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# M.D. of Bonnyville No. 87
# Private Sewage Disposal System
# Permit Application

Sewer Permit Label

**Please call or email the MD office prior to concealment to request an inspection.**
**A minimum of 48 hours notice is required.**

PSDS Permit #: _____ Roll #: _____ Application Date: _____

Building Permit # : _____ Permit Issue Date: _____

Permit Type: ☐ Residential Property Owner ☐ Certified PSDS Contractor

Does this installation require building and development permits: Yes ☐ No ☐

Legal Location: PLAN _____ BLK ____ LOT ____ PART_____1/4 SEC _____ TWP _____ RG _____W4M

Rural Address: _____ Parcel Size:_____(acres)

Owner Name: _____

Mailing Address: _____ Postal Code:_____

Phone Number: _____ Other Phone Number: _____

Email: _____

WE PROPOSE TO DO AN INSTALLATION AT THE ABOVE PREMISES ZONED AS: ☐ New ☐ Replacement

☐ Residential ☐ Commercial ☐ Industrial ☐ Institutional ☐ Recreational

DESCRIPTION OF INSTALLATION: _____

**System Design Criteria:**

Expected daily volume of effluent: _____ # of Bedrooms: _____

Depth of Water Table if less than 3m from ground surface: _____

Water Softener: Yes ☐ No ☐ Iron Filter: Yes ☐ No ☐

Reverse Osmosis: Yes ☐ No ☐

**Water Supply Detail:**

Municipal/Community ☐ Dug Well ☐

Drilled Well ☐ Bored Well ☐

Casting Depth (Feet):_____ Capacity (Gallons):_____

Cistern: ☐ Concrete ☐ Fibreglass ☐ Other_____

**FOR INSPECTOR USE ONLY**

**The Permit Holder hereby certifies that this installation will be completed in accordance with the Alberta Safety Codes Act and Regulations and shall be commenced within 90 days. The permit may expire in 2 years. Owner's signature/declaration (homeowner permits only) "I hereby declare I am the owner of the premises in which the work will be conducted and reside on the property. I am doing the work myself and assume responsibility for compliance with the applicable Act and Regulations.**

Total Permit Fee: _____ Job Value: _____

Payment: ☐ Cheque ☐ Cash ☐ Interac

☐ MasterCard ☐ Visa ☐ Invoice Account

Permit Issuer Name: _____

Designation #: _____

Permit Issuer Signature: _____

Agency:_____ (6112) Admin: _____ (6114)

Safety Code: _____ (6113) R#:_____

**OFFICE USE ONLY**

Permit Holder Signature:_____

Permit Holder Name: _____

Certification Number:_____

Estimated Start Date:_____

Estimated Completion Date:_____

Company Name:_____

Mailing Address:_____

_____ Postal Code: _____

Phone: _____ Fax: _____

Email: _____

**The personal information provided in this application package is protected by the Freedom of Information and Protection of Privacy Act. Information supplied in this application package may be used by the Authority having Jurisdiction.**

**Site Evaluation Details:**

Date of Site Evaluation:_____ Time of Day:_____ Number of test pits:_____

Name of Certified Laboratory:_____
Design soil texture Classification (attach lab reports and soil bore logs): _____

Effluent Loading Rate (gal/sq ft/day):_____ Linear Loading Rate (gal/l ft/day)_____

**Plot Plan:**

Attach a drawing showing the layout including:

☐ Location and distances of the septic/holding tank/packaged treatment plant from the house or building, any water sources any bodies of water, property lines, driveways or roadways.

☐ Location and distances of the disposal field from the house or building, any water sources, any bodies of water, property lines and driveways or roadways.

Proposed Treatment and Disposal System:

**Tank Information:**

| **Septic** | **Holding** | **Packaged Treatment Plant** |
|---|---|---|
| ☐ Concrete | ☐ Concrete | ☐ Concrete |
| ☐ Fibreglass | ☐ Fibreglass | ☐ Fibreglass |
| ☐ Plastic | ☐ Plastic | ☐ Plastic |
| ☐ Other:_____ | ☐ Other:_____ | ☐ Other:_____ |

Make/Model:_____ CSA Standard #_____ Working Capacity (gal)_____

**Discharge Information:**

☐ Pump ☐ Siphon

Make/Model:_____ Horsepower:_____

☐ Disposal Field ☐ Treatment Mound ☐ Other:_____

Media:_____ Gravel-depth (inches)_____ Chambers-width (feet/inches)_____

Total Length of Perforated Pipe/Chamber (feet):_____ Number of runs:_____

Length of Each Run (feet):_____ Trench width (feet):_____ Number of trenches:_____

Total Area of Trench Bottom (sq ft):_____

**Attach completed pressure distribution worksheets, trench bottom worksheets and/or mound worksheets from the Alberta Standard of Practice Handbook to support your system design and sizing.**

**If this sewer system is concealed prior to application approval OR prior to final inspection, pictures of the installation and squirt height test are required to be submitted to the MD and/or the Safety Codes Officer (Inspector). This is to ensure the system has been installed to comply with the Alberta Private Sewage Standard of Practice as well as the Safety Codes Act.**

Section 2.1.2.6 of the Alberta Private Sewage Systems Standard of Practice

**1)** On-site wastewater treatment systems designed under the prescriptive requirements of this Standard shall not receive substances and wastewater that could adversely affect the operation of the system, which include, but are not limited to, the following:[1]

a. Storm water
b. Surface water
c. Abattoir waste
d. Sub-surface seepage water from weeping tile systems, foundation drains, or subsoil foundation drainage pipes
e. Clearwater waste from a hot tub, spa or hydro massage bath that is not of the fill-and-drain design, unless the design of the septic system specifically includes capacity for the additional wastewater flow and instantaneous flow conditions the fixture will cause along with the potential disinfectants in the water
f. Clearwater waste from a swimming pool, except that the waste from the area drains around the pool area may discharge into a system
g. Commercial or industrial process wastes
h. Waste from a water filter or other water treatment device, if the on-site wastewater treatment system has not been designed to receive and treat the discharge from the filter or treatment device [2, 3, 4]
i. Wastes from an iron filter (doesn't matter if it uses chemicals or not)
j. Other wastes not considered in the design of the system

[1] Intent: Sentence (1) – The wastewater treatment systems identified in this Standard are intended for treating wastewater. Substances, contaminants and wastewater constituents not typically expected in domestic wastewater require special consideration.
[2] Warning: Clause (1)(h) – The use of water softeners and the discharge of regeneration wastes are not specifically prohibited from discharging to an on-site wastewater treatment system. The use of sodium salts in a water softener is generally more harmful to the soil-based treatment component of a treatment system than the use of potassium-based salts. Increased sodium levels will be present I the domestic water used daily in the house, and may be further increased by the inefficient backwash functioning of a water softener that does not control the regeneration by flow volume. High levels of sodium can reduce the effectiveness of the on-site wastewater treatment system and reduce its life expectancy, particularly when it is located in fine-textured clay soils. Sodium occurring naturally in the groundwater or introduced to the water supply by a water softener using sodium salts may affect the ability of the soil to absorb the effluent. High sodium absorption ratio effluent and the presence of expansive clays, such as montmorillonite clay in the soil may cause a soil-based treatment component to fail. Additional considerations from those set out in the Standard may be required.
[3] Note: Clause (1)(h) – The use of potassium salts as a regeneration agent in a water softener is not expected to have the same negative effect on expansive clays as the use of sodium salts.
[4] Warning: Clause (1)(h) – The discharge of waste from water treatment devices can generate large volumes of water that are not included in flow estimates set out in this Standard. They may generate volumes that cannot be accurately predicted or include substances that are difficult to treat or can harm the system and cause a failure.

Clearwater waste, (as defined in the Standard of Practice), from a water softener and/or reverse osmosis system may discharge into a sewage treatment system when the soil-based treatment component of the overall system is sized to receive the additional flow from the water treatment equipment. Clearwater waste from a water softener, reverse osmosis or iron filter that were not part of the initial design, may be separately discharged into a designated drywell. (A drywell is a vertical drainage shaft or chamber constructed with perforations along its wall that aids the drainage of clearwater waste into the surrounding soil. A drywell is surrounded by crushed drainage rock to enhance infiltration capabilities and provides an additional void space for storage)

# Private Sewage System Design Document Template

## Open Discharge

## PREFACE

This is a Design Document Template for a septic tank and open discharge system. It reflects the information needed to demonstrate the design considerations for the particular site and system required by the Current Private Sewage Standard of Practice have been made. Considerations needed for a particular site may go beyond those used as an example in this document.

While it is preferable to use a consistent format to facilitate quick review, other formats of the design document may be accepted by the Safety Codes Officer (SCO), if the document includes the required information that shows the necessary design considerations were made.

A design is required in support of a permit application. It includes drawings and supporting information as it applies to the specific design. This is the information a SCO will review to evaluate whether design considerations required by the Standard have been adequately made prior to issuing the permit.

Including this design in the operation and maintenance manual that must be provided to the owner, will simplify development of the operation and maintenance manual.

# PRIVATE SEWAGE SYSTEM DESIGN - OPEN DISCHARGE

Date:

Name:
Mailing Address:
City, Province: Postal Code:

**Legal Description of Property:** _____1/4 _____Sec _____ Twp _____ Rng W4M
Plan _____ Block _____ Lot _____

**Municipal Address:**

The sewage system includes a septic tank and open discharge system. This system is suitable for the site and soil conditions of this property. The design reflected in the following applies, and meets, the requirements of the current Alberta Private Sewage Systems Standard of Practice to achieve effective treatment of the wastewater from this residence.

This sewage system serves a _____ bedroom single family dwelling. Based on the characteristics of the home identified during our review, the total peak wastewater flow that must be used for this design is _____ Imp. gallons per day. Although peak flow used in the design is _____ Imp. gal/day, an average operating flow of _____ Imp. gal/day is expected.

## 1 Wastewater Characteristics

### 1.1. Wastewater Peak flow

The development served is a _____bedroom single-family dwelling. The total plumbing fixture unit load in this residence is _____based on a review of the building. This requires _____ Imp. gal/day be added to the base peak daily flow.
Fixture unit load is as follows:

- Main bath = _____ fixture units
- Bathroom with shower off master bedroom = _____ fixture units
- Kitchen sink = _____ fixture units
- Laundry stand pipe = _____ fixture units
- Bathroom in basement = _____ fixture units

_____ high-volume plumbing fixtures were identified in the review of this development.

| | |
|---|---|
| **Total peak daily flow used in the design is:**<br>**Base flow :**<br>**Additional flow :** | **Imp gal/day** |

### 1.2. Wastewater Strength

Characteristics of the development were considered to assess sewage strength. No garbage grinders or other characteristics were identified that would cause typical wastewater strength to be exceeded.

| | |
|---|---|
| **Projected wastewater strength for the design is:** | **BOD 220 mg/L**<br>**TSS 220 mg/L**<br>**Oil and Grease 50 mg/L** |

### 1.3. Wastewater Flow Variation Considerations

The characteristics of this development indicate wastewater flow volumes will not vary substantially during the day or from day to day. No flow variation management is needed.

## 2 Site Evaluation Findings

### 2.1 Site Evaluation

The lot is _____acres in area. The dimensions of the property are shown in the drawing attached in Appendix A. The adjacent property is _____.

The proposed site has been reviewed as to consider the restrictions set out in Section 8.6.2.2 for prohibited open discharge installations. It has been confirmed that the number of subdivided parcels does not exceed 4, excluding the remnant parcel, as set out in the SOP.

The property has a _____% slope toward the _____ property line. Line locates confirmed there are existing utilities in along the _____ property line and an easement is in place.

The site evaluation assessed the area within in a 100 m (330 ft) radius of all components of the system design. No water courses or other setback constraints were noted. Pertinent features identified during the site review and the required setback distances are noted on the site plan in Appendix A.

### 2.2 Soils Evaluation

Two soil excavations were investigated on this site. Test Pit 1 is located at the proposed location of _____. Test Pit 2 is located at the proposed location of_____. As these soil profiles show little variability they are adequate for design purposes. The location of test pit 1 is shown on the site plan in Appendix A. Soil profile descriptions are attached in Appendix B.

**The area selected for the system must be kept clear of any utilities to be installed and no disturbance of the soil in that area can occur.**

## 3 Key Soil Characteristics

### 3.1. Design Soil Conditions

- Redoximorphic features (mottling/gleying) that indicate saturated soil are not present to a depth of 6 feet below surface.
- To a depth of 5 feet the dominate soil is a _____ with blocky grade 2 structure.

### 3.2. Limiting Soil Condition

No limiting condition encountered.

### 3.3. Effluent Linear Loading Rate Design Consideration

The open discharge system design considered the _____% ground slope. Landscaping at the point of discharge will be done to encourage spreading of the effluent.

# 4 Initial Treatment Component Design Details

Details of the initial treatment components required for this design are attached in Appendix C.

## 4.1 Septic Tank and Dose Tank

### 4.1.1 Septic Tank

**The working capacity of the septic tank specified for this design is _____ Imperial gallons.** Specifications for the Model _____ Septic Tank used in this design are shown in Appendix C.

The minimum working capacity required for this development is _____ Imp. gallons based on Table 4.2.2.2 of the current SOP for a _____ bedroom house (_____ Imp. gal/day plus the additional flow of _____ Imp. gal.)

Burial depth of the septic tank at finished grading will be _____ above the top of the tank. This tank is rated for a maximum burial depth of _____. Insulation of the tank is not required as the burial depth exceeds 4 feet.

### 4.1.2 Dose Tank

The dose chamber is integral to the septic tank. It has a total capacity of _____ Imp. gal. This is sufficient capacity to deliver the _____ Imp. gal required for each dose of effluent. It also provides _____ Imp. gal emergency storage above the high effluent alarm setting. Specifications are shown in Appendix C.

### 4.1.3 High Liquid Level Alarm

A _____ high level alarm is specified for this system. It shall be set to activate at _____ inches above the floor of the dose tank.

### 4.1.4 Effluent Filter

An inline _____ inch diameter _____ model _____ effluent filter having an effective opening of less than _____ mm (_____") is used. It creates a head loss of _____ feet at its rated flow of _____ Imp. gal/min. A _____ foot pressure head allowance has been included in the pump selection to allow for partially clogged conditions. A one year service interval is expected with typical flow volumes and wastewater characteristics.

# 5 Effluent Discharge Pipe Design Detail

## 5.1 Effluent Discharge Pipe

The open discharge delivery pressure piping design calculations are provided in detail in Appendix E. The open discharge system schematic drawing is included in Appendix D.

**Pressure head loss due to friction**

The friction loss through the _____ feet of piping and filter at the flow of _____ Imp. gal/min is _____ feet of head pressure.

**Pressure head to meet vertical lift requirements include:**

- Lift distance of effluent from the low effluent level in the tank to the end of the open discharge pipe is _____feet.
- The design pressure head at end of open discharge pipe is _____ feet.

Vertical lift and friction loss results in a **total pressure head** requirement of _____ **ft.**

**Pump specifications:**
Demands for this pressure effluent line are _____ **Imp. gal/min** at _____**feet** of pressure head.

A _____ model _____ effluent pump (_____ hp) is specified for this system. The pump specifications with the effluent distribution system demands plotted on the pump curve are included in Appendix C.

### 5.2 Effluent Dosing Volume and Control settings.

The volume of effluent discharged in a single dose event will be approximately _____% of the peak flow which is _____ gallons.
Liquid volume in 100 feet of _____ inch polyethylene pipe = _____ gallons.
For _____ feet of pipe the volume is _____ Imp. gallons
Total dose volume between on and off float settings =
_____ Imp. gallons + _____ Imp. gallons = _____ Imp. gallons.

**Total individual dose volume** determining float settings is _____ **Imp. gal in order to deliver** _____ **gallons per dose** to the end of the open discharge pipe.

**Effluent Level Float Control Settings**
The dose tank dimensions result in _____ Imp. gallons per inch of depth. The float control elevations shall be set at:

- _____ inches between float off and on elevations [_____ Imp. gal ÷_____ Imp. gal/inch].
- Off: _____ inches off floor of dose tank
- On: _____ inches off floor of dose tank
- Alarm set at _____ inches above pump on elevation (_____ inches off floor based on float elevations set out in this design).

Redundant off float control is not required by this design. No manual pump on switch is included in the system. The effluent level control floats will be attached to a 1 inch PVC pipe independent float mast that will withstand the dose tank environment.

### 5.3 Effluent Quality Sampling
Effluent samples can be taken from the effluent dose tank if required.

## 6 Initial operational set up parameters

The following activities need to be conducted to commission the system:

- Clean the septic tank of any construction debris and flush effluent delivery line.
- Confirm the residual _____ foot head is achieved and the discharge is effectively controlled and directed to prevent erosion.
- Confirm float levels are set to deliver the dose volume required by this design.

## 7 Operation and Maintenance Manual

The Owner's Manual detailing the design, operation, and maintenance of the installed system will be provided to the owner in accordance with Article 2.1.2.8 of the Standard of Practice.

## Signature and closing by the designer/Installer.

This design has been developed by (_____). This design meets the requirements of the current Alberta Private Sewage Systems Standard of Practice unless specifically noted otherwise and in such case special approval is to be obtained prior to proceeding with installation of this design. *( Carry on with any other qualifications or limitations that in your opinion as the designer/installer are needed.)*

**Attachments:**
**Appendix A – Site Information [Site Plan, Drawings, etc.]**
**Appendix B – Soil Information, Soil Profiles, Laboratory Soil Analysis, etc.**
**Appendix C – Specifications for System Components**
**Appendix D – Detailed System Schematics, Drawings and Worksheets**

# Appendix A – Site Information

**Insert your own site plan here. Label it Figure A1**

**If you live in a subdivision, insert part of the subdivision that shows your lot and write proposed site on the lot. Label it Figure A2**

**Please refer to the example document if you are unsure.**

# Appendix B - Alberta Private Sewage Treatment System Soil Profile Log Form

| Legal Land Location | | | | | | | | Test Pit GPS Coordinates | |
|---|---|---|---|---|---|---|---|---|---|
| LSD-1/4 | Sec | Twp | Rg | Mer | Lot | Block | Plan | Easting | Northing |
| | | | | | | | | | |

| | | | |
|---|---|---|---|
| Investigation Date: | Vegetation notes: | Overall site slope | |
| | | Slope position of test pit: | |

| Test hole No. | Soil Subgroup | Parent Material | Drainage | Depth of Lab sample #1 | Depth of Lab sample #2 |
|---|---|---|---|---|---|
| Test Pit #1 | | | | | |

| Hori -zon | Depth (cm) (in) | Texture | Lab or HT | Colour | Gleying | Mottling | Structure | Grade | Consistence | Moisture | % Coarse Fragments |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| | | | |
|---|---|---|---|
| Depth to Groundwater | | Restricting Soil Layer Characteristic | |
| Depth to Seasonally Saturated Soil | | Depth to restrictive Soil Layer | |
| Site Topography | | Depth to Highly Permeable Layer Limiting Design | |
| **Key Soil Characteristics applied to system design effluent loading** | | | |
| Weather Condition notes: | | | |
| Comments (such as root depth and abundance or other pertinent observations): | | | |

# Insert lab analysis results of soil samples taken for determining soil texture!

# Appendix C - Manufacturer's and Design Specifications for System Components

## Insert the specifications about your septic tank from the Manufacturer

## Pump Specifications

**Insert specifications for the pump you are installing. Please refer to the example document for assistance.**

# Appendix D- Detailed System Schematics and Drawings

## Insert the schematics for your system

# Appendix D – Worksheets

## Here you will insert the calculation worksheets. Pressure Distribution, Orifice, Pipe & Pump Sizing is the one to use.

# Pressure Distribution, Orifice, Pipe & Pump Sizing

**This design worksheet was developed by Alberta Municipal Affairs and Alberta Onsite Wastewater Management Association.**

**The completed installation is to comply with Alberta Private Sewage Standard of Practice 2015.**

**This worksheet is for use in Alberta to: size the orifices in distribution lateral pipes, size effluent delivery piping, and to calculate the required capacity and pressure head capability of the effluent pump.**

**It can be used for: calculating delivery of effluent to laterals in disposal fields, mounds and sand filters.**

**This worksheet does NOT consider all of the mandatory requirements of the Standard.**

**It is intended for use by persons having training in the private sewage discipline.**

Note: Page numbers refer to the Private Sewage Systems Standard of Practice 2015.

Use only Imperial units of measurement throughout (feet, inches, Imperial gallons, etc...).

**Step 1) Select the pressure head to be maintained at the orifices:**

Minimum pressure at the orifice:
3/16" or less orifice = 5 ft. Minimum - 2.6.2.5 (1), (p 38)
larger than 3/16" orifice = 2 ft. Minimum - 2.6.2.5 (1) (p 38)

**Design pressure at lateral orifices** _____ ft. **P1**

*Note: worksheet will not provide an adequate design if laterals are at different elevations. Differing elevations will result in a different pressure head and volume of discharge at the orifices in each lateral. Additional considerations must be made for laterals at differing elevations.*

**Step 2) Select the size of orifice in the laterals:**

**Minimum size: 2.6.1.5. (1)(e) p. 37** **1/8"**

**Orifice Diameter selected** _____ in. **P2**

**Note:** larger sizes are less likely to plug.

**Step. 3) Select the spacing of orifices and determine the number of orifices to be installed in distribution laterals:**

| **Length of Distribution Lateral** From system design drawings | | **Spacing of Orifices selected for design** | | **Resulting number of orifices per lateral** | |
|---|---|---|---|---|---|
| _____ ft. | ÷ | _____ ft. | = | _____ | **P3a** |

Select a spacing of orifices to attain even distribution over the treatment area:
Maximum spacings are determined for :
* 5 ft. Primary treated effluent: 2.6.1.5. (1)(e) p. 37
* 3 ft. Secondary treated effluent: 8.1.1.8 & 2.6.2.2 (c) (pp 77 & 38)
* 3 ft. On sandy textured soils: 8.1.1.8 (p. 77)

| | | | | | |
|---|---|---|---|---|---|
| _____ | X | _____ | = | _____ | **P3b** |
| **From P3a** | | Number of Laterals | | Total Number of Orifices All Laterals | |

*If laterals are of differing lengths, calculate each separately and add the number of orifices together.*

**Step 4) Determine the minumum pipe size of the distribution laterals:**

Enter the system design information into the 3 boxes below. If distribution laterals are of differing lengths, each lateral must be considered separately.

| Orifice Diameter | | Length of Distribution Lateral | | Total Orifices Each Lateral |
|---|---|---|---|---|
| | in. | | ft. | |
| From P2 | | From System Design Drawings | | From P3a |

*Use Table A.1.A. (pp 118 - 121) when applying the information entered in this step to determine the minimum size of the distribution lateral pipe.*

**Size of Distribution Lateral Pipe From Table A.1.A.** _____ in. P4

**Step 5) Determine the total flow from all orifices:**

| Total Number of Orifices in all laterals | | Gal/min for each Orifice at Head Pressure Selected | | Total flow from all lateral orifices | |
|---|---|---|---|---|---|
| | X | | Imp. gal /min. = | | Imp. gal /min. P5 |
| From P3b | | From Table A.1.B. (pp 122 & 123) | | | |

**Step 6) Select the type and size of effluent delivery pipe:**

Use Tables A.1.C.1 to A.1.C.4 (pp 124 - 127) to aid in decision. A larger pipe will reduce pressure loss.

| Type of pipe used for effluent delivery line | Pipe size selected | |
|---|---|---|
| | | inch - NPS P6 |

Choose a friction loss from Tables A.1.C.1 to A.1.C.4 in between the bolded lines to ensure a flow velocity between 2 to 5 feet per second. The pipe size selcted will affect the amount of friction loss the pump must overcome to deliver effluent.

**Step 7) Calculate the equivalent length of pipe for pressure loss due to fittings:**

**Insert total from Worksheet "A" on last page (p.5) of this Pressure Distribution Worksheet**

**Equivalent Length of All Fittings** _____ ft. P7

For Pressure Loss

**Step 8) Calculate the equivalent length of pipe from pump to the farthest end of header of distribution laterals for pressure loss:**

| Length of Piping (ft) | | Equivalent Length of Fittings (ft) | | Length of Pipe for Friction Loss (ft) | |
|---|---|---|---|---|---|
| | + | | = | | P8 |
| Length from pump to farthest end of distribution header supplying laterals. | | Equivalent fitting length from P7. | | Used to determine total pressure head loss due to friction loss in piping. | |

**Step 9) Calculate the pressure head loss in delivery pipe including fittings:**

| Total Length of Pipe for Friction Loss | | Friction Loss per 100 feet of pipe | | Delivery Piping Pressure Head Loss | | |
|---|---|---|---|---|---|---|
| Divide by 100 ft. | X | | ft. = | | ft. | P9 |
| From P8 | | | | | | |
| Don't forget to divide the length by 100 feet to match the factors in the tables. | | Use Tables A.1.C. On pp 124 - 127 using flow volume from P5. | | | | |

**Step 10) Calculate the total pressure head required at pump:**

| | | | |
|---|---|---|---|
| Delivery piping pressure loss | | ft. | From P9 |
| + | | | |
| Lift distance of effluent from effluent level in tank to orifices | | ft. | Measure from lowest effluent level in tank to elevation of orifices. |
| + | | | |
| Design pressure at orifices | | ft. | From P1 |
| + | | | |
| Head loss allowed if an inline filter is used in pressure piping | | ft. | **Explain Pressure Loss Allowed if Applied** |
| + | | | |
| Add 1 ft to allow for pressure loss along the distribution lateral | 1 | ft. | |
| **Total minimum pressure head pump must provide at Imp. gal/min required to supply orifices** | | ft. | P10 |

**Step 11) Select the size of the drain back orifice if used and determine the flow from the drain back orifice. Then calculate total flow requirement for pump:**

| Size of Drain Back Orifice | | Determine flow using Head Pressure at Drain Back Orifice | | Flow from all lateral orifices | | Total Imp. Gallons per Minute from the pump | | |
|---|---|---|---|---|---|---|---|---|
| | in. | | Imp. gal /min | + | Imp. gal /min | = | Imp. gal /min | P11 |
| | | Use pressure head from P10 to find flow from Extended Table A.1.B.1 | | From P5 | | | | |

**Step 12) Details of the pump specifications required:**

| Required Flow Rate (Imp. gal/min) | | Required Pressure Head (ft) |
|---|---|---|
| | @ | |
| From P11 | | From P10 |

Imp. gal (P11) multiplied by 1.2 = U.S. gallons

**Required Flow Rate (US gal/min)**

Select the appropriate pump by reviewing the pump curve of available pumps. Select a pump that exceeds the requirments set out in this step by approximately 10% considering both pressure head and volume.

**Step 13) Consider the pumping demands of the system. If they are considered excessive, redesign the pressure distribution system and recalculate the pump demands.**

**Worksheet "Appendix A" Determine Equivalent Length of Pipe due to fittings in piping system.**

Determine the equivalent length of pipe to allow for friction loss due to fittings in the piping system:

| | Number of Fittings | | Friction loss as per Table A.1.C.5 or 6 (p. 128) | | Total |
|---|---|---|---|---|---|
| 90° Elbows | | x | | = | |
| | | | | + | |
| 45°Elbows | | x | | = | |
| | | | | + | |
| Gate and Ball Valves | | x | | = | |
| | | | | + | |
| Tee-on-Branch (TOB) | | x | | = | |
| | | | | + | |
| Tee-on-Runs (TOR) | | x | | = | |
| | | | | + | |
| Male iron pipe Adaptors (MIP) (M/F Threaded Adaptors) | | x | | = | |
| | | | | = | |
| Total Equivalent Length of pipe to allow for fittings in piping system | | | (Enter this total, Box P7) | | |