

ENGINEERED SIPHONIC ROOF DRAINAGE SYSTEM

The purpose of this checklist is to provide guidance and information in the design of an engineered siphonic roof drain system. This checklist will help ensure that all engineered siphonic roof drainage systems when submitted can be reviewed efficiently to verify compliance with the requirements of the Minnesota Plumbing Code. The design engineer is responsible for the design of the engineered siphonic roof drainage system and for compliance with MN Rules, part [4715.2790](#). To avoid delays during plan review and construction, it is recommended the following information be considered and addressed in advance of submitting plans. All required documents requested below must be submitted to DLI for review of the engineered siphonic roof drainage system. Please be advised that the checklist is subject to change and additional requirements may apply.

General/administrative:

- 1. The siphonic roof drainage system is not allowed at Minnesota Department of Health (MDH) Licensed Healthcare Facility, unless specific approval is granted from DLI and the MDH licensing authority.
- 2. Obtain signed documentation from the city building official stating that an engineered siphonic roof drainage system is acceptable and has no objection for the proposed project. The official must confirm that final engineer certification will be filed with the city and a copy forwarded to DLI prior to issuing a certificate of occupancy.
- 3. Submit a complete set of engineered plans and specifications signed by the MN licensed Professional Engineer that is responsible for the design.
- 4. Provide documentation or a report from the design engineer that includes the following information:
 - The design engineer is practicing within their areas of expertise.
 - The siphonic roof drainage system is designed in accordance with American Society of Plumbing Engineers (ASPE) 45 and in accordance with all manufacturer recommendations and requirements.
 - Calculations of the siphonic roof drainage must be signed and sealed, and must include performance data, including min. & max. operating pressures and velocity.
 - The design engineer shall confirm that the siphonic to gravity TRANSITION location has been designed according to the siphonic roof drainage sizing and venting requirements (ASPE 45, section 9.9.3) and coordination has been made with the civil site engineer to make provisions for proper transition location. Pipe freezing provisions must be addressed at the building storm sewer as well as any possible surcharge to the building storm drainage system.
 - The design engineer understands: that upon completion of installation of the system and prior to final plumbing inspection, the engineer shall provide written certification to DLI and the local Building Official; that the installed siphonic roof drainage system has been inspected (final walk-through) by the design engineer and that the system as installed is in accordance with their certified design, plans, specs and calculations according to ASPE 45.
- 5. Manufacturer design software must be in accordance with ASPE 45. Required documentation from the manufacturer must be submitted stating that the software is in compliance with ASPE 45.
- 6. To ensure proper operation and maintenance of the system, the design engineer should provide the owner final design drawings, specifications, and recommended and required maintenance and operation procedures at the completion of the final walk-through.

Design Criteria:

- 1. Siphonic roof drainage system must be sized at a minimum rainfall rate of 4 inches per hour.
- 2. Design to ASPE 45 and followed all manufacturer's recommendations and requirement.
- 3. Roof drains must meet ASME A112.6.9, Siphonic Roof Drains and provide strainers in accordance with part 4715.2760, subpart 1.
- 4. When designed for water accumulation for control flow, the roof must be designed for the maximum possible water accumulation according to chapter 1305 and part [4715.2780](#), subpart 1, item C.

- 5. *Pipe and fitting materials must be in accordance with ASPE 45.* The following documentation is required:
 - Manufacturer approval of the proposed material** for siphonic drainage system (see ASPE 45 sect. 2.1.3).
 - Manufacturer warranty of the proposed material at testing conditions specified in ASPE 45, section 12.6 (1.5 times max. pos. pressure but not less than pos. pressure of 13 psig or 30 ft w.c.).
 - Because of the unique pipe configuration for balancing the system for proper functioning, additional manufacturer information is required when PLASTIC piping is considered for the project. The engineer must review the expansion and contraction of the plastic material to the extreme design performance of the siphonic system and obtain manufacturer documentation stating that the selected plastic material will not impact the design and operation of the system.
- 6. Transition to gravity flow **MUST** be at an approved location by the Administrative Authority and meets the following conditions.
 - Proper transition manhole should be located outside of building.
 - Transition manhole is vented in accordance with ASPE 45, section 9.9.2. Catch basin grate cover in accordance with section 9.9.2 may be used.
 - Where necessary, freezing provisions for exterior piping and connections must be made (see parts 4715.0340, subp. 4).
- 7. The velocity at the transition location has been reduced to less than 3 feet per second to break from siphonic action. Inlet piping to manhole must be flare out at min. run of 10 or more pipe diameters prior to manhole. See ASPE 45, section 9.9.3.
 - Inlet pipe into the manhole should enter at higher elevation than outlet pipe.
 - The gravity portions of the building storm sewer (MH outlet pipe) must meet the gravity flow sizing (MN Rules, part 4715.2710). All gravity flow must be pitched at 1% pitch min.
- 8. Minimum pipe size must be 1-1/2 inches.
- 9. Horizontal pipe size must not reduce in the direction of flow.
- 10. All pipe sizes and cleanouts in the drainage system must be designed and installed according to ASPE 45.
- 11. The plans and specifications for the drainage system must indicate the siphonic roof drainage system as an engineered method used for the design.
- 12. System marking Requirements:
 - The specifications must include requirements for the siphonic roof drainage piping to be permanently and continuously marked at approved intervals, should not be more than 25 feet, and clearly at points where piping passes through walls and floors.
 - Roof drains must be marked in accordance with ASME A112.6.9.
- 13. Provisions must be made to prevent movement in the piping and fittings. Above ground horizontal pipe and fittings must be supported or braced accordingly (at all changes in direction).
- 14. The design has incorporated cleanout provision in accordance with ASPE 45 for proper maintenance.
- 15. Provision for overflow roof drainage system (secondary system) must be in accordance with Chapter 1305.
- 16. Any overflow roof drainage system (secondary system) is **NOT** connected to a siphonic primary roof drainage system.

Testing Requirements:

- MN Rules, part 4715.2790 requires testing be performed in accordance with ASPE 45, Section 12.6. The following shall be considered:
 - All pipe sections tested at 1.5 times max. pos. pressure, but not less than a pos. pressure of 13 psig or 30 ft w.c. & maintained for one hour. Safety should be considered and hydrostatic testing is recommended.
 - The engineer shall verify and make provision in the project specification to have the plumbing contractor confirm the capability to meet the testing requirements specified in ASPE 45. Most contractors are not aware or do not have the equipment or resource to provide this testing. Subcontracting may be necessary.