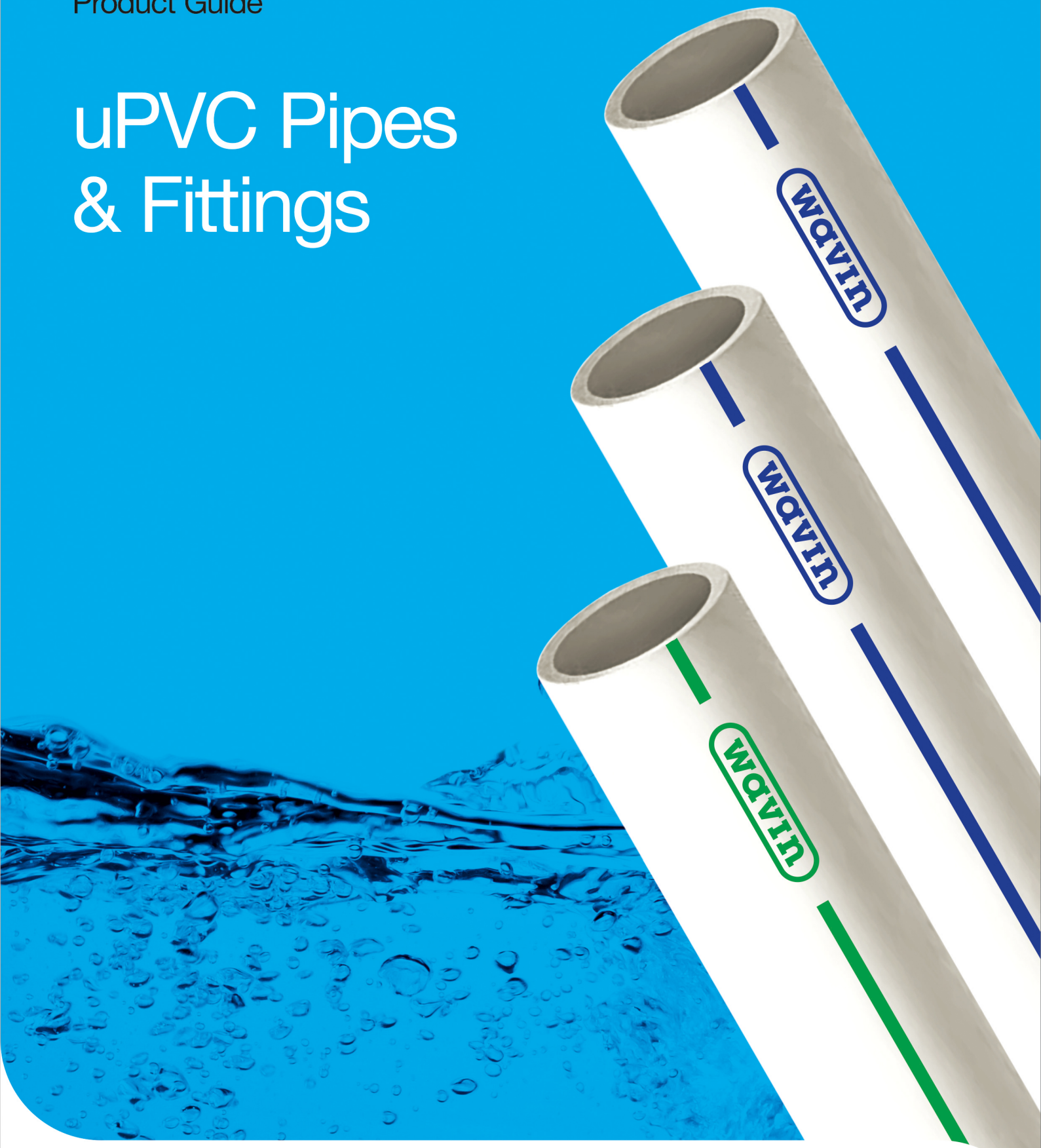
WAVIN India
Product Guide

uPVC Pipes & Fittings



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Introducing WAVIN uPVC Pipes & Fittings

WAVIN “Lead-free” uPVC pipes and fittings are used in a wide range of applications including cold water distribution system for bathrooms, kitchens, gardens, washing places and toilets in residential blocks, commercial complex, offices, factories, laboratories, bus stands, railways, airports, resorts, hotels and hospitals.

This system is designed for normal water application and is an ideal solution for potable water distribution, plumbing and water supply in residential and industrial buildings. It can be used for uptake lines, down take lines and loops on the terrace, water distribution mains, industrial process lines, sugar, paper, distillery industry, concealed pipe work and transportation of corrosive fluids.

It is easy to install and offers a long service life. It is mainly used for cold water applications in plumbing for residential, commercial, public complexes and is also used in water supply.

Identification on uPVC Pipes:

For Schedule 40 Pipes BLUE Striper Line is applicable.

For Schedule 80 Pipes GREEN Striper line is applicable.

Standards and Codes:

Standards & Codes specifies certain requirements, test methods and methods of marking for unplasticised polyvinyl chloride plastic pipes for cold water distribution supplies.

WAVIN uPVC Lead-Free Pipes		
Class of Pipe	Standard	Sizes Available
Sch 40	ASTM D1785	½” – 2”
Sch 80	ASTM D1785	½” – 2”

WAVIN uPVC Lead-Free Fittings		
Class of Fitting	Standard	Sizes Available
Sch 80	ASTM D2467	½” – 2”

Transparent-Medium Bodied uPVC Solvents:

Meet or exceed the requirements of the ASTM D2564 standards.

Brass Standards:

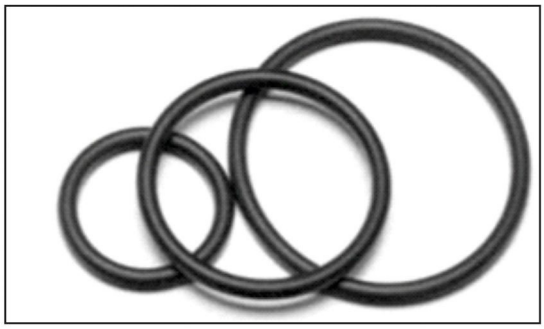
Composition Standard: IS 319.

uPVC Ball Valves:

Mechanical test as per the ASTM F1970, and socket dimensions as per the ASTM D2846 standards.

WAVIN's EPDM Rubber 'O' Rings & Washers:

WAVIN's fittings – Unions, Tank Nipple & Plastics FTA are equipped with specially designed EPDM 'O' Rings & EPDM Washers. They are highly resistant towards heat, oxidation, ozone, and weather aging, making the fittings ideal for potable cold water applications.



EPDM Rubber 'O' Rings

Washers

Smart Features & Benefits:

1) Cost-effective and easy to install

- WAVIN's pipes and fittings are lightweight and cost-effective with low maintenance, labour, and shipping costs.
- No electric/heat source is required for installation.
- A simple cutter, chamfering tool and uPVC solvent are the only requirements for 100% leak-proof jointing.

2) Resistance to chemicals, corrosion and abrasion

- WAVIN's pipes and fitting do not break down even under the harshest of water conditions.
- Our pipes and fittings can even be buried directly under concrete slabs as they don't react chemically with concrete.

3) Smooth internal surface

- Absence of scaling, pitting and leaching ensures smooth and full bore flow with no water pressure loss and noise.

4) Perfect for external use

- WAVIN's pipes and fittings can be installed outside the building, and can withstand temperature up to 60°C.
- Our pipes and fittings are made using UV-resistant materials, ensuring they don't lose their mechanical properties even under greater exposure to sunlight.

5) Energy-efficient

- WAVIN'S pipes and fittings are self-insulating with lower thermal conductivity.
- Our pipes are built for tough conditions with minimum offsets/looping.

6) Self-extinguishing

- WAVIN's pipes and fittings come with an integral flame-retarding property with a very high Limiting Oxygen Index (LOI) of 60, and therefore cannot support or sustain combustion.

7) Suitable for carrying drinking water

- WAVIN's pipes and fittings are lead free, and are made of food grade material.

uPVC Pipe Dimensions and Technical Details:

1) Pipe dimensions

Dimension Details for uPVC Pipes (Sch-40 & Sch-80) ASTM D1785							
S. No.	Nominal Pipe Size (inch)	Outside Diameter (mm)		Wall Thickness (mm)		Wall Thickness (mm)	
				Sch 40		Sch 80	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
1	½	21.24	21.44	2.77	3.28	3.73	4.24
2	¾	26.57	26.77	2.87	3.38	3.91	4.42
3	1	33.27	33.53	3.38	3.89	4.55	5.08
4	1 ¼	42.03	42.19	3.56	4.07	4.85	5.43
5	1 ½	48.11	48.41	3.68	4.19	5.08	5.69
6	2	60.17	60.47	3.91	4.42	5.54	6.20
7	2 ½	72.84	73.20	5.16	5.77	7.01	7.85
8	3	88.70	89.10	5.49	6.15	7.62	8.53
9	4	114.07	114.53	6.02	6.73	8.56	9.58

2) Temperature derating factor

Elevated temperature fluid mediums require derating of a thermoplastic pipe, with a maximum internal pressure rating of 23°C. To determine the maximum internal pressure rating at an elevated temperature, simply multiply the pipe pressure rating at 23°C by the factor specified for the desired temperature.

Operating Temperature									
	°F	70	80	90	100	110	120	130	140
	°C	23	27	32	38	43	49	54	60
uPVC Sch 40/80		1	0.9	0.81	0.72	0.63	0.55	0.47	0.39

3) Working pressure of uPVC pipes

a) Sch 40 Pipes

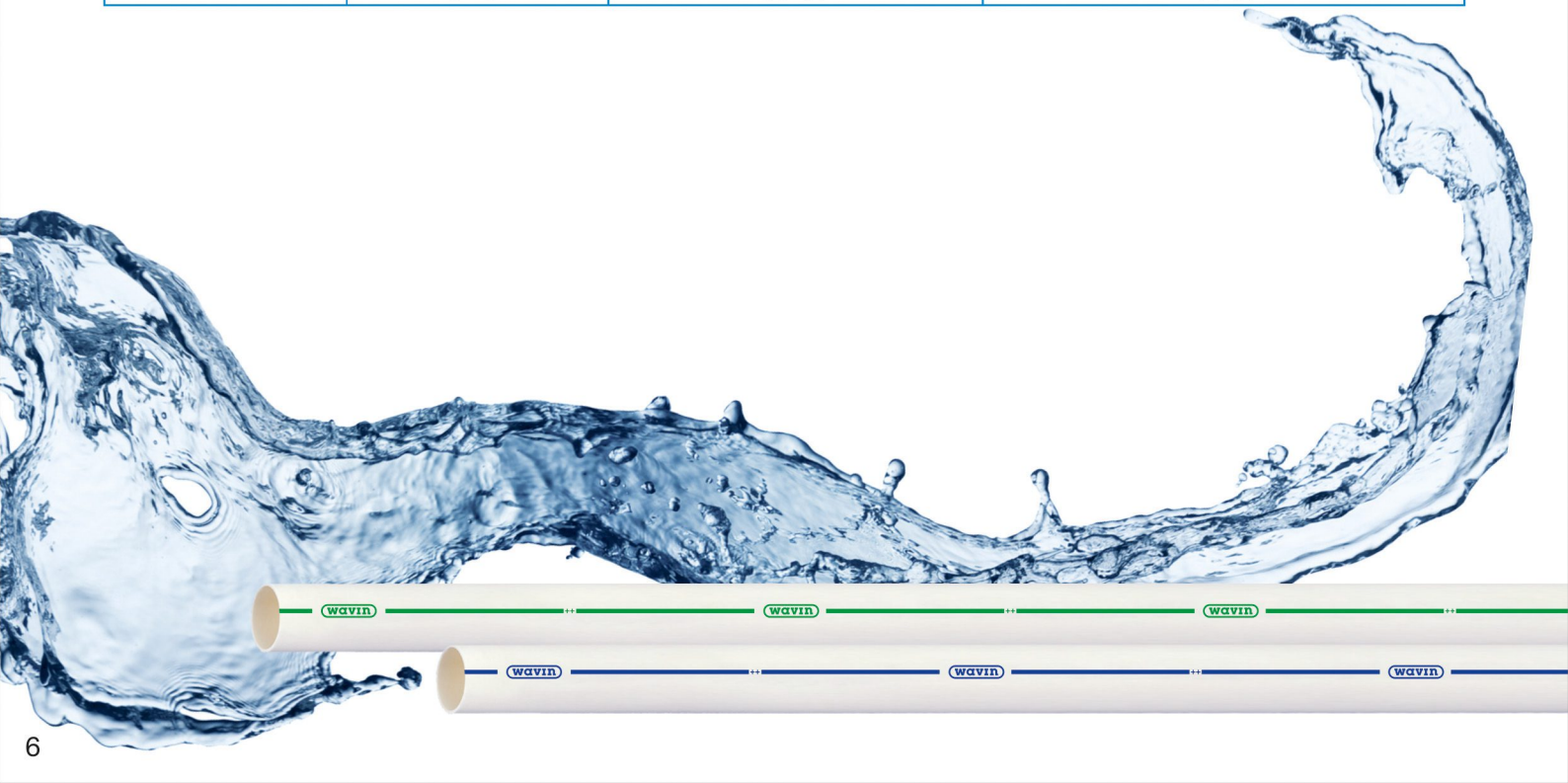
Temperature °C	Derating Factor	Working Pressure (kg/cm²)					
		½"	¾"	1"	1 ¼"	1 ½"	2"
23°C	1	42.80	34.60	32.30	26.40	23.60	19.80
27°C	0.9	37.99	30.38	28.45	23.40	20.92	17.71
32°C	0.75	31.66	25.31	23.71	19.50	17.44	14.76
38°C	0.62	26.17	20.93	19.60	16.12	14.41	12.20
43°C	0.5	21.11	16.88	15.81	13.00	11.62	9.84
49°C	0.4	16.89	13.50	12.64	10.40	9.30	7.87
54°C	0.3	12.66	10.13	9.48	7.80	6.97	5.90
60°C	0.22	9.29	7.43	6.95	5.72	5.11	4.33

b) Sch 80 pipes

Temperature ^{0}C	Derating Factor	Working Pressure (kg/cm^2)					
		½"	¾"	1"	1 ¼"	1 ½"	2"
23^{0}C	1	60.80	49.30	45.20	37.20	33.60	29.00
27^{0}C	0.9	53.78	43.68	39.83	32.95	29.73	25.33
32^{0}C	0.75	44.82	36.40	33.19	27.46	24.78	21.11
38^{0}C	0.62	37.05	30.09	27.44	22.70	20.48	17.45
43^{0}C	0.5	29.88	24.27	22.13	18.30	16.52	14.07
49^{0}C	0.4	23.90	19.42	17.70	14.64	13.22	11.26
54^{0}C	0.3	17.93	14.56	13.28	10.98	9.91	8.44
60^{0}C	0.22	13.15	10.68	9.74	8.05	7.27	6.19

4) Burst pressure ratings:

Size (inch)	uPVC Pipes Sch 40 as per ASTM D1785	uPVC Pipes Sch 80 as per ASTM D1785	uPVC Fittings Sch 80 as per ASTM D2467-06, Classes 12454, 13354, 11443
	Minimum Burst Pressure within 60 to 70 sec. at 23 + 2^{0}C	Minimum Burst Pressure within 80 to 70 sec. at 23 + 2^{0}C	Minimum Burst Pressure within 60 to 70 sec. at 23 + 2^{0}C
½	134.29	191.30	191.19
¾	108.29	154.69	154.69
1	101.26	142.04	142.04
1 ¼	83.00	116.76	116.65
1 ½	74.54	106.15	106.15
2	62.61	90.65	90.65



Transparent-Medium Bodies uPVC Solvent Cement:

WAVIN's Transparent-Medium Bodied uPVC Solvent Cement is ideal to fix pipes and fittings together. It meets, or even exceeds, the requirements of the ASTM D2564 and is as per the environmental regulations.

Moreover, it is Lo-VOC compliant and NSF approved.

The right solvent cement and its quality will not only help you save a great deal on costs but also ensures 100% leak-proof joints.

Installation Guidelines:

A few simple steps must be followed for 100% leak-proof, efficient and productive joints.

WAVIN pipes and fittings are designed with precise tolerance. They are architected using a system which enables a perfect fit and leak-proof joints.

Step 1:
Cutting the Pipe

- WAVIN pipes can be easily cut with a wheel cutter, ratchet cutter or power hacksaw, though our recommended tool which is a wheel cutter.
- Be sure to score the pipe first to get the best results and ensure clean square cuts.
- Always use the right cutter wheel.
- Cutter wheels & blades, should always be sharp & well maintained.
- Square cuts will ensure full engagement with fittings to maximize the bonding surface within the jointing surface of pipes & fittings.

Step 2:
Deburring/Beveling

- A reamer is preferred, though a file or pocket-knife may also be used.
- The ID and OD of the pipes should be reamed to remove burrs, filings, and flares.

Important

Burrs, filings & flares:

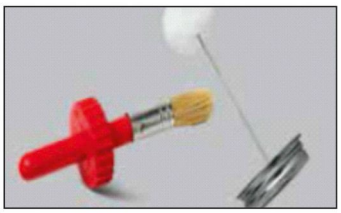
- They prevent proper contact between pipes & fittings during assembly.
- They restrict & disturb flow of water.
- Score & channel in the socket ID and create leak potential.
- Minimize the chances of pushing solvent cement to the bottom of the joints.

Step 3:
Fittings Preparation

- Wipe and clean any dirt or moisture from the surface of the pipes & fittings.
- For a dry fit, the contact point between the pipes and fittings should be about 40-80% into the fittings. This is commonly referred as the interference fit. After applying the solvent cement the pipe must reach the bottom of the fitting without any resistance, for the fit to be correct.

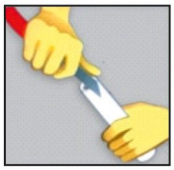
Step 4:
Solvent Cement Jointing & Assembly

- Apply a thin coat of WAVIN Transparent-Medium uPVC Solvent Cement into the socket and a full even coat on the pipe to the depth of socket bottom. Do not puddle cement in the socket. Use the dauber applicator supplied with the can.
- Select proper cement, pipe cleaner and primer for the work. Choose a dauber/applicator which is sized properly. Daubers, brushes or applicators should be ½ the diameter of the fittings being joined (1" brush/applicator for 2" pipe). This reduces the time required to apply the cement, resulting in better joints.
- Insert the pipe into the socket quickly while the cement is still wet. If it has dried, re-coat the pipe and fitting.
- If possible, twist the pipe a quarter turn. This will allow the cement to cover any dry spot and make sure the pipe goes all the way to the bottom of the fitting.
- Hold the pipe and fitting together (30 seconds to a minute) to make sure the pipe does not push out. Allow the cement to set (approx. 15 minutes) before handling the assembly.
- Wipe off any excess cement with clean and dry cloth.
- Allow the WAVIN Transparent-Medium uPVC Solvent Cement to cure before applying water (fluid) pressure. The cure time depends on temperature, humidity, etc. Follow the cement recommendation. Under normal conditions, allow it to cure for 24 hours.

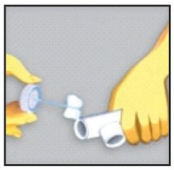



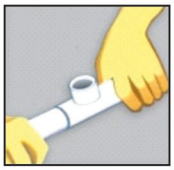
Solvent Weld Joining Method


01. CUTTING


02. DEBURRING

03. ROUGHENING


04. SOLVENT CEMENTING


05. JOINTING

Important

While assembling the pipes and fittings, a common failure may occur – "dry joint". This happens when the assembly is delayed and, in this case, the cement will "flash-off" its solvents and fail to weld the plastics.

Delaying the assembly of pipes & fittings can lead to dry joints.

Solvent Cement Consumption:

Solvent Cements are at the core of uPVC plumbing and their quality is of vital importance in the strength of the joint. The chart shows the consumption of solvent cements and the approximate number of joints which can be made per litre of WAVIN Transparent-Medium uPVC Solvent Cement.

Consumption of solvent						
Pipe Size (inch)	½	¾	1	1 ¼	1 ½	2
Pipe Size (mm)	15	20	25	32	40	50
No. of Joints per litre	1200	750	500	450	325	225

Average Joint Cure Times for WAVIN's Transparent-Medium uPVC Solvent:

Relative Humidity 60% or less	Cure Time for Pipe Size ½" to 1 ¼"		Cure Time for Pipe Size ½" to 3"		Cure Time for Pipe Size 4"	
Temperature During Assembly & Cure Periods	Upto 12.65 kg/cm^2	12.65 kg/cm^2 above	Upto 12.65 kg/cm^2	12.65 kg/cm^2 above	Upto 12.65 kg/cm^2	12.65 kg/cm^2 above
16°C-38°C	13 Minutes	6 Hours	30 Minutes	12 Hours	1.5 Hours	24 Hours
4°C-16°C	20 Minutes	12 Hours	45 Minutes	24 Hours	4 Hours	48 Hours
0°C-4°C	30 Minutes	48 Hours	1 Hour	96 Hours	3 Days	8 Days

Horizontal and Vertical Supports:

Pipe clamps are used for anchoring the pipes with the structural element of the building. Proper support spacing is critical to ensure that the deflection is kept to a minimum. Support location and spacing depends on the pipe diameter, operating temperature of the system, and the location of any concentrated stress loads (valves, flanges, etc.). Hangers used must have an adequate load-bearing surface, free from any rough or sharp edges that could damage the pipe during use. Hangers must not restrict linear movement of the system due to the effects of thermal expansion and contraction, as a result of temperature changes. Furthermore, over-tightening must be avoided.

Recommended Support System for uPVC:

Size (inch)	Recommended Support Spacing in (Ft.)			
	27°C	38°C	49°C	60°C
½	4.4	4.3	4.2	4.1
¾	4.8	4.7	4.6	4.5
1	5.3	5.2	5.1	5
1 ¼	5.9	5.8	5.7	5.5
1 ½	6.2	6.1	6	5.9
2	6.8	6.7	6.6	6.4
2 ½	7.5	7.4	7.3	7.1
3	8.2	8	7.9	7.8
4	9.1	8.9	8.8	8.6

Under-Slab Installation Guidelines:

WAVIN's uPVC pipes and fittings are highly flexible in nature, and therefore extra care must be taken to ensure proper burial conditions. The stiffness of the piping system is affected by the sidewall support, soil complication and the condition of the trench. Trench bottoms must be smooth and regular, in either undisturbed soil or a layer of compacted backfill. Pipes must lie evenly on this surface throughout the entire length of its barrel.

Trenching:

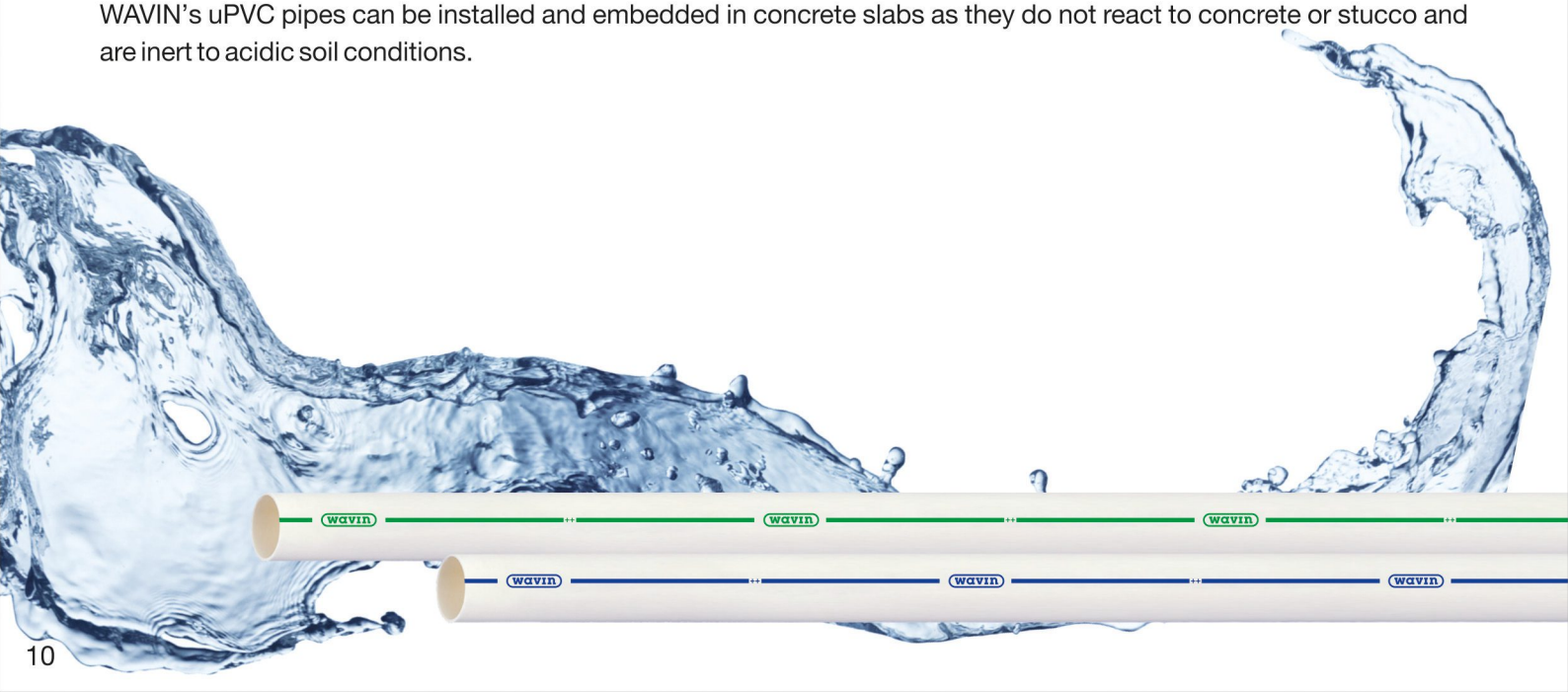
- Excavate the trench, ensuring the sides are stable under all working conditions.
- The trench should be wide enough to provide adequate room for joining the pipes in the trench shaking the pipe from side to side, to compensate for expansion and contraction filling and compacting the side fills.
- The space between the pipe and trench wall must be wider than the compaction equipment used in the compaction of the backfill. Minimum width must not be less than the greater of either the pipe outside diameter + 16 inches, or the pipe outside diameter times 1.25 + 12 inches. The trench width may be different, if approved by the design engineer.
- Install the foundation and bedding as needed by the engineer according to the conditions of the trench bottom. Provide firm, stable and uniform bedding for the pipes. Provide a minimum of 4 inches of bedding. In case any rock or unyielding material is encountered in the bottom of the trench, provide 6 inches of bedding.
- Plastic pipes should always be installed at least below the frost level.

Bedding & Backfilling:

- Sub-soil conditions vary from place to place, therefore, the pipe backfill should be stable and provide protection.
- The pipe should be surrounded with an aggregate material that can easily be worked around the sides of the pipe. Backfilling must be performed in layers of 6 inches, with each layer being sufficiently compacted to 85-95%.
- A mechanical tamper is recommended for compacting a sand and gravel backfill that contains a significant proportion of fine-grained material like slit and clay. If a tamper is not available, it must be done by hand.
- The trench should be completely filled. The backfill should be spread in uniform layers to prevent any unfilled spaces or voids. Large rocks, stones, frozen clods and other debris must be removed.

In-Slab Installation:

WAVIN's uPVC pipes can be installed and embedded in concrete slabs as they do not react to concrete or stucco and are inert to acidic soil conditions.

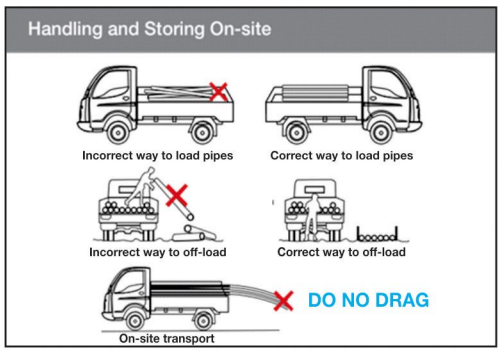


Handling & Storage:

1) Proper Handling of Pipes

Please check and inspect the pipes on receipt. The pipes should be checked for any forms of transport damage due to shift in loads or improper handling/treatment. Visually examine the ends of pipes for any cracks or damage.

The pipes should be handled with care. The tendency to throw or drop the pipes to the floor should be avoided. Do not drag or push the pipes from a truck bed. Contact of the pipes with any sharp object should be totally avoided.



2) Storage of Pipes

- The pipes should preferably be stored indoors. When this is not possible, please ensure to protect the pipes from sunlight, to reduce the effect of UV rays.
- The pipes should be stored on ground level and on dry surface.
- If pipes of same diameter but different classes are being stacked together, place the thicker pipes below. i.e.; stack Sch 80 below Sch 40.
- If placing pipes on racks then ensure the spacing between the supports does not exceed 3 feet.

3) Safe Handling of Solvent Cements

- When using solvent cements, primers and cleaners, there are some basic safety measures all users should keep in mind.
- After every application of solvent on the pipe/fitting ensure to put the lid back on the solvent cement containers and tighten the lid slightly to avoid evaporation and escape of solvent.
- Avoid prolonged breathing of solvent vapours. When pipe and fittings are being joined in enclosed areas, please ensure sufficient ventilation.
- Keep the cements, primers and cleaners away from all sources of ignition, heat, sparks and open flame.
- Keep containers of cements, primers and cleaners tightly closed except when the product is being used.
- Dispose off all rags used with solvents in a proper outdoor waste bin.
- Avoid eye and skin contact. In case of eye contact, flush with plenty of water for 15 minutes and call a doctor.
- Refer to ASTM F402, standard practice for safe handling of Solvent Cements, primers, and cleaners, used for joining thermoplastic pipes and fittings.

Do's:

- Use a clean cloth to clean the pipes and fittings, before installation.
- In case of any cracks in the pipe, cut off a minimum of 25 mm beyond the edge of the crack.
- Cut the pipe as a square (perpendicular) before making a joint.
- Deburr & bevel - ensure no sharp edges are in contact with the fittings surface while inserting the pipe.
- Apply the recommended WAVIN Transparent uPVC Solvent Cement on the pipe surface before inserting it into the fitting.
- Assemble the pipes and fittings quickly after applying the Solvent Cement.
- Rotate the pipe 90^0-180^0 to spread the WAVIN Transparent uPVC Solvent Cement evenly in the joint while pushing the pipe into the fitting. Hold for 30 seconds.
- Ensure the pipes and fittings are properly aligned, to avoid stress on the joints.
- Ensure no air is trapped once the installation is completed.
- Provide vertical and horizontal supports, as recommended.
- Use Teflon tapes only as a thread sealant.
- Before the conceal work is completed, conduct hydraulic pressure testing after installation to detect any leaks or faults, by using WAVIN Plastic End Plug.
- Before pressure testing, wait for the appropriate cure time, fill the lines slowly and bleed air from the system.
- Keep the solvent cement container closed when it is not in use.
- Strictly keep the solvent cement away from sparks and open flames while in use, because it is volatile in nature and can catch fire easily.

Dont's:

- Don't use dull or damaged cutters for cutting the pipes.
- Don't use metal hooks or nails to support/hold/put pressure on the pipes.
- Don't use straps and hangers with rough/sharp edges or tighten the straps over the pipes.
- Don't expose the pipe to an open flame while trying to bend it.
- Don't drop pipes on their edges or on heavy objects, and don't walk on them.
- Don't use air or gases for pressure testing.
- Don't use any other petroleum or solvent-based sealant, adhesive, lubricant or fire stop material on the uPVC pipes and fittings.
- Don't use uPVC pipes and fittings for pneumatic applications.
- Don't use uPVC plastic threaded fittings for water above 60^0C.
- Don't use cotton threads to join the uPVC brass fittings or plastic threaded fittings.
- Don't smoke cigarettes while using the solvent as its fumes can catch fire and cause severe injuries.
- Don't let the solvent cement come in contact with skin or eyes.

Notes

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WAVIN INDIA E-mail wavinindia@wavin.com I Internet www.wavin.co.in
Toll free number: 1800-123-7704

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@wavinindia