ZURN®

Siphonic
Drain System

Engineered Water Solutions for Today's Building Design Needs

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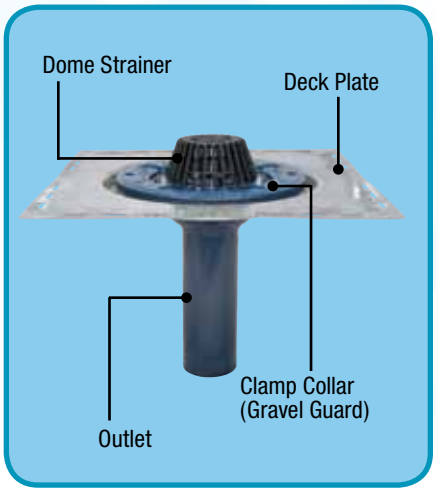
Zurn is proud to provide a patented specified roof drain product for siphonic roof drains.

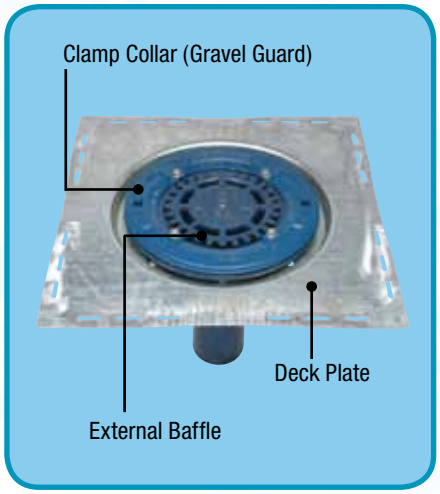
1. Zurn Siphonic Drains provide full bore flow when used in conjunction with a fully engineered design piping system.
2. The Zurn Siphonic Drain is fully tested and certified in accordance to ANSI/ASTM 112.6.9 *Siphonic Roof Drains.*
3. Zurn Siphonic Roof Drains are made of an acid-resistant epoxy coated iron body and utilize many accessories of our gravity roof drain systems, making it familiar and easy for the contractor to install.
4. Fully secured, dual air baffle provides double protection against debris and allows the drain to go siphonic with just two inches of water above the drain body. This provides quicker siphoning action versus other designs, which require between 3"-4" of water buildup before siphoning action occurs.

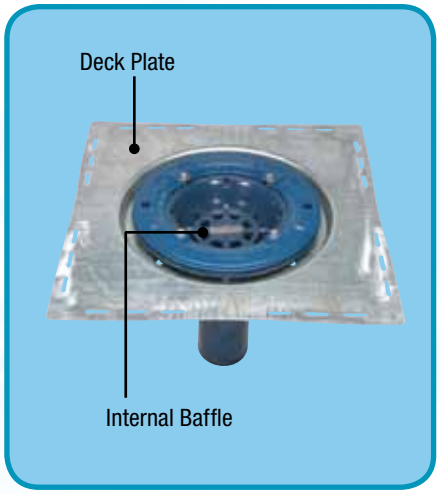
Brief History of Siphonic Systems

1. Developed in Finland in 1968, the siphonic drain is designed to operate with the expectation of 100% full flow which results in increased discharge, smaller pipe diameters, and no drainage slope.
2. In 1999, the Boston Convention Center was the first building in the United States to use siphonic drainage.
3. Siphonic drainage is used in about 20% of commercial construction projects in Europe today.
4. Common European applications: malls, warehouses, factories, and low rise buildings with large footprints.

Components of a Siphonic System







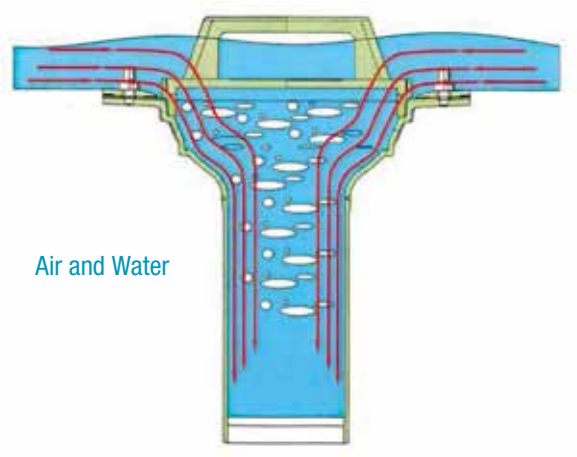
Specifics of Siphonics

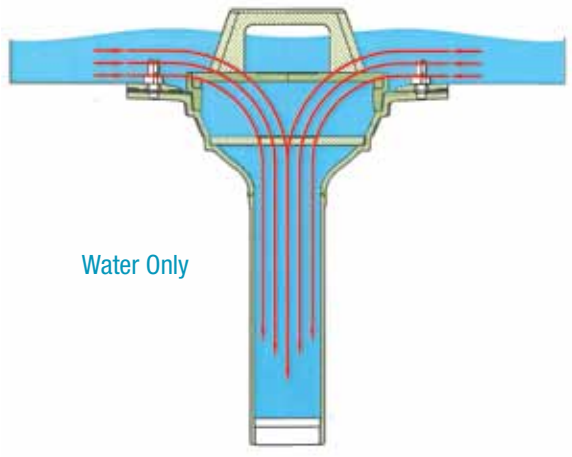
The key to the operation of a siphonic system is eliminating all air from entering the piping system. This is achieved by placing an engineered secured baffle into the base of the sump that breaks up the Coriolis Effect of rotating water (outlet primer). Atmospheric pressure then forces the liquid straight down, without the air. This pressure becomes the driving force of the system. The rainwater then travels to the horizontal piping, located just below the roof. In this section, the water is depressurized and piping size will increase to accommodate multiple drains accordingly. When the rainwater hits the vertical stack, it stays at full bore flow but continues to pressurize as it moves downward to the zero point (Siphonic Break).

The driving hydraulic head of the system is the entire height from the top of the roof to the discharge point as opposed to a conventional system where only the roof water acts as a head pressure. Because of this, the siphonic system allows higher flow capacities and velocities than a conventional system with the same sized piping. Due to the higher velocities, the system is considered "self-cleaning." Any debris in the pipes will be forced out by the fast moving water. This "self-cleaning" system does not mean that it is maintenance free, though. Regular roof maintenance should be continued to prevent blockages at the drain inlet.

A Zurn Siphonic Drain only acts in this fashion when at least 2 inches of water are on the rooftop. In situations where less than this amount of water is on the roof, the drain cycles between conventional and siphonic drainage.

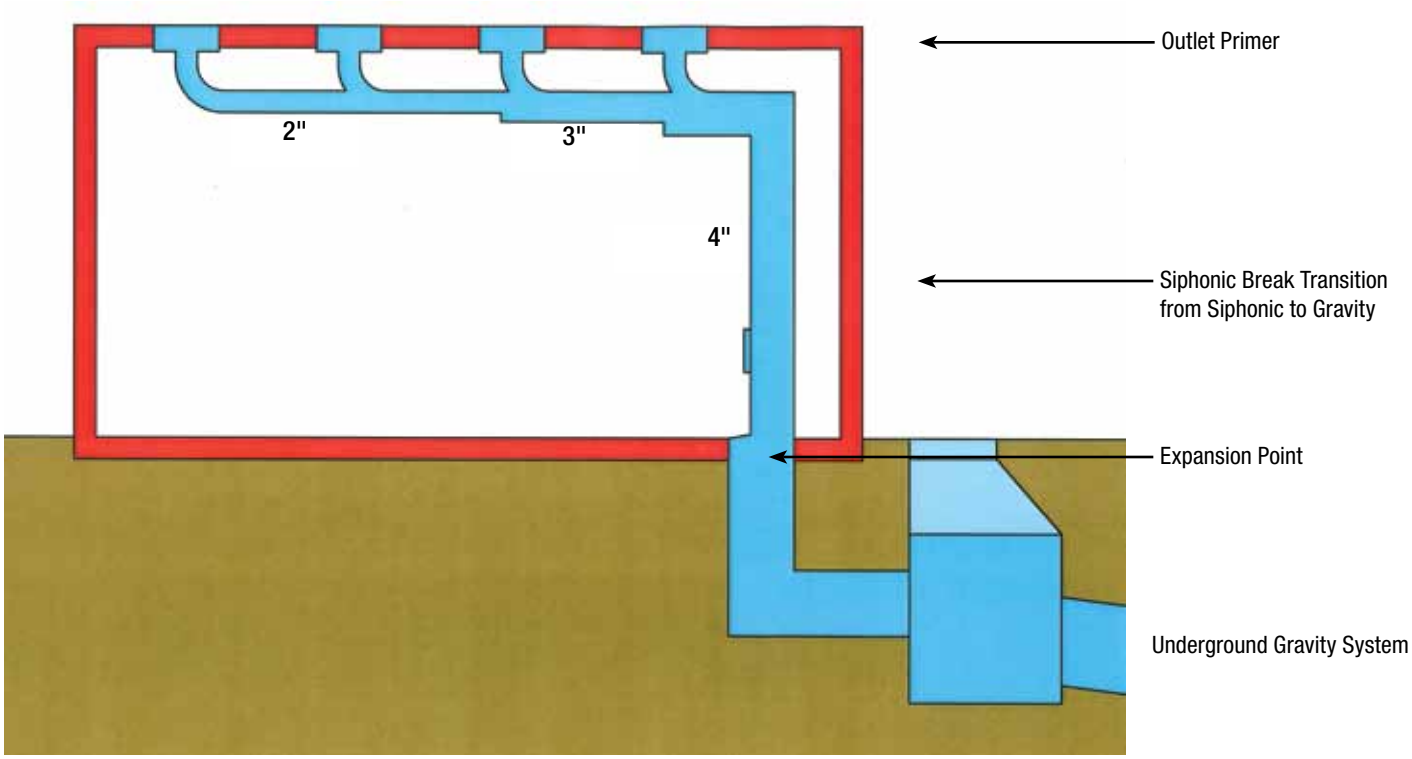
Conventional (gravity) Drainage Versus Siphonic Drainage:



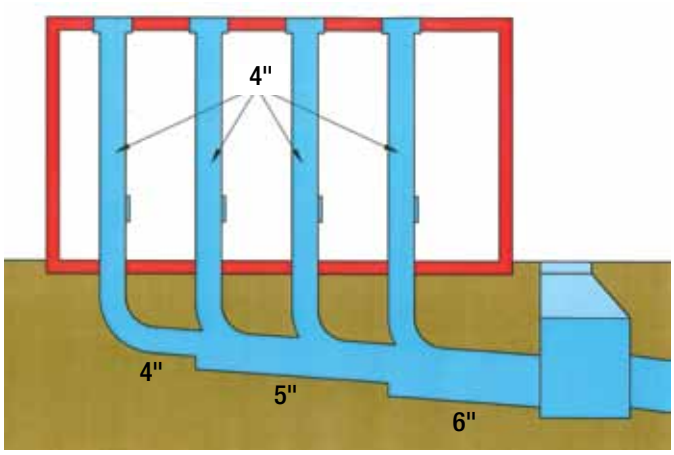


How it Works

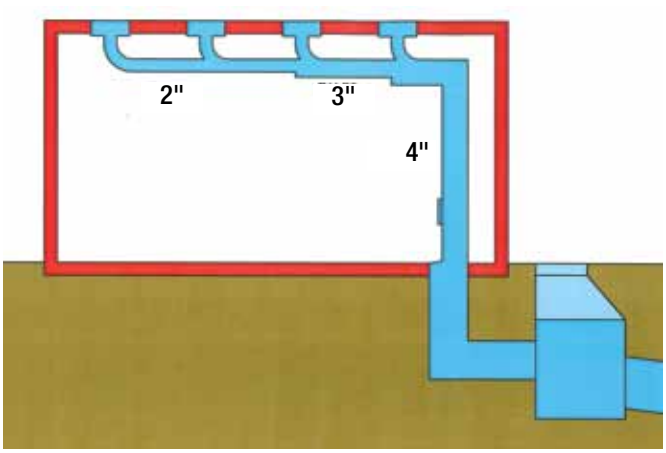
- Siphonic drainage can be achieved by adding/securing a highly engineered air baffle to the sump of a standard conventional drain.
- This air baffle prevents vortex flow while restricting air from entering the vertical tailpipe and horizontal collector piping.
- As water forces air out, a negative head pressure is created in the collector pipe and the water is sucked off the roof.
- In a Zurn Siphonic Drain, full-bore flow occurs with 2 inches of water above the air baffle.
- Multiple drains can flow into a common horizontal collector pipe. This pipe eventually turns downward into a vertical downspout and transfers to conventional gravity drainage when below grade.
- When not operating under full flow, the system drains like a gravity system.



Gravity Roof Drain System:



Siphonic Roof Drain System:



Summary of Benefits of Siphonic

- No pitch requirement in piping to induce flow.
- Smaller pipe diameters get equal flow rates.
- Flow Rates of Zurn Siphonic: 2" - 149 GPM, 3" - 380 GPM, 4" - 704 GPM.
- Vertical stack placement is flexible.
- Higher flow velocities help to clean pipes. No cleanouts necessary in system.
- More efficient than conventional drainage.
- Use of recycled materials.

Gravity Roof Drains Systems Versus Siphonic Roof Drain Systems

Gravity

– **Conventional flow.** Piping is only filled up 1/3 to 2/3 of the way with water. The rest is air.

– **Pitched horizontal piping.** Must drop down from roof surface and take up room in the ceiling.

– **Lower drainage velocities** due to atmospheric pressure in the system.

– **Flow rate relies on head pressure**, or amount of water on roof.

– **Water flows naturally** through the system due to the gradient. Air is necessary to balance pressure.

– **Larger pipe diameters** create increased construction costs.

– **Higher construction costs** because more downspouts mean more excavation and underground pipe.

Siphonic

+ **Full-bore flow.** Piping is completely filled with water, providing the most efficient drainage solution.

+ **Level horizontal piping.** Piping takes up less room and can run right below rooftop.

+ **Higher flow velocities** due to negative system pressures forcing the water through.

+ **Flow rate is constant while siphoning.** Distance from roof to discharge point acts as driving head for the system.

+ **Siphoning action forces water through** level pipes. Piping full water creates negative pressures in pipe and higher flow velocities.

+ **Smaller pipe diameters** drive building cost down.

+ **Lower construction costs** due to the need for less downspouts which makes for less excavation work and less ground pipe.

General Product Description

Zurn Industries offers a variety of siphonic drains and options. The standard siphonic drain is the Z130, 15" diameter. Outlet sizes include 2", 3" and 4" No-Hub connections. The drain and clamp collar are made from ductile iron while the low-silhouette dome is available in either polypropylene, aluminum, rough bronze, or iron. The air baffle and interior grate are cast iron. Stainless steel vandal-proof (VP) hardware is standard to help reduce corrosion in the assembly.

Zurn Siphonic Roof Drains use many basic roof drain options. Zurn deck plate (DP) comes standard with all siphonic drains to attach to the roof. A drain riser (DR) and adjustable extensions (EB) assist in leveling the roof drain during construction. For rooftop gravel applications, a gravel guard (84) is available to ensure proper drainage.

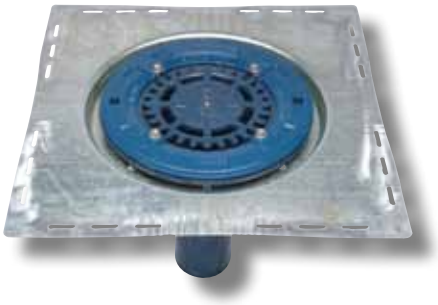
Also available in the siphonic system is the Z131 overflow drain. This overflow drain can be used in conjunction with a standard siphonic system to provide both primary and secondary drainage.

Siphonic Options

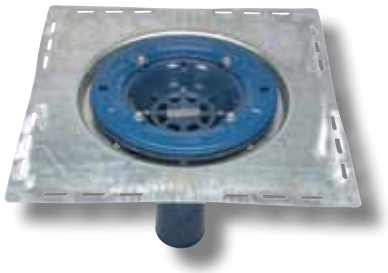
Z130

Z131

Z130 Less Dome



Z130 Less Dome, Less Grate



Z130-EB

Z130-DR

Siphonic Roof Drain Data

Model	Resistance Coefficient	Maximum Flow Capacity		
Z130	K	CFS	LPS	GPM
2"	0.21	0.33	9.3	147
3"	0.48	0.85	24.0	380
4"	0.48	1.57	44.4	704

Zurn Siphonic Drainage System Environmental Benefits

The Zurn Siphonic Roof Drain System provides green benefits to the building owner. Zurn Siphonic Roof Drain design can help buildings reduce energy consumption, conserve water, reduce the depletion of natural resources, and reduce construction costs.

Green Benefits of Zurn Siphonic Drain System

- Reduces site disturbance by collecting multiple drain outlets below the roof instead of underground.
- Reduces storm water runoff by reducing the number of discharge points. Zurn Siphonic Drains can discharge multiple roof drain outlets into one vertical runoff pipe.
- Manufactured from post-consumer recycled materials. All Zurn cast iron, plumbing, and drainage products contain post-consumer recycled materials.
- Provides an innovative design solution that reduces the amount of drainage pipe, reduces the diameter of the drainage pipe, and provides more free space per square footage in the building.
- Significant cost savings can be achieved by using a well-planned Zurn Siphonic Drainage design.

Rainwater Harvesting

Rainwater harvesting is a relatively simple and effective method of retaining drained roof water for re-use. Captured rainwater can be used for many applications on a property that uses non-potable water. These applications include irrigation, urinal and toilet flushing, supply for overhead sprinkler systems, and ground hydrant uses. By using the “free” water from the sky, your utility bills will be lowered.

Another benefit of rainwater harvesting is that it helps reduce the chance of flooding in the storm sewers. By diverting the rainwater to another source, the water entering the standard drainage system is minimized and can help the sewer from becoming overwhelmed in heavy downpour situations.

Siphonic drainage is ideal for rainwater harvesting due to the minimal number of downspouts. Fewer downspouts make it easier to transport the rainwater from the roof to a retention area. Such areas include rain barrels, cisterns, drainage ponds, and other storage tanks.

Siphonic Estimate

To determine the number of drains:

1. Select location of the drains on the roof.
2. Select the location of the down pipe.
3. Horizontal collector pipe length should not exceed 20 times the building height.
4. Maximum distance between SDS drains with a common collector pipe is 65 feet.
5. Use the below chart to select the number of drains based on square feet and rainfall data.

* Note: this tool can be used for a quick estimate for number of drains – must have system designed by Zurn for complete piping layout.

SDS with Air Baffle, Machined Collar Clamp, and Zurn Dome

Roof Drain Vertical Requirement for Horizontal Roof Areas at Various Rainfall Rates											
Leader Size		Hourly Rainfall in Inches									
Pipe Size (in.)	Open Area (sq. in.)	1	1.5	2	2.5	3	4	5	6	7	8
		Total Square Footage Covered per Drain *									
2	2.66	14,188	9,458	7,094	5,675	4,729	3,547	2,837	2,364	2,026	1,773
3	6.33	36,614	24,409	18,307	14,645	12,204	9,153	7,322	6,102	5,230	4,576
4	12.17	67,736	45,157	33,868	27,094	22,578	16,934	13,547	11,289	9,676	8,467

* Theoretical value based on ideal condition of our tests in the University of Munich (without safety factor)

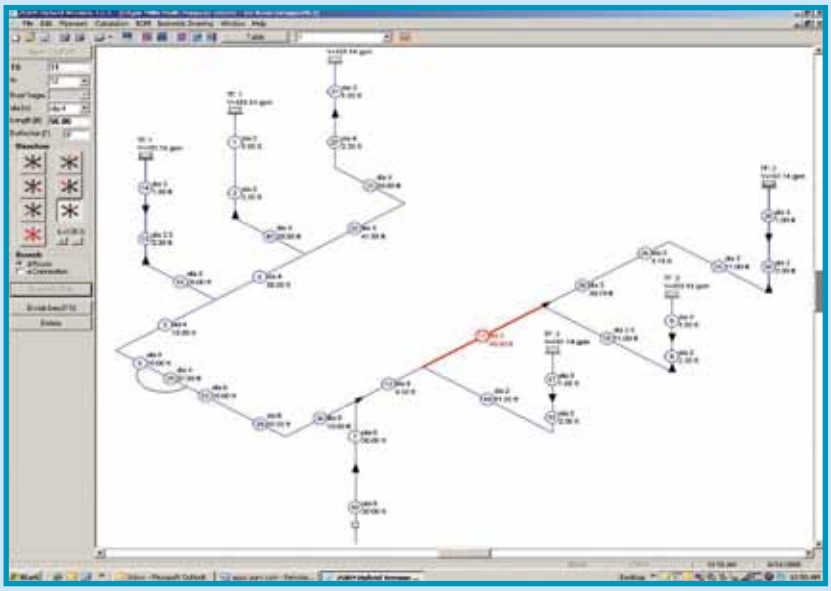
Siphonic Design Questions

We will require building plans including roof layout and building sections as a DWG file. Additionally the below questions must be answered:

1. What kind of roof construction is it? (details, surface)
2. What are the measurements of the sections of the roof?
3. Is there a specific location the roofer would like the drains to be placed?
4. Will a rainwater harvesting system be used on this project?
5. What is the rainfall data for the area?
6. Do you have ground plans for the building sections?
7. Where do you want the down pipe located?
8. What material of piping are you using? (PVC, cast iron)
9. What is the minimum height of the horizontal drainage pipe?
10. Are there any specific areas where drains cannot be located?
11. Are overflow drains required?

Zurn Siphonic Software Program

Zurn Siphonic Software Sizing



Zurn Siphonic Sizing program gives the customer the ability to calculate pipe size layouts to provide a design that provides aesthetic and functional benefits to the owner. In the Design View of the software, the customer can change diameter, length, direction, and angle of any of his pipe sections to fit his needs. Once a change is made a simple calculation button is clicked and all calculations are updated. This software provides a quick solution to laying out and modifying your siphonic design. All design calculations are in accordance to ASPE and ANSI Standards.

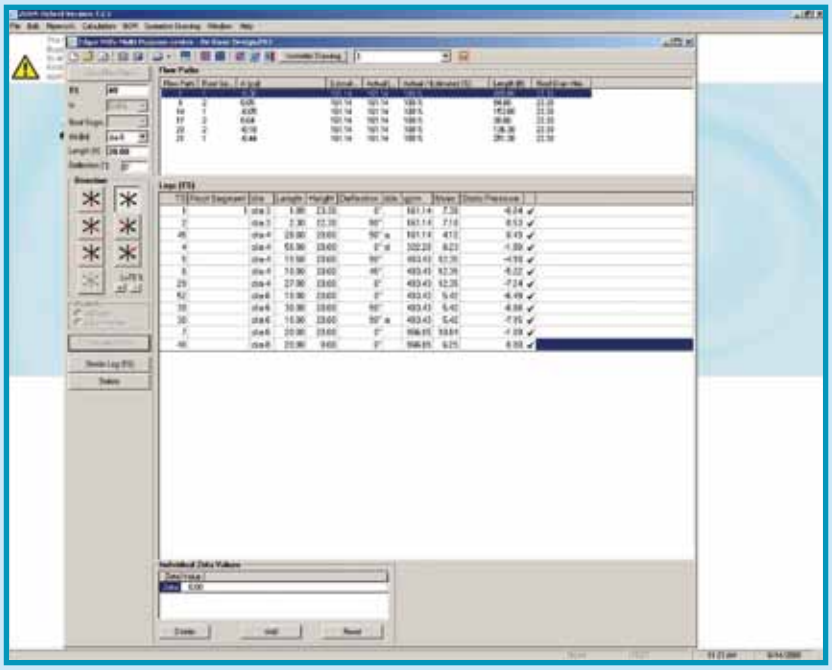
All design flow paths are to be designed to provide balance between available head in the system and the friction loss in the pipe design. This balance in the system is done by changing pipe diameters – increasing pipe size to reduce pressure and decreasing pipe size to increase pressure.

Zurn Siphonic Data View

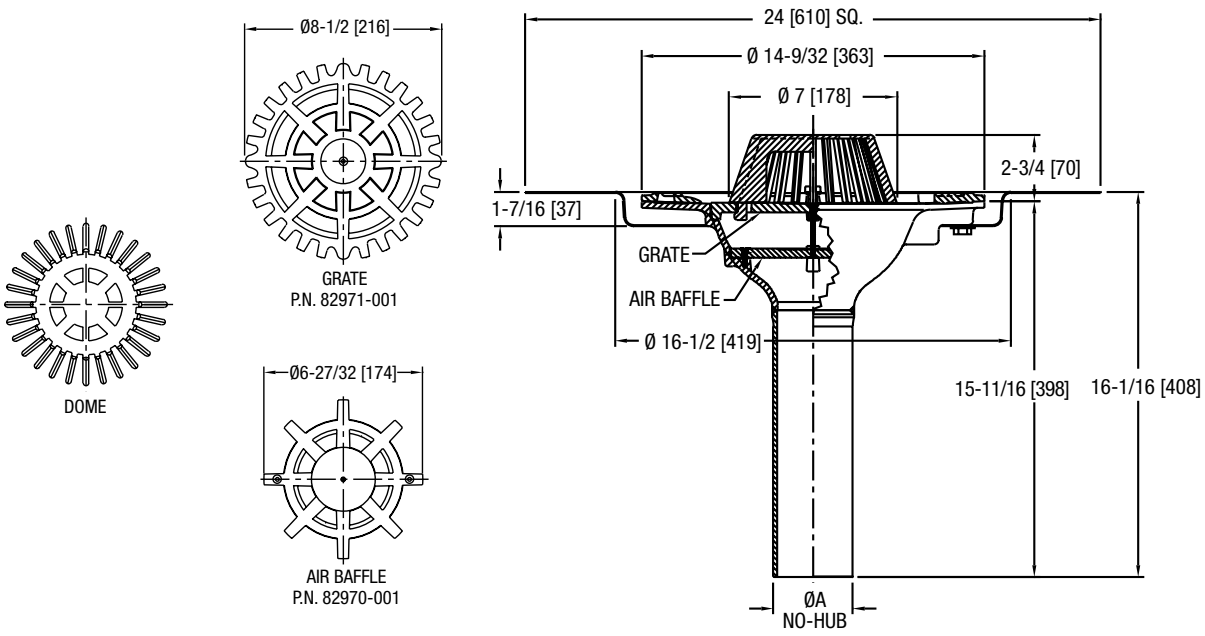
Zurn Software Data View provides the designer results from each section of his design view. Pipe changes can be made in either Design or Data View to bring the design within the allowable parameters. After each change selecting the simple calculation button will update both design an data view of the software.

Zurn Software uses hydraulic parameters that alert the designer when the system is out of specification. The designer must modify the highlighted section to make sure the system will work properly.

Zurn Software will be distributed through a download link. Please contact the factory or your local representative to receive a copy. Please note that training will be required before using the software.



Engineering Specification: Z130
14-9/32 [363] Diameter Siphonic Main Roof Drain



Dimensional data (inches and [mm]) is subject to manufacturing tolerances and change without notice.

Pipe Size In. [mm]	Approximate Weight Lbs. [kg]	Dome Open Area Sq. In. [cm²]
2-3-4 [51-76-102]	44 [20]	103 [665]

Engineering Specification: Zurn Z130 14-9/32 [363] diameter siphonic roof drain with Dura-Coated ductile iron drain body, membrane flashing clamp, and low silhouette poly-dome. Complete with vandal-proof secured, Dura-Coated cast iron air-restricting baffle and grate, and Top-Set® deck plate.

Options (check/specify appropriate options)

Pipe Size (specify size)

2-3-4 [51-76-102]

Outlet

____ NH No-Hub

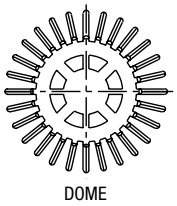
Prefixes

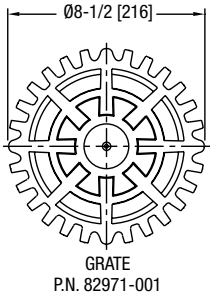
____ Z Dura-Coated Ductile Iron Body with Poly-Dome

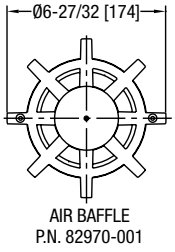
Suffixes

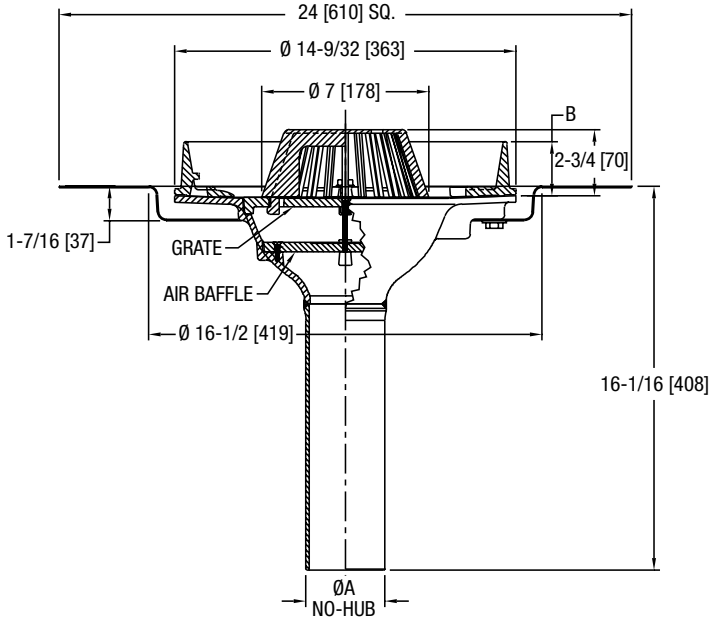
____ -DR Top-Set® Drain Riser
____ -EB Top-Set® Adjustable Extension Assembly
____ -LD Less Dome
____ -LG Less Dome and Grate
____ -VP Vandal-Proof Secured Top
____ -84 Stainless Steel Perforated Gravel Guard

Engineering Specification: Z131
14-9/32 [363] Diameter Siphonic Overflow Roof Drain









Dimensional data (inches and [mm]) is subject to manufacturing tolerances and change without notice.

Pipe Size In. [mm]	Approximate Weight Lbs. [kg]	Dome Open Area Sq. In. [cm²]
2-3-4 [51-76-102]	44 [20]	103 [665]

Engineering Specification: Zurn Z131 14-9/32 [363] diameter siphonic overflow roof drain with Dura-Coated ductile iron drain body, [ ] high external combination membrane flashing clamp/ overflow gravel guard, and low-silhouette poly-dome. Complete with vandal-proof secured, Dura-Coated cast iron air-restricting baffle and grate, and Top-Set® deck plate.

Options (check/specify appropriate options)

Pipe Size (specify size)

2 [51]
3-4 [76-102]

____ NH No-Hub
____ NH No-Hub

"B" Dimension

2-1/4 [57]
3-5/16 [84]

Prefixes

____ Z Dura-Coated Ductile Iron Body with Poly-Dome*

Suffixes

____ -DR Top-Set® Drain Riser
____ -EB Top-Set® Adjustable Extension Assembly
____ -VP Vandal-Proof Secured Top

* Regularly furnished unless otherwise specified.

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