairy farm. A flush toilet with a separate disposal system and in a separate room away from the milkroom is recommended. However, a flush toilet that has a self-closing door will not be considered a violation under the IMS (Interstate Milk Shippers) program, or by the PMO (Pasteurized Milk Ordinance). A toilet in a private home close to the dairy barn and accessible for workers may be used. A chemical toilet or pit privy may be used but neither can open directly into the milkroom. All outer openings in toilets or privies must be screened or protected from entrance of flies.

Most health departments require that the disposal system for a flush toilet be kept separate from milkroom or milking center wastes. Local plumbing and health regulations must be followed.

Milkroom Wastes

Disposal of milkroom wastes in a sanitary manner usually means no surface discharge that creates pools that generate odors, fly breeding or other nuisances. Milking center waste should not discharge to any roadside ditches or waterways.

The milkroom waste contains cleaning and sanitizing solutions, some milk and dirt. This waste can be contained in a storage tank and used to clean a milking parlor. The amount can vary from two to ten gallons per cow per day. The amount will depend on the size of the milking system and bulk tank and the type of washing system.

Subsurface leach fields are the poorest system. The leach fields are quickly clogged by the milk and other solids. Using settling tanks before the leach field can delay trouble if the tanks are properly designed and maintained. Tanks can be used for short-term storage and the material pumped onto a sloped grass infiltration area or hauled to the field.

When a liquid manure system is present, the waste should be added to the system. This can be accomplished by pumping the waste directly to the storage or to a reception pit where manure is scraped. The latter approach can help drier manure flow to the storage.

Ventilation and Heating

SANITARY REGULATIONS

The milkhouse shall... be well ventilated...(5r)

Ventilation

To reduce odors and condensation on floors, walls, ceilings and cleaning utensils, the milkroom must be ventilated. Changing the air sometimes cools the milkroom so good insulation and supplemental heat are also necessary. Air entering the milkroom must **not** come from a barn or milking parlor or any smelly, dirty or fly infested location. Either an exhaust fan system pulling air out of a milkroom or a pressure system pushing air into a milkroom can direct the correct airflow. A minimum ventilation rate of 4 air changes per hour is recommended. Fan delivery rates of 300 to 700 cubic feet per minute (cfm) with manual or timer control to ventilate milkrooms would be required to meet this recommendation for typical milkrooms.

This small amount of air may be part of the exhaust volume for a milking parlor or barn. Anti-backdraft dampers are used in common walls to direct the airflow in one direction. For each 700-cfm, provide one or more inlet openings totaling 100 square inches. When barn exhaust fans are some distance away from the milkroom there is little chance for recirculation.

Pressurized ventilation systems with fans forcing the air into the milkroom have been successful in temperate regions where moisture is less likely to be driven into walls or ceilings.

Heating

Freezing in milkhouses can break waterlines, crack floors and shift bulk milk tanks. Good insulation and supplemental heat prevents freezing. Heat from an air-cooled compressor-condenser unit should be utilized where possible.

Sound, well-insulated construction will reduce the amount of supplemental heat that will be necessary to maintain above freezing temperatures. A thermostat to turn off an exhaust or supply fans in the milkroom at temperatures below 40°F (4.4°C) should be provided. A thermostat can be used to control fans and dampers. Supplemental heat can be supplied by small electric or gas fired unit heaters in the range of 8,000 to 12,000 BTU/hour output. An energy conservation alternative would be to utilize the heat being rejected by the cooling compressor-condenser unit for bulk coolers. See the section below.

Heat from Cooling Milk

Waste heat from the milk cooling can be used for warming the milkhouse. Probably the most financially beneficial use of this waste heat is for heating water. However, many farmers will find that until this equipment is added, considerable value can be obtained by using this waste heat for space heating.

To lower the temperature of one pound of milk from 90°F (32.2°C) to 40°F (4.4°C), nearly 50 BTU's must be removed. An additional 25 BTU's of electrical energy that is converted to heat is needed to run the refrigeration cycle. The total heat dissipated to the air or water is approximately 75 BTU's for every pound

of milk cooled to 40°F (4.4°C). For example, if 100 cows are producing an average of 30 lbs. at each milking then the heat produced from cooling this milk will be 100 x 30 x 75 = 225,000 BTU.

A well-insulated milkhouse should rarely require more than 15,000 BTU/hr even in severe conditions. This means that there is enough heat given off by the compressor-condenser unit from cooling 1000 pounds of milk to supply the heat loss from a well insulated milkhouse for about 4 to 5 hours or more in severe weather. Direct expansion type bulk tanks generate all the heat within the milking time plus one hour; as a result the milkhouse will over-heat if all this heat is retained. Ventilation will prevent over-heating. An ice-bank type bulk tank would dissipate the heat during a 4 or 5 hour period. Supplemental heat may be necessary between the milk cooling (or ice bank formation) and the next milking. Larger dairies will have proportionately more heat to utilize. With proper planning and construction, part of this heat could also be used to heat the milking parlor during cold weather. During warm weather, this heat should go directly outside so that severe over-heating does not occur.

Cooling

SANITARY REGULATIONS

> *Raw milk for pasteurization shall be cooled to 45°F (7°C) or less within 2 hours after milking:* ***Provided, That*** *the blend temperature after the first milking and subsequent milkings does not exceed 50°F (10°C). (19r)*

For detailed information on cooling requirements of regulatory agencies, see DPC 36, Guidelines for Dairy Farm Inspection, pages 41 and 42.

The cooling performance of bulk tanks should meet or exceed the 3-A Sanitary Standards for Farm Milk Cooling and Holding Tanks. These standards are as follows:

Cooling Requirements

A tank when operated with a condensing unit of the minimum capacity given on the name plate shall have enough refrigerated surface to accomplish the following when the condensing unit is in operation during the filling period:

E.1.1 First Milking.

Tanks designed for the following pick up frequency to cool the milk in the tank from 90°F (32.2°C) to 50°F (10.0°C) within the first hour after being filled to the corresponding volume and from 50°F (10.0°C) to 40°F (4.4°C) within the next hour:

E.1.1.1 Everyday pick up filled to 50 percent of its rated capacity.

E.1.1.2 Every other day pick up filled to 25 percent of its rated capacity .

E.1.2 Second or Subsequent Milkings. Prevent the blend temperature to rise above 50°F (10°C) during the addition of milk.

E.2 Cooling Information.

The tank shall have an information or data plate permanently attached to it giving the following information or the information shall appear on the name plate (see E.2.2.1).

E.2.1 The maximum rate at which milk can enter the tank and comply with the cooling requirements of E.1.1 and E.1.2.

E.2.2 The minimum condensing unit capacity required when the milk enters the tank at the maximum rate.

E.2.2.1 Tank Plate.

Maximum rate at which milk can enter this tank and meet the cooling requirements of the 3-A Sanitary Standards for Farm Milk Cooling and Holding Tanks, Number 13-06, is _____U.S. Gallons per hour. When milk enters the tank at the maximum rate, the minimum condensing unit capacity is *_____ BTU/hr. at *_____ °F saturated suction temperature.
* The BTU capacity specified is to be at the saturated suction temperature designated by the manufacturer.

E.3 Cooling System.

E.3.1 In determining cooling capacity, the ambient temperature shall be 90°F (32.2°C) and when water cooled condensers are used, the refrigerant condensing temperature shall be not less than 103°F (39.4°C).

E.3.2 The tank shall be provided with an automatic refrigeration control capable of functioning on a change in product temperature of not more than plus or minus 2°F at 37°F (2.8°C).

Recording Thermometers

Recording thermometers are a useful tool on the dairy farm. The thermometer chart with its record of time and temperature is a permanent record. This record aids the farmer, the processor, and, in fact, anyone who has an interest in the marketing of fluid milk.

The recording charts can give the following information:

1. Time, date and signature.
2. Elapsed milking time.
3. Elapsed cooling time from start of first milking or subsequent milking.
4. Temperatures at any time while the tank has milk.
5. Cleaning temperatures after the tank has been emptied.
6. A high temperature limit can automatically signal dangerous milk temperatures.

Installation

1. 3-A sets standards[1] for inclusion of a well on all tanks now being manufactured. The well can either be protruding in the milk or against the outside of the inside liner. This well should be located so that when the milk reaches 10% of the tank volume the sensor bulb will record the proper temperature.

2. The recording thermometer should not be attached to the farm tank. It should be firmly attached to an inside wall of the milkhouse. (Preferably offset from the wall.)

Standards for Recording Thermometers

1. The recorder chart should make one revolution compatible with the maximum storage of the milk in the farm tank. That is, every other day pickup should have 48-hour charts.[2]

2. The chart drive of the recorder can either be manually wound or electrically driven.[1]

[1] Copies of the complete 3-A Sanitary Standards for Farm Milk Cooling and Holding Tanks, are available from IAMFES, PO Box 701, Ames, Iowa 50010.

[2] The State of Washington requires a seven (7) day recording chart.

3. Scale - shall have a scale span of not less than 50°F, including normal storage temperature plus or minus 5°F, graduated in not more than 2°F divisions with not more than 40°F (4.4°C) per inch of scale; graduated in time scale divisions of not more than one hour having a chord or straight line length of not less than 1/8-inch at 40°F 4.4°C). Chart must be capable of recording temperatures up to 180°F (82.2°C). (Span specifications do not apply to extensions beyond 100°F (37.8°C).)

   Temperature Accuracy - within 2°F plus or minus, between specified range limits.

4. The case of the recorder should be maintained to be moisture resistant under milkhouse conditions.

5. The mechanism of the recorder should have provision for making it tamper proof.

   (a) Pins in the chart hub so that the chart can't be spun.
   (b) Sealing device so that calibration or zeroing can't be altered without authorization.

6. If the recorder has the added function of automatic control, it should be capable of functioning on a change in product temperature of not more than plus or minus 2°F at 37°F (2.8°C).

Sizing Farm Bulk Tank Condensing Units

Farm bulk tank condensing units should be sized to cool milk to 3-A Standards plus additional allowances for heat gain and reduced efficiency during the life of the equipment. The cooling or heat removal rate is normally in British Thermal Units per Hour (BTUH).

The greatest demand upon the refrigeration system is the maintenance of a 50° blend temperature during the second milking. This cooling demand would require 144 BTUH per gallon for direct expansion tanks. The American Society of Agricultural Engineers recommends an additional 5 percent allowance for heat gain and an additional 10 percent allowance to compensate for reduced efficiency during the life of the equipment. This additional 15 percent increases the cooling capacity to 165 BTUH per gallon for direct expansion tanks based upon a 90 minute milking time.

For ice bank tanks a cooling capacity of 49 BTUH per gallon based upon a 10-hour ice building time is needed.

For sizing condensers, the loading per milking should be considered to be 25 percent of tank capacity for every other day pickup and 50 percent of tank capacity for every day pickup.

Equipment Space Requirements

Figures 7 and 8 are examples of equipment layout planning. Wall space, floor space, and working clearances need to be planned for the milkroom and utility room areas. Be sure to plan for future expansion or equipment additions.

[1] The State of Washington requires the chart to be electrically driven.

FIGURE 7. MILKROOM AND UTILITY ROOM EQUIPMENT LAYOUT.

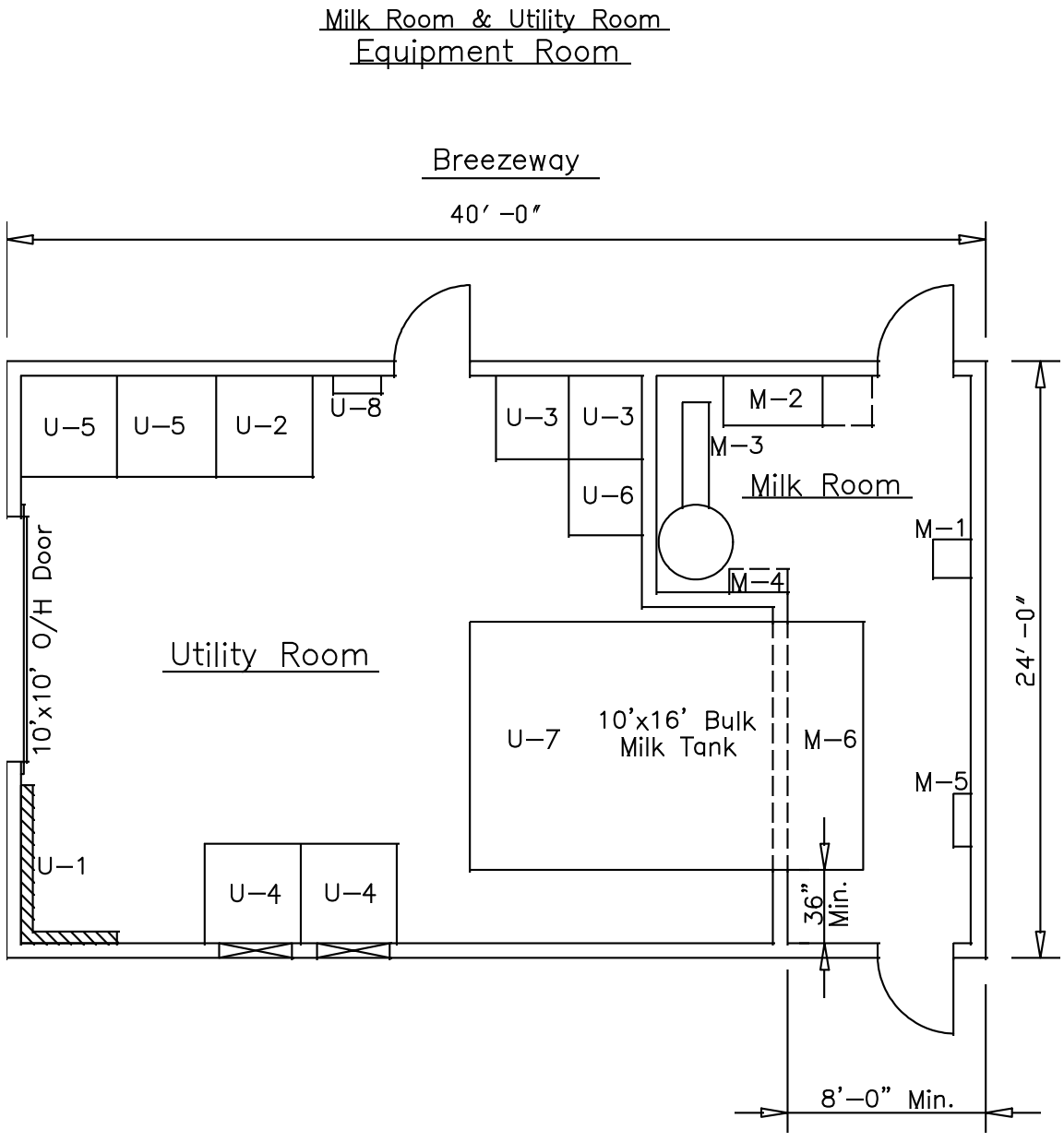


FIGURE 8. MILKROOM AND UTILITY ROOM EQUIPMENT LAYOUT SCHEDULE.

Utility Room Equipment

Mark	Description	Unit Working Area (Floor Space)
U-1	Electrical panels	6′ to 15′ of wall space
U-2	Air compressor	4′ X 4′ per unit
U-3	Water heaters	3′ X 3′ per unit
U-4	Ref. compressor (& wall louvers)	4′ X 4′ per unit (vented to outside)
U-5	Vacuum pump	4′ X 4′ per unit
U-6	Water tanks	3′ X 3′ per unit
U-7	Milk bulk tank	Distance out from wall + diameter
U-8	Air dryer	2′ of wall space

Milkroom Equipment

Mark	Description	Unit Working Area
M-1	Stainless steel hand sink	18″ of wall space (18″ square)
M-2	Stainless steel dbl. wash vat	4′ to 6′ long X 2′ deep (8 to 12 sq.ft. floor space)
M-3	Stainless steel vertical wash tank without milk storage with milk storage	 4′ wide X 3′ deep (12 sq.ft. floor space) 7′ wide X 3′ deep (21 sq.ft. floor space)
M-4	Plate type milk cooler	2′ of wall space
M-5	Wash down hose	2 sq.ft. of wall space
M-6	Milk bulk tank	3′ clearance out from wall + diameter. Must bulk head at least 3′–6″ into milkroom.

APPLICATION TO INSTALL A REFRIGERATED BULK MILK STORAGE TANK

Name of producer_____ Date _____

PO address_____ Telephone _____

Name of dealer receiving milk_____

Address _____

Fieldman or sanitarian _____

I HEREBY MAKE APPLICATION FOR PERMISSION TO INSTALL A REFRIGERATED BULK MILK STORAGE TANK. THIS EQUIPMENT WILL CONFORM TO OR EXCEED 3A SANITARY STANDARDS FOR FARM COOLING/STORAGE TANKS.

I. Farm refrigerated storage tank

Make

Model No. _____ Capacity_____ gallons

Tank bulkheaded Recording thermometer

Condensing unit make _____ BTU per hour_____

Every day pickup Every-other-day pickup

No. milking units_____; Milking rate_____lbs/hr.

Bucket Pipeline system Max cooler loading rate____lbs/hr.

Pre-cooler Pre-cooling capacity_____BTU/hr @_____gal/hr.

List automatic equipment _____

II. Washing equipment

Automatic Manual Estimated hot water_____gallons each use

Hot water: Type heater_____; Capacity_____gallons

Recovery rate gal/hr/100° rise_____gallons

III. A cleaning program including water hardness and detergent and sanitizer concentration must be posted in the milkroom. If procedure is changed in any way, a new program must be posted.

IV. A detailed drawing of this installation is required on the reverse side of this application.

V. Any future modifications of this equipment must have prior written approval.

Owner or authorized representative_____

Bulk tank dealer_____

OFFICIAL ACTION

PLAN APPROVAL

Fieldman-signature _____Date _____

Regional sanitarian signature _____Date _____

INSTALLATION APPROVAL

Regional sanitarian-signature_____Date _____

THIS APPLICATION WHEN PROPERLY FILLED OUT AND SIGNED BY THE OFFICIAL AGENCY SERVES AS THE OFFICIAL APPROVAL. IT SHOULD BE POSTED UNDER PLASTIC OR GLASS IN THE MILKROOM.