PLUMBING

NAPSYS™-LR PVC DWV 25 and NAPSYS™-HR PVC DWV 25/50 Pipe & Fittings Installation Guide

Rated for Low Rise and High Rise Applications

Westlake Pipe & Fittings

NAPSYS™-LR PVC DWV 25 and NAPSYS™-HR PVC DWV 25/50 Pipe & Fittings Installation Guide

Preface

This guide is intended for use by installers, supervisors, and inspectors responsible for the installation of NAPSYS™-LR PVC DWV 25 and NAPSYS™-HR PVC DWV 25/50 Pipe and Fittings by providing details on system design and usage. This document serves as a supplement to basic PVC DWV system knowledge. It provides guidelines for correct receiving, handling and installation of PVC Pipe and Fittings. If used correctly, the information in this booklet can help maximize product performance and minimize the possibility of field problems. PVC DWV systems are gravity drainage systems, used for the transport of stormwater and sewage. The use of PVC DWV systems for the transport of compressed air or gases is strictly prohibited and may result in injury or death.

This booklet is not intended to assume the authority of the Design Engineer. System requirements and actual field conditions may vary significantly. The sole responsibility for all design and installation decisions lies with the Design Engineer.

All Local Health and Safety Regulations must be followed.

This booklet is also available electronically on the Westlake Pipe & Fittings' website, www.westlakepipe.com.

Introduction

About PVC DWV

Westlake Pipe & Fittings manufactures PVC (poly vinyl chloride) pipe and fittings that can be used in both combustible and noncombustible buildings for drain, waste and vent (DWV) piping systems. Our products can be used in residential, industrial, commercial and institutional buildings, and are available in 1½ to 18 inch diameters and 12 and 20 foot lengths.

NAPSYS-LR PVC DWV 25 and NAPSYS-HR PVC DWV 25/50 are long-lasting, durable pipe and fitting product lines specifically developed for use in DWV applications. Both systems are certified to CSA B181.2 and are designed to meet the Canadian National and Provincial Building Code requirements for noncombustible construction.

NAPSYS-LR PVC DWV 25

NAPSYS-LR PVC DWV 25 system (fittings, pipe, solvent cement and primer) is certified with a flame-spread rating of 20 when tested to CAN/ULC-S102.2. (Rating requirement for nonmetallic pipe used in low rise noncombustible construction is 25 or lower).

NAPSYS-HR PVC DWV 25/50

NAPSYS-HR PVC DWV 25/50 system (fittings, pipe, solvent cement and primer) meets Canadian National and Provincial Building Code-specified flame-spread and smoke-developed ratings for high-rise buildings (NBC 3.2.6) and ceiling spaces used as air plenums (NBC 3.6.4.3). NAPSYS-HR PVC DWV 25/50 is certified with a flame spread rating of 0 and smoke developed rating of 50.

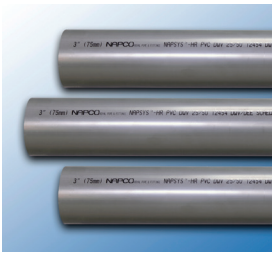
Installation Notes

Both systems can be easily identified by the color. NAPSYS-LR PVC DWV 25 is a lighter grey than the grey NAPSYS-HR PVC DWV 25/50.

Be sure the print lines are visible after installation to simplify inspection.

NAPSYS-LR PVC DWV 25

NAPSYS-HR PVC DWV 25/50



Pipe Dimensions

Following are pipe dimensions for both NAPSYS-LR PVC DWV 25 and NAPSYS-HR PVC DWV 25/50.

NAPSYS-LR PVC DWV 25 & NAPSYS-HR PVC DWV 25/50 Pipe Dimensions			
Diameter mm (in)	Average Outside Diameter mm (in)	Average Wall Thickness mm (in)	Length ft
40 (1½)	48.3 (1.900)	3.9 (0.155)	12
50 (2)	60.3 (2.375)	4.2 (0.164)	12
75 (3)	88.9 (3.500)	5.8 (0.229)	12
100 (4)	114.3 (4.500)	6.4 (0.251)	12
150 (6)	168.3 (6.625)	7.5 (0.297)	12
200 (8)	219.1 (8.625)	8.7 (0.342)	12, 20
250 (10)	273.1 (10.750)	9.8 (0.387)	12, 20
300 (12)	323.9 (12.751)	10.9 (0.431)	12, 20
350 (14)	355.6 (14.000)	11.8 (0.463)	20
400 (16)	406.4 (16.000)	13.5 (0.530)	20
450 (18)	457.2 (18.000)	15.1 (0.595)	20

Note: NAPSYS-LR PVC DWV 25 pipe and fittings are available in 40mm - 450mm (1½" to 18"). NAPSYS-HR PVC DWV 25/50 pipe and fittings are available in 40mm - 250mm (1½" to 10").

Pipe Weights

The chart below shows the pipe weights for both NAPSYS-LR PVC DWV 25 and NAPSYS-HR PVC DWV 25/50 systems.

NAPSYS-LR PVC DWV 25 & NAPSYS-HR PVC DWV 25/50		
Size mm (in)	Weight (lb/ft)	Weight (kg/m)
40 mm (1½")	0.52	0.77
50 mm (2")	0.70	1.04
75 mm (3")	1.45	2.16
100 mm (4")	2.07	3.08
150 mm (6")	3.65	5.43
200 mm (8")	5.50	8.18
250 mm (10")	7.78	11.58
300 mm (12")	10.30	15.33
350 mm (14")	11.70	17.41
400 mm (16")	15.65	23.29
450 mm (18")	20.11	29.93

Temperature

Both the NAPSYS-LR PVC DWV 25 and NAPSYS-HR PVC DWV 25/50 systems are safe for use for non-pressure applications where the pipe wall temperature does not exceed 140°F (60°C).

Expansion/Contraction of PVC DWV Pipe

PVC pipe expands and contracts with changes in temperature. The amount of expansion or contraction depends on the length of pipe run, the material coefficient of linear expansion and the change in temperature of the pipe. This expansion/contraction often means expansion joints are required.

The coefficient of linear expansion for PVC DWV pipe is as follows:

Imperial: 3×10^{-5} in (expansion/contraction) / in (pipe length) / °F (change in temperature)

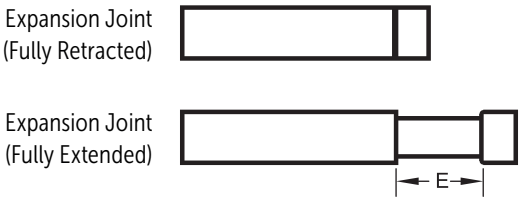
Metric: 5.4×10^{-5} mm (expansion/contraction) / mm (pipe length) / °C (change in temperature)

Expansion/Contraction of PVC DWV Pipe

- The charts on the next page show the amount of expansion expected for (ΔT) and length.

- If the pipe is installed in an exposed location, 17°C (30°F) should be added to the amount of temperature change (ΔT) due to the effects of radiant heat.

EXPANSION JOINTS			
Part Number	Trade Size	Type (I or II)	Maximum Travel (E)
DL631	1½"	I	4.5"
DL632	2"	I	4.5"
DL633	3"	II	8.0"
DL634	4"	II	8.0"



Installation

Westlake Pipe & Fittings PVC DWV Expansion Joints are for **Vertical Installation Only**.

- Install expansion joint with the barrel at the bottom and the piston at the top
- Start with the expansion joint in the fully retracted position and set the position as shown below

Use the following equations to determine expansion joint piston set position during installation:

$$\text{Piston Setting (in)} = \frac{(\text{Max. Temp. (°F)} - \text{Install Temp. (°F)}) \times \text{Expansions Joint Max Travel (in)}}{\text{Total Expected Temp. Change (°F)}}$$

$$\text{Piston Setting (mm)} = \frac{(\text{Max. Temp. (°C)} - \text{Install Temp. (°C)}) \times \text{Expansions Joint Max Travel (mm)}}{\text{Total Expected Temp. Change (°C)}}$$

Expansion/Contraction of PVC

Expansion/Contraction of PVC (in)										
ΔT (°F)	Length of Pipe Run (ft)									
	5	10	15	20	25	30	35	40	45	50
5	0.01	0.02	0.03	0.04	0.05	0.05	0.06	0.07	0.08	0.09
10	0.02	0.04	0.05	0.07	0.09	0.11	0.13	0.14	0.16	0.18
15	0.03	0.05	0.08	0.11	0.14	0.16	0.19	0.22	0.24	0.27
20	0.04	0.07	0.11	0.14	0.18	0.22	0.25	0.29	0.32	0.36
25	0.05	0.09	0.14	0.18	0.23	0.27	0.32	0.36	0.41	0.45
30	0.05	0.11	0.16	0.22	0.27	0.32	0.38	0.43	0.49	0.54
35	0.06	0.13	0.19	0.25	0.32	0.38	0.44	0.50	0.57	0.63
40	0.07	0.14	0.22	0.29	0.36	0.43	0.50	0.58	0.65	0.72
45	0.08	0.16	0.24	0.32	0.41	0.49	0.57	0.65	0.73	0.81
50	0.09	0.18	0.27	0.36	0.45	0.54	0.63	0.72	0.81	0.90

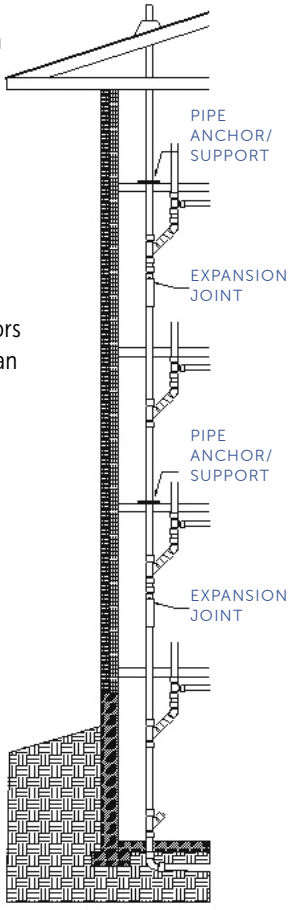
Expansion/Contraction of PVC (mm)										
ΔT (°C)	Length of Pipe Run (m)									
	2	4	6	8	10	12	14	16	18	20
5	0.54	1.08	1.62	2.16	2.70	3.24	3.78	4.32	4.86	5.40
10	1.08	2.16	3.24	4.32	5.40	6.48	7.56	8.64	9.72	10.80
15	1.62	3.24	4.86	6.48	8.10	9.72	11.34	12.96	14.58	16.20
20	2.16	4.32	6.48	8.64	10.80	12.96	15.12	17.28	19.44	21.60
25	2.70	5.40	8.10	10.80	13.50	16.20	18.90	21.60	24.30	27.00
30	3.24	6.48	9.72	12.96	16.20	19.44	22.68	25.92	29.16	32.40
35	3.78	7.56	11.34	15.12	18.90	22.68	26.46	30.24	34.02	37.80
40	4.32	8.64	12.96	17.28	21.60	25.92	30.24	34.56	38.88	43.20
45	4.86	9.72	14.58	19.44	24.30	29.16	34.02	38.88	43.74	48.60
50	5.40	10.80	16.20	21.60	27.00	32.40	37.80	43.20	48.60	54.00

Compensating for Building Movement

When working with wood-framed construction, shrinkage and settlement can be significant. The amount of shrinkage will depend on the humidity and moisture content and height of the framing.

To limit movement between two floors of a building:

- Install an expansion joint every second floor.
- Support the pipe stack on alternating floors such that any movement is directed into an expansion joint (see example at right).



Handling and Storage

NAPSYS-LR PVC DWV 25 and NAPSYS-HR PVC DWV 25/50 are strong and lightweight piping systems. While this ensures easy handling, it is important to take the appropriate measures to avoid damage.

- Safety first: Always use a forklift to unload NAPSYS-LR PVC DWV 25 and NAPSYS-HR PVC DWV 25/50 crates from the delivery vehicle. To avoid the potential for injury do not use wire ropes, chains or slings.
- Use extra care when unloading, storing and handling pipe in colder temperatures: Impact strength of PVC pipe is reduced when

temperatures are cold, increasing the risk of damage to the pipe ends.
- Secure goods in transit: Secure your pipe and fittings during transit to avoid load shifting.
- Store the pipes on a level surface.
- If they are placed on the ground, support the pipe with timbers spaced no more than 3 feet apart.
- Place smaller diameter pipe on top.
- Keep pipes away from heat sources (e.g. boilers, steam lines, engine exhaust outlets, etc.)

Solvent Cements

The selection of cements and primers and the solvent welding process are essential to a successful installation.

To achieve optimum results, use only NAPSYS PVC DWV solvent cements and primers supplied by Westlake Pipe & Fittings for all installations.

Our solvent cements have been specifically designed for the NAPSYS-LR PVC DWV 25 and NAPSYS-HR PVC DWV 25/50 product lines. Available in both one and two step formulations, both solvent cements are certified to CSA B181.2.

Westlake Pipe & Fittings PVC DWV solvent cements have VOC (Volatile Organic Compounds) emission levels of 486 and 508 grams/litre (SCAQMD Test Method 316A) for the 1 Step and 2 Step solvent cements.

Choice of solvent cement is determined by pipe diameter and installation temperatures. The following are usage guidelines:

One-Step or Two-Step Solvent Cementing (Low VOC)	
Pipe Diameter mm (in)	NAPSYS-LR PVC DWV 25 NAPSYS-HR PVC DWV 25/50
40 (1½) - 150 (6)	Either One-step or Two-step Solvent Cement
200 (8) and above	Two-step Solvent Cement

Solvent Cementing Application and Procedure

SAFETY

- Solvent cement and primer contain highly flammable solvents. Follow all specific safety precautions provided on container label and Safety Data Sheet (SDS).
- Keep primer and solvent cement away from heat, sparks and open flame.
- Ensure adequate ventilation of work area and avoid inhaling solvent vapours.
- Wear approved eye protection or a face shield.
- Avoid contact with skin.
- Do not attempt to thin or dilute solvent cements or primers.
- Do not use open flame or electric heaters to warm cements and primers.

GENERAL

- Use solvent cement and primer prior to expiration date, which is marked on the can.
- Above 0°C ambient temperature, joints may be assembled without the use of primer, provided adequate penetration and softening of the pipe or fitting surface can be achieved with solvent cement alone.
- At the job-site, solvent cements and primers should be stored in the shade and at a temperature between 5°C and 45°C (40°F and 110°F).

PIPE AND FITTING PREPARATION

Pipe Cutting:

- Cut pipe as square as possible. Do not use a diagonal cut, as it reduces the bonding area in the joint. See Figure 1.

Figure 1

- Remove burrs from the inside and outside of the pipe end, as these will hinder the integrity of the joint. All sharp edges should be removed from the inside and outside edges of the pipe to prevent the pipe from pushing the solvent cement into the fitting socket, thereby causing a weak spot to form. This can be done using a knife edge, file or deburring tool; do not use sandpaper. Check inside of pipe for debris and remove if present. The pipe end should be chamfered as shown in Figure 2.

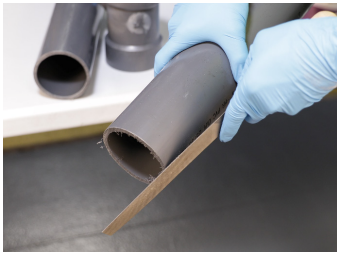


Figure 2

Joint Preparation:

- All dirt, grease and moisture should be removed from the pipe and socket by thoroughly wiping with a clean, dry cloth.
- Dry fit pipe and fitting joints prior to cementing.
- For correct interference fit, the pipe should go easily into the socket approximately 1/3 to 2/3 of the socket depth.
- At the pipe and fitting tolerance extremes, it may be possible to fully insert the dry pipe into the fitting until it bottoms out. If this occurs, the fit should be snug-if the fit is loose or wobbly, other fittings or pipe should be used.
- The applicator should be sized according to the size of pipe and fittings being joined. The brush width of the applicator should be equal to approximately ½ of the pipe diameter.

JOINT CONSTRUCTION

With Primer:

1. Primer is used to penetrate and soften the surfaces so that they will fuse together under a wide variety of conditions. The penetration or softening can be checked by dragging the edge of a knife or sharp object over the coated surface. If a few thousandths of an inch of the primed surface can be scratched or scraped away, adequate penetration has occurred. Varying weather conditions affect priming and cementing action and may require more time or repeated applications to either or both surfaces.

2. Using the correct applicator size, aggressively work the primer into the socket, keeping the surface and applicator wet until the surface has softened, re-dipping the applicator as required. When the surface is primed, remove any puddles of primer from the socket.
3. Aggressively work the primer onto the end of the pipe, to a point ½" beyond the depth of the socket.
4. Perform a second application of primer in the socket.
5. While the surfaces are still wet, the appropriate solvent cement should then be applied. Stir or shake the solvent cement prior to application.
6. Using the correct applicator size, aggressively work a full, even layer of cement onto the pipe end to a point equal to the depth of the socket. Do not brush out to a thin paint type layer, as this will dry within a few seconds.
7. Aggressively work a medium layer of cement into the fitting socket; avoid puddling cement in the socket. On the pipe end, do not coat beyond the socket depth or allow cement to run down into the pipe beyond the socket.
8. Apply a second full, even layer of cement on the pipe.
9. Immediately, while the cement is still wet, assemble the joint. Use enough force to ensure that the pipe is fully inserted into the socket. Twist the pipe ¼ turn as it is being inserted, ensuring even distribution of the solvent cement in the joint.
10. Hold the joint together for approximately 30 seconds to avoid push out.
11. After assembly, inspect the joint to ensure that there is a ring or bead of cement completely around the juncture of the pipe and socket. If there are voids in this ring, sufficient cement was not applied and the joint may be defective.
12. Wipe off the excess cement without disturbing the joint.
13. Handle newly cemented joints with care until initial set has taken place.

Without Primer:

1. The penetration or softening by solvent cement alone can be checked by following the same guidelines in (1) above.
2. Using the correct applicator size, aggressively work a full, even layer of cement onto the pipe end to a point equal to the depth of the socket. Do not brush out to a thin paint type layer, as this will dry within a few seconds. Do not coat beyond the socket depth or allow cement to run down into the pipe beyond the socket.
3. Aggressively work a medium layer of cement into the fitting socket; avoid puddling cement in the socket.

4. Apply a second full, even layer of cement on the pipe to a point equal to the depth of the socket.
5. Repeat steps (9) to (13) from "With Primer".

Follow set and cure times before handling or testing the system:

AVERAGE INITIAL SET TIMES				
Temp Range	1½" – 2"	2½" – 8"	10" – 14"	16", 18"
15°C to 40°C	5 minutes	30 minutes	2 hours	4 hours
5°C to 15°C	10 minutes	2 hours	8 hours	16 hours
-16°C to 5°C	15 minutes	12 hours	24 hours	48 hours

AVERAGE JOINT CURE SCHEDULE				
Relative Humidity 60% or Less Temp Range During Assembly and Cure Periods	Cure Time Pipe Sizes 1½" – 2"	Cure Time Pipe Sizes 2½" – 8"	Cure Time Pipe Sizes 10" – 14"	Cure Time Pipe Sizes 16", 18"
15°C to 40°C	30 minutes	1½ hours	48 hours	72 hours
5°C to 15°C	45 minutes	4 hours	96 hours	6 days
-16°C to 5°C	1 hour	72 hours	8 days	14 days

In damp or humid weather allow 50% more cure time.

ESTIMATED SOLVENT CEMENT REQUIREMENTS												
Average Number of Joints Per Litre of Solvent Cement												
Pipe/Fitting Diameter	1½"	2"	2½"	3"	4"	6"	8"	10"	12"	14"	16"	18"
Number of Joints	90	60	40	40	30	10	5	2-3	1-2	¾	½	½

ESTIMATED PRIMER REQUIREMENTS												
Average Number of Joints Per Litre of Primer												
Pipe/Fitting Diameter	1½"	2"	2½"	3"	4"	6"	8"	10"	12"	14"	16"	18"
Number of Joints	180	120	80	80	60	20	10	4-6	2-4	1½	1	1

SOLVENT CEMENTING IN COLD WEATHER:

- Store pipe and fittings together in a heated area and prefabricate as much of the system as possible in a heated area.
- Surfaces to be joined should be protected with a portable shelter and heated with indirect heat to above 5°C before joining. The shelter and heat should remain in place for at least 2 hours after assembly. Do not use open flame or electric heaters to warm cements and primers.
- Take care to remove moisture, ice and snow from the mating surfaces.

SOLVENT CEMENTING IN HOT WEATHER:

- At the time of assembly, the surface temperature of the mating surfaces should not exceed 45°C. Shade or shelter the joint surfaces from direct sunlight for at least 1 hour prior to joining and during the joining process. If necessary, swab the mating surfaces with clean, wet rags to reduce the surface temperature (thoroughly dry surfaces before applying primer or cement).
- Apply cement quickly and join pipe to fitting as quickly as possible after applying the cement.
- Keep solvent cement container closed when not in use, to minimize solvent loss.

SOLVENT CEMENTING IN WET CONDITIONS:

- Work under a cover or canopy to keep rain off pipe and fittings-mating surfaces must be dry when the joint is made.
- Work quickly after drying the pipe and fitting to avoid condensation.
- Allow a longer cure time before the system is tested or used.

STORAGE AND HANDLING:

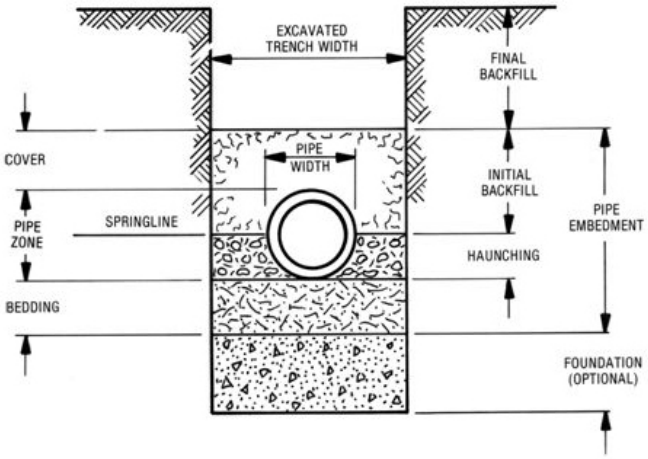
- Keep containers tightly sealed except when in use, solvent cements and primers must be stored in a controlled temperature of 23°C (73°F) and in a moisture protected environment.
- Containers display manufactured date on bottom of the can.
- Solvent cement can be used up to 18 months from manufactured date and primers can be used up to 3 years from manufactured date, dependent on proper storage of the products.
- If solvent cement or primer are "jelly-like" after opening the can, do NOT use.

Pipe Installation Instructions

UNDERGROUND, UNDER BUILDING:

The following general guidelines should be followed when installing PVC DWV pipe underground:

- When installed under a building, pipe should be supported on a base that is firm and continuous under the entire length of the pipe or using hangers fixed to a foundation or concrete slab, as per NPC 2015 2.3.4.6. There should be a minimum of 300mm of cover between the crown of the pipe and a concrete slab.
- When design dictates that the pipe penetrate a foundation wall, common practice is for a structural sleeve through the foundation wall to be provided for the pipe. Care should be taken for placement and compaction of pipe foundation and bedding material at the foundation wall, to prevent collapse and/or shearing of pipe due to ground settlement.
- When installed under driveways and parking areas, a minimum of 300mm of cover over the crown of the pipe is required; the actual amount of cover required for an individual site should be determined by the design engineer.
- Trench bottom should provide continuous, uniform support under the pipe for the entire length.
- For all underground installation, proper selection, placement and compaction of pipe bedding material up to the pipe springline is required, to ensure adequate resistance to deflection due to dead/live load and protection of the pipe from damage during installation.



OUTSIDE OF BUILDING:

- The following guidelines should be followed when installing PVC DWV pipe outside of a building:
- Attention should be paid to expected expansion and contraction of the pipe; expansion joints or other methods of expansion compensation should be provided where necessary.
- When installed where the product will be permanently exposed to sunlight, it should be covered to prevent UV degradation or painted, using latex paint which is formulated to adhere to PVC pipe.

Pipe Installation Instructions Support Spacing

The following are guidelines for pipe support and hanger placement when installing a PVC DWV system:

- Do not compress, distort or bend the pipe by over-tightening the hangers. Hangers should allow the pipe to move freely and allow thermal expansion and contraction of the pipe.
- Use strap-type metal hangers with a broad support surface. Hangers should not have rough/sharp edges or burrs. Hangers should be loose enough to allow movement of the pipe without causing mechanical damage to the pipe.
- Keep nonmetallic lines away from steam or other high temperature pipelines.
- Follow the support spacing guidelines for support locations.

Note: Pipe support and hanger placement must meet National Plumbing Code of Canada and/or local authority requirements. NPC 2015, Table 2.3.4.5 states maximum horizontal support spacing of 1.2m (4ft) for PVC pipe.

Recommended Maximum Support Spacing (feet)		
Nominal Pipe Size mm (in)	Temperature 23˚C / 73˚F	Temperature 60˚C / 140˚F
40 (1½)	4.7	4.1
50 (2)	5.2	4.6
75 (3)	6.7	5.9
100 (4)	7.6	6.7
150 (6)	9.3	8.2
200 (8)	10.7	9.5
250 (10)	12.1	10.7
300 (12)	13.3	11.8
350 (14)	14.0	12.5
400 (16)	15.4	13.6
450 (18)	16.6	14.7

Note: Based on a sag limit of 0.2% of span length.

National and Provincial Building Codes do not allow the use of combustible pipe and fittings in vertical service spaces.

PVC DWV Pipe and Fittings

PVC DWV Pipe and Fittings					
Product	Application				
	Inside Building[1]			Outside or Under Building[2] (Building Sewer)	Air Plenum[4]
	Combustible Construction	Non-Combustible Construction[3]			
		Low Rise[3A]	High Rise[3B]		
NAPSYS-LR PVC DWV 25	✓	✓	X	✓	X
NAPSYS-HR PVC DWV 25/50	✓	✓	✓	✓	✓

Note: ✓ = Suitable as per NBC/NPC 2015, X = Not Suitable as per NBC/NPC 2015

1. NPC 2.2.5.11
2. NPC 2.2.5.9
3. NBC 3.1.5.19
    A. 3.1.5.19(1)(a)
    B. 3.1.5.19(1)(b)
4. NBC 3.6.4.3

Testing

A system should be tested once installation is completed and the joints have cured. Tests should be conducted in accordance with the National Plumbing Code of Canada and/or local authority requirements, and CSA B181.2, Annex A.

Water is the recommended method for testing completed sections of a piping system.

Pressure testing guidelines are as follows:

- Slowly fill the system with water and bleed all air from the highest and farthest points of the installation.
- Once the desired test pressure is reached, maintain that pressure for one hour.
- During that hour, inspect the assembled sections for joint leaks. If a leak is discovered, remove the joint and replace it.

Where water sources are not available, air testing is an alternative option. **Always approach air testing with caution, since thermoplastic piping under pressure may explode, leading to personal injury or death.**

NAPSYS-LR PVC DWV 25 and NAPSYS-HR PVC DWV 25/50 may be air tested at no more than 5 psi. To ensure safe testing, apply proper pressure regulation, relief devices and procedures.

Conversion Chart

Conversion Chart		
Feet	To Metres	0.3048
Metres	To Feet	3.2808
Miles	To Kilometres	1.6093
Kilometres	To Miles	0.6214
Inches	To Millimetres	25.400
Millimeteres	To Inches	0.0394
U.S. Gallons	To Cubic Metre	0.003785
Cubic Metre	To U.S. Gallon	264.1728
Cubic Yard	To Cubic Metre	0.7645
Cubic Metre	To Cubic Yard	1.3079
Pound (Force)	To Newton	4.4482
Newton	To Pound (Force)	0.2248
Pound (Mass)	To Kilogram	0.4536
Kilogram	To Pound (Mas)	2.2046
PSI	To Kilopascal	6.8947
Kilopascal	To PSI	0.1450
U.S. GPM	To cu. ft/sec	0.0022
cu. ft/sec	To U.S. GPM	448.8306
U.S. GPM	To Litre/sec	0.0631
Litres/sec	To U.S. GPM	15.8503
ft/lb (Force)	To Nm	1.3558
Nm	To lb/ft (Force)	0.7375
lb/ft	To kg/m	1.4882
kg/m	To lb/ft	0.6721

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