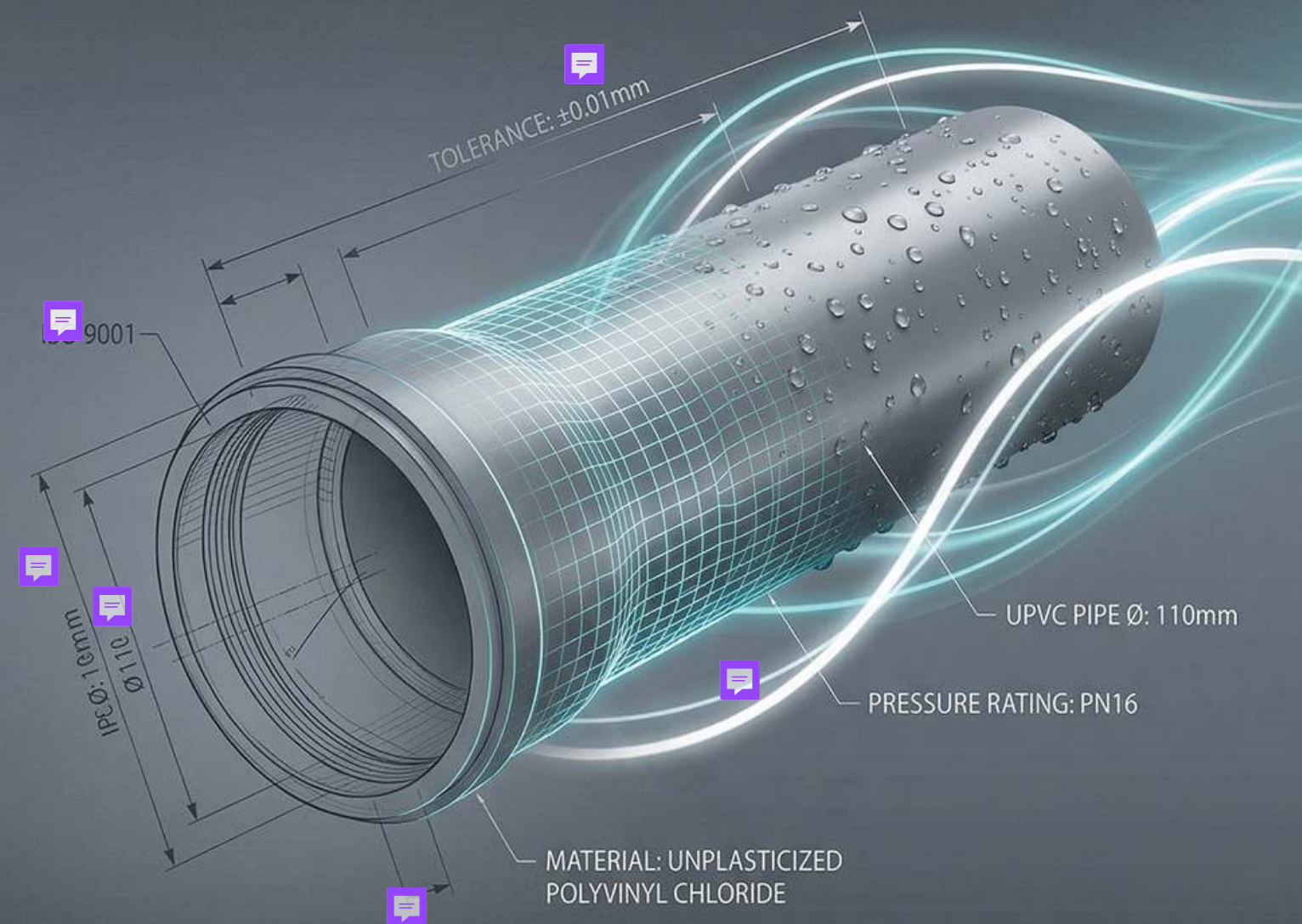




- Strict Compliance with International Standards**
مطابقة لكافة المعايير الدولية
- Massive Production Capacity**
قدرة إنتاجية كبيرة جداً
- Guaranteed Seamless Supply Chain**
ضمان سلسلة التوريد
- Extended Long-Term Warranty**
ضمان يدوم طويلاً
- Comprehensive One-Stop Services**
خدمات شاملة في مكان واحد
- All Products Under One Roof**
كل المنتجات في مكان واحد
- Uncompromising Quality and Reliability**
الاعتمادية والجودة
- Complete Alignment with the Kingdom's Vision**
توافق كامل مع رؤية المملكة
- Unmatched Value and Return on Investment (ROI)**
القيمة مقابل العائد في الأفضل
- Advanced Loyalty Program for Ultimate Satisfaction**
برنامج ولاء متقدم لرضاكم
- 24/7 Round-the-Clock Support**
خدمات على مدار الساعة
- Expert Consultation for Optimal Value**
الدعم الاستشاري لأفضل قيمة

احسب كفاءة شبكتك:
استخدم حاسبة الهيدروليكا
المتقدمة من تكوين بلاست
OPTIMIZE YOUR NETWORK:
Use Takween's Plast Advanced
Hydraulics Calculator.



صمم بدقة:
حمل مكتبة (BIM)
لمنتجات تكوين الآن.
DESIGN WITH PRECISION:
Download Takween's BIM
Library Now.



شارع عبد الرحمن الغافقي - 3285 الروضة - بناء رقم 13213 الطابق الأول - الرياض
ABDULRAHMAN ALGHAFFEY - ST.3285 AR RAWDAH,
RIYADH 13213 1ST FLOOR
WWW.TAKWEENPLAST.COM



DISTRIBUTED BY: INNOVATION EXPORTS CO. LTD.

TAKWEEN PLAST
One of Innovation Experts Brands إحدى علامات شركة صادرات الابتكار التجارية

uPVC PIPES
SASO/ISO
STANDARD



Who We Are **TAKWEEN PLAST**



About Us "Innovation Expeerts" (Innovation Exports) is the institutional umbrella and the proud owner of the "Takween Plast" brand. This relationship represents a strategic integration combining investment vision with industrial expertise, where "Innovation Expeerts" drives innovation and growth, while "Takween Plast" operates as a distinguished industrial arm representing a strategic consortium of leading Saudi manufacturers. We are committed to delivering sustainable and innovative plastic piping solutions for water drainage, telecommunications, HVAC, and energy applications. We take pride in providing advanced piping systems that align with the evolving requirements of modern infrastructure projects, both regionally and globally. Our strength lies in collaboration, organizational unity, and a shared commitment to excellence. With a strategic presence across key business hubs in the Kingdom of Saudi Arabia, the Gulf region, and the Middle East, TAKWEEN PLAST leverages a highly skilled workforce, a trusted network of distributors, and strong business partnerships to serve a broad and diverse client base. Operating as an integrated network of local manufacturing companies, and collaborating with more than 20 international production partners, TAKWEEN PLAST is supported by a robust distribution chain throughout Saudi Arabia, the GCC, and the wider Middle East. This collective capability enables us to deliver consistent quality, customized solutions, and reliable service across all markets we serve.



OUR MISSION

To build a strong and continuously expanding base of satisfied and loyal customers by consistently delivering high-quality plastic piping systems that meet the highest international standards. We are committed to providing reliable products, innovative solutions, and exceptional service that support the long-term success of our clients and partners while contributing to the sustainable development of modern infrastructure.

OUR VISION

To become a globally recognized leader in plastic piping systems, setting benchmarks for trust, innovation, and manufacturing excellence. Takween Plast aims to lead regional markets through advanced technologies, sustainable solutions, and strategic partnerships, becoming a trusted reference for infrastructure and utility projects worldwide.

Our Core Values

-  **Quality Excellence:** We uphold the highest standards in manufacturing, delivering reliable and long-lasting piping solutions that meet international requirements and exceed customer expectations.
- Customer Commitment:** We place our customers at the center of everything we do, building long-term partnerships based on trust, performance, and mutual success.
- Innovation & Continuous Improvement:** We continuously develop advanced solutions and enhance our processes to meet evolving infrastructure and industry demands.
- Integrity & Reliability:** We operate with transparency, accountability, and consistency, ensuring dependable performance in every project we support.
- Sustainability & Responsibility:** We are committed to environmentally responsible manufacturing practices that contribute to sustainable infrastructure development and long-term environmental protection.

Who We Are **TAKWEEN PLAST**



About Us "Innovation Expeerts" (Innovation Exports) is the institutional umbrella and the proud owner of the "Takween Plast" brand. This relationship represents a strategic integration combining investment vision with industrial expertise, where "Innovation Expeerts" drives innovation and growth, while "Takween Plast" operates as a distinguished industrial arm representing a strategic consortium of leading Saudi manufacturers. We are committed to delivering sustainable and innovative plastic piping solutions for water drainage, telecommunications, HVAC, and energy applications. We take pride in providing advanced piping systems that align with the evolving requirements of modern infrastructure projects, both regionally and globally. Our strength lies in collaboration, organizational unity, and a shared commitment to excellence. With a strategic presence across key business hubs in the Kingdom of Saudi Arabia, the Gulf region, and the Middle East, TAKWEEN PLAST leverages a highly skilled workforce, a trusted network of distributors, and strong business partnerships to serve a broad and diverse client base. Operating as an integrated network of local manufacturing companies, and collaborating with more than 20 international production partners, TAKWEEN PLAST is supported by a robust distribution chain throughout Saudi Arabia, the GCC, and the wider Middle East. This collective capability enables us to deliver consistent quality, customized solutions, and reliable service across all markets we serve.



OUR MISSION

To build a strong and continuously expanding base of satisfied and loyal customers by consistently delivering high-quality plastic piping systems that meet the highest international standards. We are committed to providing reliable products, innovative solutions, and exceptional service that support the long-term success of our clients and partners while contributing to the sustainable development of modern infrastructure.

OUR VISION

To become a globally recognized leader in plastic piping systems, setting benchmarks for trust, innovation, and manufacturing excellence. Takween Plast aims to lead regional markets through advanced technologies, sustainable solutions, and strategic partnerships, becoming a trusted reference for infrastructure and utility projects worldwide.

Our Core Values

1. **Quality Excellence:** We uphold the highest standards in manufacturing, delivering reliable and long-lasting piping solutions that meet international requirements and exceed customer expectations.
2. **Customer Commitment:** We place our customers at the center of everything we do, building long-term partnerships based on trust, performance, and mutual success.
3. **Innovation & Continuous Improvement:** We continuously develop advanced solutions and enhance our processes to meet evolving infrastructure and industry demands.
4. **Integrity & Reliability:** We operate with transparency, accountability, and consistency, ensuring dependable performance in every project we support.
5. **Sustainability & Responsibility:** We are committed to environmentally responsible manufacturing practices that contribute to sustainable infrastructure development and long-term environmental protection.

uPVC PIPES

SASO/ISO STANDARD

TABLE OF CONTENTS

Introduction

Who We Are – TAKWEEN PLAST
Our Mission & Vision
Why Choose TAKWEEN PLAST?

HDPE Industry Overview

History of HDPE Pipes
Advantages Over PVC & Metal
Key ISO & Internatioiv Standards

Product Overview

Measurements and Terms
Working Pressure & Compliance Standards
Premium Material Quality

Technical Specifications

Material Properties (PE80 vs. PE100)
Chemical & Environmental Resistance
Thermal Performance & Safety Compliance

Product Range & Dimensions

Product Range & Dimensions (A)
Product Range & Dimensions (B)

Key Features & Benefits

Customization Options
Technical Notes

Quality Assurance & Installation Standards

Raw Material Verification
In-Process Quality Checks
Finished Product Inspection
Advanced Jointing Technologies

Handling & Storage

Safe Handling & Storage of TAKWEEN PLAST PE Pipes
Storage Protocols (ISO 4427 Compliance)

TAKWEEN PLAST PE Pipe Installation Standards

Appendices



FORWARD

TAKWEEN PLAST for Manufacturing CO.LTD.
(TAKWEEN PLAST) in brief .

Some Applications of TAKWEEN PLAST uPVC Pipes

WATER NETWORKS:

TAKWEEN PLAST uPVC pipes will NEVER interfere or interact with the water or whatever liquid flowing inside. As for the drinking water, it will never change its taste, color or give it a weird smell.

IRRIGATION SYSTEM:

uPVC pipe is suitable for numerous watering applications, including irrigation (reticulation), water supply, recycled water.

SEWAGE & DRAINAGE SYSTEMS:

uPVC Pipes are the ideal substitute for cast-iron. Because of its special features such as chemical resistance and corrosion resistance, it is strong and long lasting, and easy to install. In addition, it has high flow rates and a wide range of applications such as sanitary water drainage, waste and ventilation.

INDUSTRIAL:

TAKWEEN PLAST uPVC pipes make it the best choice to use everywhere even in industrial factories because they are easy to install and fix, light weight, high chemical resistance makes it more convenient than old traditional steel pipes systems.

Electrical & Telecommunication Cables Protection:

TAKWEEN PLAST uPVC pipes are suitable to use as conduits for electrical or communication



TAKWEEN PLAST is an advanced plastic pipes and fittings factory established in the Kingdom of Saudi Arabia. In addition to standard **PVC/cPVC, HDPE, and COD** pipes and fittings, the company introduces new technologies that add value to piping systems, such as double-wall corrugated HDPE pipes and foam-core PVC pipes, making it the first factory to provide such enhanced piping solutions.

The factory adopts the highest quality control systems and strives to ensure that its products meet international standards.

The technical and sales teams at TAKWEEN PLAST are dedicated to offering the best support to customers and are always available for sales and after-sales services.

TAKWEEN PLAST is promising its customers for the best service while constantly keeping up with technological advancements that arise in this business field.

uPVC PIPE FEATURES AND BENEFITS

Although PVC and other plastics are distinct materials, they share many advantages common to plastic piping systems, including ease of installation, corrosion resistance, low friction loss, cost-effectiveness, and long service life.

FLOW CAPACITY

Extremely smooth pipe bore, precision joints, and lack of internal projections encourage flow capacity over the total life of the system; flatter grades may be possible using PVC-U systems compared with alternative pipe materials.

EASY & LOW INSTALLATION COST

uPVC systems are light in weight (approximately one half the weight of aluminium and one-sixth the weight of steel), reducing transportation, handling and installation cost. They have smooth, seamless interior walls. No special tools are required for cutting. These materials can be installed using the solvent cement joining technique or the rubber joint push fit type.

FLAMMABILITY AND FIRE RESISTANCE

uPVC piping systems are self-extinguishing and will not support combustion. The ASTM E 84 test protocol is used to determine the flame and smoke rating for various materials. uPVC will not pass the ASTM E-84 25/50 flame spread/smoke developed test and is not acceptable for use in plenum areas. For plenum applications, follow prevailing code requirements.

STRENGTH

uPVC products are highly resilient, tough and durable with high tensile and high impact strength.

NON-CONDUCTIVITY

uPVC is a non-conductor of electricity, and is therefore not subject to galvanic or electrolytic action.

LOW FRICTION LOSS

The smooth interior surfaces of uPVC assure low friction loss and high flow rate. Additionally, since uPVC pipe resist rusting, pitting, scaling and corrosion, the high flow rate can be maintained for the life of the piping system.

CHEMICAL RESISTANCE

TAKWEEN PLAST uPVC pipes are one of the best products that resist to a wide range of chemicals, this is what makes uPVC one of the best products used in the industrial piping systems, a proven history of over 50 years is witnessed in many applications that makes uPVC the chosen product when aggressive fluids are carried in the piping systems.



QUALITY CONTROL DEPARTMENT

At TAKWEEN PLAST, we implement a strict and comprehensive quality control system through an independent quality control department to ensure consistent product quality at all levels. This department operates 24/7, in coordination with the plant's shift system, and reports directly to top management to maintain full transparency and prevent any quality deviations.



RAW MATERIAL QUALITY CONTROL

All raw materials supplied to our facility undergo thorough incoming quality control testing. Before production begins, material samples are tested to verify compatibility with technical specifications and ensure they meet our manufacturing requirements. The system is fully integrated with our internal reporting procedures across departments.

PROCESS QUALITY CONTROL

To assure quality of the Products during production process and finish product, Quality Control department ensures that material used in the manufacturing process are in strict compliance with the end users' requirement and the end product is in conformity with the applicable international standards

HIGH QUALITY AND PERFORMANCE STANDARDS

Our products are manufactured in accordance with a wide range of international standards and undergo rigorous quality testing. TAKWEEN PLAST maintains full compliance with ISO 9001 standards, continuously updating its quality systems to meet the latest global requirements.

EXTENSIVE QUALITY CONTROL

All TAKWEEN PLAST pipes are subjected to a comprehensive range of quality tests, including:

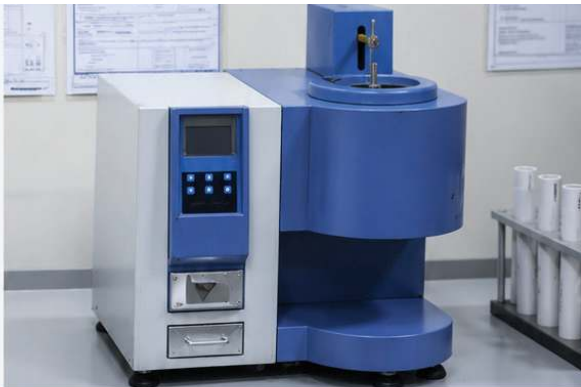
- Dimensional checks, Extrusion quality
- Flattening tests, Burst pressure
- Impact resistance, Joint integrity
- Hydrostatic performance, Melt flow rate
- Internal Hydrostatic Pressure Resistance (ICPR), Longitudinal reversion (heat reversion), Tensile strength

These tests ensure optimum quality, reliability, and long-term mechanical performance.

LABORATORY TESTING

To maintain consistent quality, our in-house laboratory performs regular testing in accordance with SASO, ISO, EN, and ASTM standards.

QUALITY CONTROL & TESTING LAB



TAKWEEN PLAST is a high quality product that must adhere to strict quality control procedures implemented. The following are some of the testing equipment:

IMPACT STRENGTH

This test applies pressure to a pipe sample, to measure the how much it can absorb.

FLATTENING & STIFFNESS

This test is used to calculate how much pressure can the pipe hold before deforming, this test is important for the buried pipes installation. Bulk Density This test deals with the level of how much the materials in the pipe sample are compact and to measure its density.

DENSITY & SPECIFIC GRAVITY

This test uses certain levels of gravity to identify the properties of the making process of the pipes.

VICAT SOFTENING TEMPERATURE

This test measures the temperature when the pipe sample softens under.

Hydrostatic Strength This tests is done to measure the strength of the pipe sample, it applies internal pressure on the sample, for both short and long term.

TENSILE STRENGTH, ELONGATION AND ELASTICITY

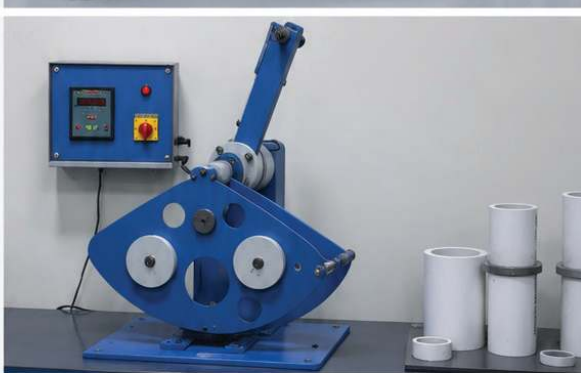
This test measures how strong the pipe sample is, before it

Longitudinal Reversion or Effects of Heating

This test exposes the pipe sample to heat, to see at which temperature the sample begins to deform, or start cracking. And to measure how much heat the pipe sample can take.

Methylene Chloride Test

This test identifies the homogeneity of raw material mix.



MANUFACTURING STANDARDS:

TAKWEEN PLAST uPVC pipes are manufactured in compliance with the following standards:

- Saudi Arabian Standard SASO ISO 1452-2 (latest edition).
- German Standards: DIN 8061 / DIN 8062.
- European Standards: BS EN 1401-1 and BS EN 1329-1.
- British Standards: BS 3505 / BS 3506.
- American Standards:
- ASTM D-1785 for SCH40 & SCH80.
- ASTM D-2665 and ASTM D-2241 for SDR pipes.
- ASTM F-441 for cPVC.
- NEMA Standards: TC-2, TC-3, TC-6, TC-8, and TC-9.
- Saudi Standards for electrical conduits (SSA 254, 255), based on BS 6099 Part 1.

RANGE OF PRODUCTION

TAKWEEN PLAST uPVC pipes are produced in metric sizes ranging from 16 mm to 800 mm in outer diameter, with various pressure classes and dimensional specifications (detailed later in the catalogue).

According to SASO/ISO standards:

- Sizes up to 63 mm are available with solvent joint sockets.
- Larger sizes are available with either solvent joint or rubber ring joint types.
- ASTM standard pipes are manufactured in sizes ranging from 1/2" to 8" in plain socket design (socketed ends available upon special request).
- Both PVC and cPVC pipes are manufactured in compliance with ASTM standards and meet the relevant material specifications.

MARKING

TAKWEEN PLAST pipes are clearly marked during the production process in accordance with the applicable standards and include the name of the manufacturing facility.



TAKWEEN PLAST uPVC Pipes According to (SASO-ISO-1452 -2). Table No.1:

Nominal Outside diameter	Nominal (minimum) Wall Thickness Pipe Series S						
	S 20 (SDR 41)	S16 (SDR 33)	S16 (SDR 33)	S 12,5 (SDR 26)	S8 (SDR 17)	S 6,3 (SDR 13,6)	S5 (SDR 11)
	Nominal pressure PN based on service (design) coefficient C=2,5						
	PN 6	PN 8	PN 10	PN 12,5	PN 16	PN 20	
16	-	-	-	-	-	-	1.5
20	-	-	-	-	-	-	1.9
25	-	-	-	-	-	-	2.3
32	-	1.5	1.5	1.9	2.4	2.9	
40	1.5	1.6	1.9	2.4	3.0	3.7	
50	1.6	2.0	2.4	3.0	3.7	4.6	
63	2.0	2.5	3.0	3.8	4.7	5.8	
75	2.3	2.9	3.6	4.5	5.6	6.8	
90	2.8	3.5	4.3	5.4	6.7	8.2	
	Nominal pressure PN based on service (design) coefficient C-2,0						
	PN 6	PN 8	PN 10	PN 12,5	PN 16	PN 20	PN 25
110	2.7	3.4	4.2	5.3	6.6	8.1	10.0
125	3.1	3.9	4.8	6.0	7.4	9.2	11.4
140	3.5	4.3	5.4	6.7	8.3	10.3	12.7
160	4.0	4.9	6.2	7.7	9.5	11.8	14.6
180	4.4	5.5	6.9	8.6	10.7	13.3	16.4
200	4.9	6.2	7.7	9.6	11.9	14.7	18.2
225	5.5	6.9	8.6	10.8	13.4	16.6	-
250	6.2	7.7	9.6	11.9	14.8	18.4	-
280	6.9	8.6	10.7	13.4	16.6	20.6	-
315	7.7	9.7	12.1	15.0	18.7	23.2	-
355	8.7	10.9	13.6	16.9	21.1	26.1	-
400	9.8	12.3	15.3	19.1	23.7	29.4	-
450	11.0	13.8	17.2	21.5	26.7	33.1	-
500	12.3	15.3	19.1	23.9	29.7	36.8	-
560	13.7	17.2	21.4	26.7	-	-	-
630	15.4	19.3	24.1	30.0	-	-	-
710	17.4	21.8	27.2	-	-	-	-

Note: To apply a design coefficient of 2.5 (instead of 2.0) for pipes with nominal diameters above 90 mm, the next higher pressure rating should be used.

Length: 6 meters (Other lengths available upon request).

Colour: Grey (Other colours available upon request).

Socket Type:

Rubber Joint (R/J): Supplied for sizes from 63 mm to 800 mm.

Solvent Cement (P/S): Supplied for sizes from 20 mm to 315 mm.

uPVC Pipes According to (SASO 14 & 15, DIN 8061/8062)

TAKWEEN PLAST uPVC pipes comply with SASO 14 and 15/1998, ISO and DIN 8061/8062 standards, covering both nominal outer diameters and wall thickness.

Table No. 2:

Nominal Outside Diameter (mm)	Socket Depth for R/J mm(t)	Socket Depth for S/J mm(t)	CLASS 1 2 Bar		CLASS 2 4 Bar		CLASS 3 6 Bar		CLASS 4 10 Bar		CLASS 5 16 Bar	
			Nom.wt kg/m	Nom. thick. of the wall mm	Nom.wt kg/m	Nom. thick. of the wall mm	Nom.wt kg/m	Nom. thick. of the wall mm	Nom.wt kg/m	Nom. thick. of the wall mm	Nom.wt kg/m	Nom. thick. of the wall mm
16											0.09	1.2
20		20									0.137	1.5
25		25							0.174	1.5	0.212	1.9
32		32							0.264	1.8	0.342	2.4
40		40					0.334	1.8	0.35	1.9	0.525	3
50		50					0.422	1.8	0.552	2.4	0.809	3.7
63	117	63					0.562	1.9	0.854	3	1.289	4.7
75	119	70			0.642	1.8	0.782	2.2	1.22	3.6	1.82	5.6
90	124	79			0.774	1.8	1.13	2.7	1.75	4.3	2.61	6.7
110	129	91	0.95	1.8	1.16	2.2	1.64	3.2	2.61	5.3	3.9	8.2
125	132	100	1.08	1.8	1.48	2.5	2.13	3.7	3.34	6	5.01	9.3
140	135	109	1.21	1.8	1.84	2.8	2.65	4.1	4.1	6.7	6.27	10.4
160	142	121	1.39	1.8	2.41	3.2	3.44	4.7	5.47	7.7	8.17	11.9
200	150	145	1.74	1.8	3.7	4	5.37	5.9	8.51	9.6	12.8	14.9
225	162	160	1.96	1.8	4.7	4.5	6.76	6.6	10.8	10.8	16.1	16.7
250	162	175	2.4	2	5.65	4.9	8.31	7.3	13.2	11.9	19.9	18.6
280	170	193	3.11	2.3	7.11	5.5	10.4	8.2	16.6	13.4	24.9	20.8
315	180	214	3.78	2.5	9.02	6.2	13.1	9.2	20.9	15	31.5	23.4
355	189		4.87	2.9	11.4	7	16.7	10.4	26.5	16.9	39.9	26.3
400	200		6.1	3.2	14.5	7.9	21.1	11.7	33.7	19.1	50.8	29.7
450	213		7.65	3.6	18.3	8.9	26.8	13.2	42.7	21.5	-	-
500	253		9.37	4	22.4	9.8	32.9	14.6	52.6	23.9sc	-	-

Note: SASO 14 & 15 is a withdrawn standard and has been officially replaced by SASO-ISO 1452-2.

Pipes manufactured according to SASO 14 & 15 are available only upon request and for an indefinite transitional period.

uPVC Plastic Piping Systems for Non-Pressure Underground and Above-Ground Drainage

TABLE NO. 3:

BS EN 1401 -1 uPVC Pipes for underground drainage:
Underground drainage, sewer and storm water pipes are available under BS EN 1401 (Orange Brown) as follows:

BS EN 1401-1								
Nominal Size (mm)	Outside Diameter		Wall Thickness					
			SdR 51		SdR 41		SdR 34	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
110	110	110.3	-	-	3.2	3.8	3.2	3.8
125	125	125.3	-	-	3.2	3.8	3.7	4.3
160	160	160.4	3.2	3.8	4	4.6	4.7	5.4
200	200	200.5	3.9	4.5	4.9	5.6	5.9	6.7
250	250	250.5	4.9	5.6	6.2	7.1	7.3	8.3
315	315	315.6	6.2	7.1	7.7	8.7	9.2	10.4

APPLICATION INFORMATION:

- The standard length of pipes is 6 meters or as required.
- Pipe color is Orange Brown or as required.
- Pipes with solvent cement or Ring seal socket end.

TABLE NO. 4:

BS EN 1329 are manufactured in sizes from 32 mm to 315 mm for soil and waste discharge piping systems, the dimensional specifications under this standard are as follows (in metric sizes):
BS EN 1329 - 1

Class B: For Non pressure water networks (Above Ground only Inside or Outside buildings)
Class BD: For Non pressure water networks (Above & Under Ground - Inside or Outside buildings).

BS EN 1329-1				
Nominal Size (Outside Diameter) (mm)	B		BD	
	Minimum	Maximum	Minimum	Maximum
32	3	3.5		
40	3	3.5		
50	3	3.5		
63	3	3.5		
75	3	3.5	3	3.5
90	3	3.5	3	3.5
110	3.2	3.8	3.2	3.8
125	3.2	3.8	3.2	3.8
160	3.2	3.8	4	4.6
200	3.9	4.5	4.9	5.6
250	4.9	5.6	6.2	7.1
315	6.2	7.1	7.7	8.7

uPVC Pipes According to British Standard BS 3505 / 3506



APPLICATION INFORMATION:

The standard length of pipes is 6 meters or as required.
Pipe color is Grey or as required.
Pipes with solvent cement or Ring seal socket end.
Solvent Cement (S/J) Type Supplied from Size: 32 mm up to 315 mm.

TABLE NO. 5:

Pressure ratings for working pressures at 20°C:
Class B 6.0 bar
Class C 9.0 bar
Class D 12.0 bar
Class E 15.0 bar

NOMINAL SIZE (MM)	OUTER DIA. (MM)	CLASS B 6 BAR		CLASS C 9 BAR		CLASS D 12 BAR		CLASS E 15 BAR	
		THICKNESS MM (MIN)	THICKNESS MM (MAX)	THICKNESS MM (MIN)	THICKNESS MM (MAX)	THICKNESS MM (MIN)	THICKNESS MM (MAX)	THICKNESS MM (MIN)	THICKNESS MM (MAX)
1/2"	21.2 - 21.5							1.7	2.1
3/4"	26.6 - 26.9							1.9	2.5
1"	33.4 - 33.7							2.2	2.7
1 1/4"	42.1 - 42.4					2.2	2.7	2.7	3.2
1 1/2"	48.1 - 48.4					2.5	3	3.1	3.7
2"	60.2 - 60.5			2.5	3	3.1	3.7	3.9	4.5
3"	88.7 - 89.1	2.9	3.4	3.5	4.1	4.6	5.3	5.7	6.6
4"	114.1 - 114.5	3.4	4	4.5	5.2	6	6.9	7.3	8.4
6"	168.0 - 168.5	4.5	5.2	6.6	7.6	8.8	10.2	10.8	12.5
8"	218.8 - 219.4	5.3	6.1	7.8	9	10.3	11.9	12.6	14.5

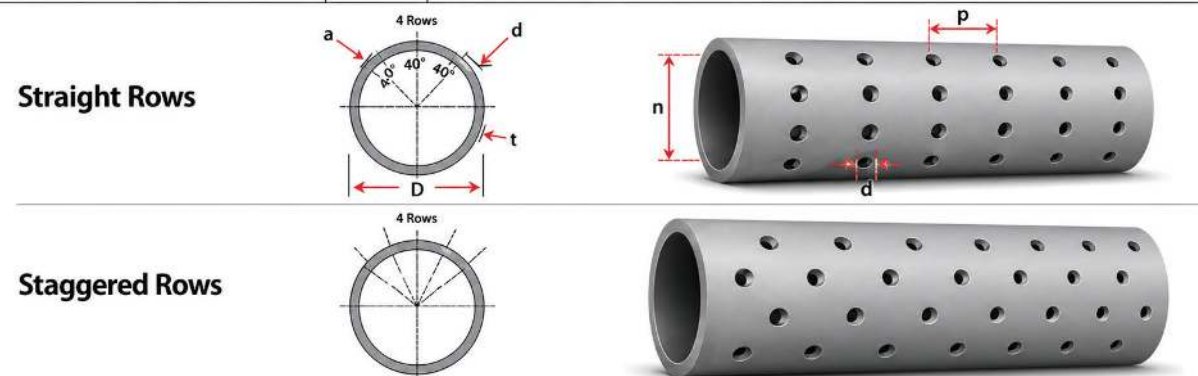
PERFORATED AND SLOTTED PIPES

A) PERFORATED uPVC PIPES

Perforated uPVC pipes are manufactured upon request, depending on the size and class of the pipes. The figures below provide a general configuration, which may vary based on individual client requirements.

TABLE NO. 6:

Parameters		Limits of variation
Outside diameter	D	32mm to 630mm in standard sizes.
Wall thickness	t	In accordance with the wall thickness of pipe selected.
Longitudinal pitch of holes	p	50 mm to 200mm depending on size and wall thickness of pipe.
Hole diameter	d	6 mm to 13 mm depending on size and wall thickness of pipe.
Number of rows	n	1 to 4.
Angular pitch of holes	a	40 degrees to 3 or 4 rows. 40, 80 or 120 degrees for 2 rows.



B) SLOTTED uPVC PIPES

Slotted pipes are produced according to RDA requirements and for use in lowering under-ground water table.

TABLE NO. 7:

Parameters	Limits of variation
Slot Length	Dep end to the size.
Slot Width	1, 1½, 2 and 3 mm.
Number of Row	4, 6 & 8 (but according to the size).
Angular Pitch	To be recommended by TAKWEEN PLAST.

uPVC FABRICATED FITTINGS

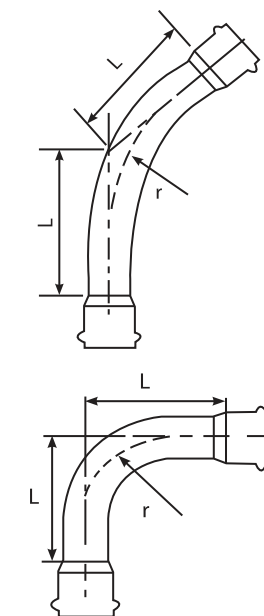
A) uPVC LONG RADIUS BENDS

TABLE NO. 8:

Pipe Size (mm)	Radius (r) mm	L(mm)			
		11. ¼°	22. ½°	45°	90°
63	221	165	187	235	364
75	263	177	204	260	414
90	315	192	224	292	476
110	385	212	251	334	559
125	438	227	271	365	622
140	490	243	292	397	684
160	729	303	373	524	934
225	788	329	408	578	1039
250	852	350	435	595	1240
280	980	385	483	694	1268
315	1103	420	531	768	1414
355	1243	860	1110	1200	1840
400	1400	910	1160	1300	1940
450	1575	960	1210	1400	2090
500	1750	1110	1410	1500	2190

NOTES:

- Dimensions stated on table are indicative, detailed specification for design purposes should be obtained from our technical Department.
- Bends for size 63 mm and above are available either with P/S or R/S.
- Single Socket or Double Socket to be specialized.

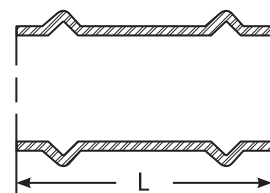


B) uPVC COUPLINGS

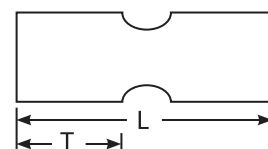
TABLE NO. 9:

Pipe O.D (mm)	R/J Coupling		P/S Coupling	
	L(mm)	T(mm)	L(mm)	T(mm)
20			58	27
25			66	30
32			74	34
40			94	39
50			96	45
63	240	100	126	53
75	250	103	140	60
90	270	111	160	69
110	290	116	185	81
140	330	125	230	99
160	350	135	250	111
200	375	144	300	135
225	430	154	360	150
250	445	162	380	165
280	495	172	425	183
315	545	185	478	204
355	588	194	520	224
400	612	205	570	246

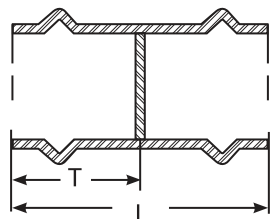
A) REPAIR COUPLING R/ J



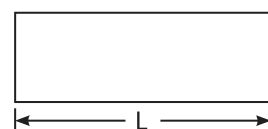
C) COUPLING WITH REGISTER P/S



B) REGISTER COUPLING R/J



D) COUPLING WITHOUT REGISTER P/S



Notes:

Dimensions stated on table are indicative, detailed specification for design purposes should be obtained from our technical Department.

TEMPERATURE PRESSURE RELATIONSHIP

Since uPVC is a thermoplastic material, its pressure ratings must be reduced at elevated temperatures. Table 10 shows the recommended percentage of the pressure rating for various operating temperatures above 20°C, with temperature fluctuations not exceeding $\pm 5^\circ\text{C}$. uPVC pipes should not be used for pressure applications if the operating temperature exceeds 60°C. As with all pipeline systems, special precautions must be taken to address potential water hammer or surge pressure. The use of surge tanks or pressure relief valves within the system is recommended to mitigate these risks.

TABLE NO. 10:

	C	F	Percentage of Working Pressure
Temp	20	68	100
	30	86	90
	35	95	80
	40	104	70
	45	113	60
	50	122	45
	55	131	30
	60	140	15

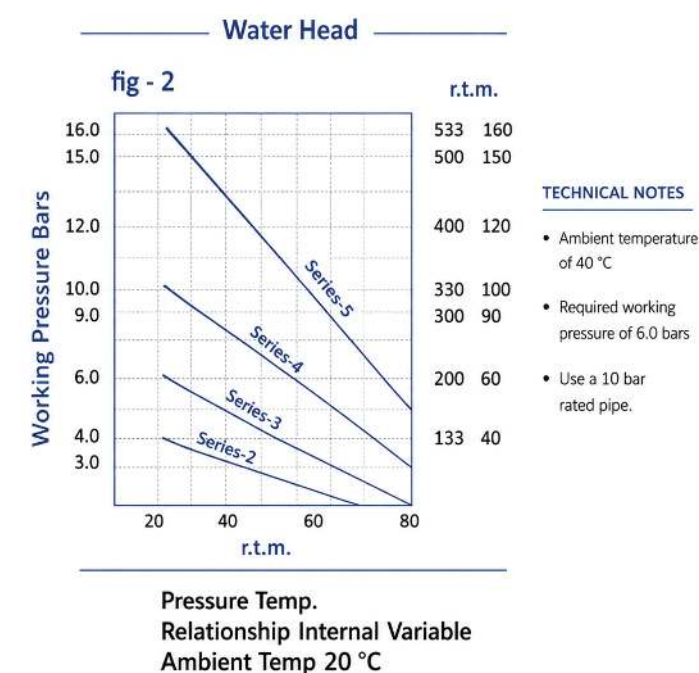
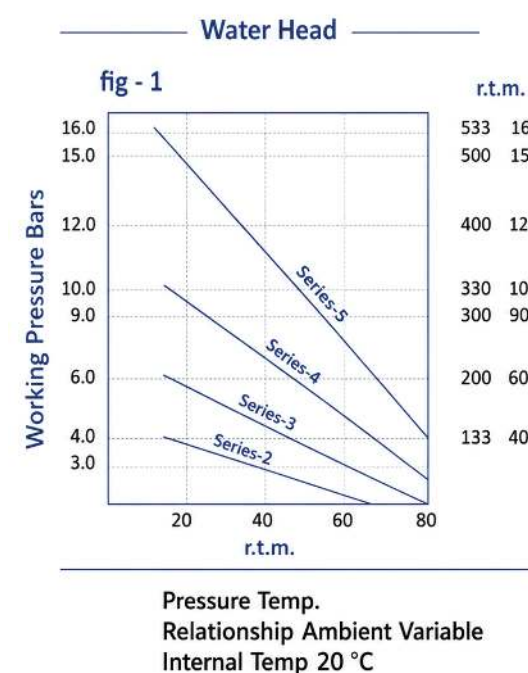


TABLE NO. 11 : PIPE PROPERTIES

PROPERTIES		
MECHANICAL	UNIT	VALUES
Tensile Strength Ultimate	kgf/cm ²	492 min
	MPa	48.0 min
Modulus of Elasticity in Tension	kgf/cm ²	28123 min
	MPa	2758 min
Compressive Strength	kgf/cm ²	638 min
	MPa	62.0 min
Flexural Strength	kgf/cm ²	1020
Izod Impact Strength	MPa	100.0 min
	J/m of notch	34.7 min
Hardness	Durometer "D"	>70t3
	Rockwell "R"	110-120
ELECTRICAL	UNIT	VALUES
Dielectric Strength	Volts/Mil	1100
Dielectric Constant	60cps @ 30 °C	4
Specific Volume Resistivity	Ohm/cm	>10 ¹⁴
Power Factor	at 10 cycles	3
THERMAL	UNIT	VALUES
Coefficient Of Thermal Linear Expansion	mm/m °K	5.6
Thermal Conductivity	Wm/°K/m ²	0.18
Specific Heat	cal / °C	0.23
	kcal /kg °C	0.23
Vicat Softening Temperature	°C	>80
Deflection Temperature	°C	>70 min
Elongation at Break	%	>40 min
GENERAL	UNIT	VALUES
Specific Gravity		1.42
Water Absorption	mg/cm ²	<4
Cell Designation	ASTM1784	1245-B
Flame Spread E-84		<25
Poison's Ratio @73 °F		0.35-0.38
Smoke Density		500
Friction Coefficient	Factor "C"	150

CHEMICAL RESISTANCE OF TAKWEEN PLAST uPVC PIPES

Polyvinyl Chloride (uPVC) is one of the most reliable petrochemical products, demonstrating excellent chemical resistance over more than 50 years of usage. It offers high compatibility with a wide range of chemicals.

The following table provides a general indication of uPVC's chemical resistance at two different fluid temperatures commonly encountered in piping systems.

It is important to note that the compatibility ratings are intended for reference only and do not guarantee full suitability for actual operating conditions. System design, including pressure, temperature, and potential chemical interactions, must be evaluated to ensure proper performance and safety prior to installation and use.

TEMPERATURE PRESSURE RELATIONSHIP

product	Conc. %	Temp 20°C	Temp 60°C	product	Conc. %	Temp 20°C	Temp 60°C
ACETIC ACID	60	S	L	HYDROFLUORIC ACID	60	L	NS
ACETIC ACID MONOCHLORIDE	SOL.	S	L	HYDROGEN	100	S	S
ACETIC ALDEHYDE	100	NS	-	HYDROGEN DIOXIDE	30	S	S
ACETIC ANHYDRIDE	100	NS	NS	HYDROGEN SULPHITE	100	S	S
ACETONE	100	NS	NS	IRON CHLORIDE	SOL.SAT.	S	S
ADIPIC ACID	SOL.SAT.	S	L	LACTIC ACID	10	S	L
ALLYLALCOHOL	90	L	S	LACTIC ACID	10-90	L	NS
ALUMINUM CHLORIDE	SOL.SAT.	S	S	LEAD ACETATE	SOL.SAT.	S	S
ALUMINUM SULPHATE	SOL.SAT.	S	S	LEAD TETRAETHYL	100	S	-
AMMONIUM(AQUEOUS)	100	L	NS	MAGNESIUM CHLORIDE	SOL.SAT.	S	S
AMMONIA(GAS)	100	S	S	MAGNESIUM SULPHIDE	SOL.SAT.	S	S
AMMONIA(SOLUTION)	SOL.DIL.	S	L	MALEIC ACID	SOL.SAT.	S	L
AMMONIUM CHLORIDE	SOL.SAT.	S	S	METHYL ALCOHOL	100	S	L
AMMONIUM FLUORIDE	20	S	L	METHYL METHACRYLATE	100	NS	NS
AMMONIUM NITRATE	SOL.SAT.	S	S	METHYLENE CHLORIDE	100	NS	NS
AMMONIUM SULPHATE	SOL.SAT.	S	S	MILK		S	S
AMYL ACETATE	100	NS	NS	NIKEL SULPHIDE	SOL.SAT.	S	S
AMYLALCOHOL	100	S	L	NICOTINIC ACID	CONC.	S	S
ANILINE	100	NS	NS	NITRIC ACID	>46	S	L
ANILINE	SOL.SAT.	NS	NS	NITRIC ACID	46-98	NS	NS
ANILINE HYDROCHLORIDE	SOL.SAT.	NS	NS	OILS		S	S
ANTIMONY CHLORIDE	90	S	S	OLEIC ACID	100	S	S
ARSENIC ACID	SOL.DIL.	S	-	OLEUM	10% OF SO3	NS	NS
BEER		S	S	OXALIC ACID	SOL.DIL.	S	L
BENZALDEHYDE	0.1	NS	NS	OXALIC ACID	SOL.SAT.	S	S
BENZEN	100	NS	NS	oxygen	100	S	S
BENZOIC ACID	SOL.SAT.	L	NS	ozone	100	NS	NS
BORAX	SOL.SAT.	S	L	Perchloric Acid	10	S	L
BORIC ACID	SOL.DIL.	S	L	Perchloric Acid	70	L	NS
BROMINE (LIQUID)	100	NS	NS	Petrol	80/20	NS	NS
BROMINE ACID	10	S	-	Phenol	90	NS	NS
BUTADIENE	100	S	S	Phosphine	100	S	S
BUTANE	100	S	-	Phosphor Trichloride	100	NS	-
BUTYL ACETATE	100	NS	NS	Phosphoric Acid	30	S	L
BUTYL PHENOL	100	NS	NS	picric Acid	SOL.SAT.	S	S
BUTYLENE	100	S	L	potassium Bichromate	40	S	S
BUTYRIC ACID	20	S	L	potassium Bromide	SOL.SAT.	S	S
BUTYRIC ACID	98	NS	NS	potassium Chloride	SOL.SAT.	S	S
CALCIUM CHLORIDE	SOL.SAT.	S	S	potassium Chromate	40	S	S
CALCIUM NITRATE	50	S	S	potassium Cyanide	SOL.	S	S
CARBON DIOXIDE	100	S	S	potassium Ferricyanide	SOL.SAT.	S	S
CARBON SULPHIDE	100	NS	NS	potassium Ferrocyanide	SOL.SAT.	S	S
CARBON TETRACHLORIDE	100	NS	NS	potassium Hydroxide	SOL.	S	S
CETYL ACID	100	S	S	potassium Nitrate	SOL.SAT.	S	S
CHLORINE (DRY GAS)	100	L	NS	potassium Permanganate	20	S	S
CHLORINE (LIQUID)	SOL.SAT.	L	NS	potassium Persulfate	SOL.SAT.	S	L
CHLOROSULPHONIC ACID	100	L	NS	Propane (gas liquid)	100	S	-
CHROMIC ACID	1-50	S	L	Pyridin	100	NS	-
CITRIC ACID	SOL.SAT.	S	S	Sea Water		S	L
COPPER CHLORIDE	SOL.SAT.	S	S	Silver Nitrate	SOL.SAT.	S	L
COPPER FLURIDE	2	S	S	Soap	SOL.	S	L
CREOSOL	SOL.SAT.	-	NS	Sodium Benzoate	35	S	L
CRESOL ACID	SOL.SAT.	NS	NS	Sodium Bisulphite	SOL.SAT.	S	S
CROTONIC ALDEHYDE	100	NS	NS	Sodium Chlorate	SOL.SAT.	S	S
CYCLOHEXANOL	100	NS	NS	Sodium ferricyanide	SOL.SAT.	S	S
CYCLOHEXANONE	100	NS	NS	Sodium Hydroxide	SOJ	S	L
DEVELOPING BATH		S	S	Sodium Hypochlorite	100(30%CL.)	S	L
DEXTRINE	SOL.SAT.	S	L	Sodium Solphite	SOL.SAT.	S	L
DICHLOROETHYLENE	100	NS	NS	Sugar	SOL.SAT.	S	S
DIGLYCOLIC ACID	18	S	L	Sulphur Acid	SOL.	S	S
DIMETHYLANNINE	30	S	-	Sulphur Anhydride	100(liquid)	L	NS
ETHYL ACETATE	100	NS	NS	Sulphur Anhydride	100(dry)	L	NS
ETHYL ACRYLATE	100	NS	NS	Sulphuric Acid	40-90	S	L
ETHYL ALCOHOL	95	S	L	Sulphuric Acid	96	L	NS
ETHYL ETHER	100	NS	L	Tannic Acid	SOL.	S	S
ETHYLENE GLYCOL	CONC.	L	L	Tartaric Acid	SOL.	S	S
FLUOSILICIC ACID	32	S	S	Tin Chloride	SOL.SAT.	S	S
FORMALDEHYDE	SOL.	S	S	Toluene	100	NS	NS
FORMALDEHYDE	40	S	S	Trichloroethylene	100	NS	NS
FORMIC ACID	1-50	S	L	TRIMETHYL PROPANE	<10	S	L
FURFURAL ALCOHOL	100	NS	NS	UREA	10	S	L
GLUCOSE	SOL.SAT.	S	L	URINE		S	L
GLYCERIN	100	S	S	VINAGRE		S	S
GLYCOLIC ACID	30	S	S	VINYL ACETATE	100	NS	NS
GOLDEN SYRUP	SOL.	S	L	WINE		S	S
HYDRAZINE BENZENE	100	NS	NS	XYLENE	100	NS	NS
HYDROZINE BENZENE CLORIC	97	NS	NS	YEAST	SOL.	S	L
HYDROBROMIC ACID	50	S	L	ZINC CHLORIDE	SOL.SAT.	S	S
HYDROCHLORIC ACID	>30	S	S				

HANDLING AND STORAGE OF uPVC PIPE

To store uPVC pipes safely, consider the following:

- Flat and Clean Storage Area: All storage areas must be level, stable, and free from stones, debris, or any sharp-edged objects that could damage the pipes.
- Protection from Contamination: Pipes must be stored in a manner that prevents dirt, debris, or other contaminants from entering their interiors.
- End Caps Removal: Pipe end caps should only be removed immediately prior to installation to maintain cleanliness.
- Prevent Deformation: Choose storage zones and stack heights that prevent damage or permanent deformation of the pipes.
- Support for Large Diameters: Large diameter pipes with thin walls must be reinforced with stiffener rings to maintain shape and structural integrity during storage.
- Avoid Point Contact: Pipes should never rest on single-point or longitudinal contact surfaces. Even support must be provided along their length.
- Stacking Limitations: Non-palletized pipes should not be stacked higher than 1 meter. This limitation does not apply to pipes stacked on properly designed pallets where the frame supports the full weight.
- Coiled Pipe Storage: Coiled pipes must either be laid flat or stored in a suitable protective framework to avoid damage or unwinding.
- Delay Removal of Fastening Bands: Fastening straps or bands should remain in place until just before installation to prevent unwanted shifting or damage.
- Increased Stack Height (Palletized): When pipes are correctly stacked on pallets and secured against lateral movement, stacking heights may be increased by up to 50%.
- Weather and Environmental Protection: Store pipes and fittings in a location that offers maximum protection from direct sunlight, moisture, and temperature extremes.
- Avoid Harmful Contact: Pipes must not come into contact with fuels, oils, solvents, greases, paints (especially silicone-based), or heat sources during storage.
- No Dragging: Pipes and coils must not be dragged across the ground under any circumstances to avoid abrasion or damage to the surface or ends.



OUTDOOR STORAGE OF uPVC PIPES

- If uPVC pipes are stored outdoors—such as on construction sites—they must be covered with suitable sheeting (either colored or plain black) to protect them from environmental exposure, particularly ultraviolet (UV) radiation. Prolonged exposure to sunlight can degrade the material properties of the pipes.
- In addition, uneven exposure to direct sunlight (i.e., on one side only) can cause thermal stress, potentially leading to pipe deformation over time. Therefore, it is essential to ensure proper and uniform protection for all stored pipes in outdoor environments.



TRANSPORTATION OF uPVC PIPES:

Vehicles for transporting pipes should be selected in such a way so that the pipes can lay completely flat on the bed of the vehicle without any over-hang.

1. All pipes are to be supported so that they cannot bend or become deformed.
2. The area of the truck where the pipes are laid should be covered with either protective sheeting or cardboard (including all side supports) in order to prevent any possible damage from protruding rivets or nails etc.
3. Pipes should be protected from possible damage during transport and not dragged over the bed of the truck or across open ground prior to installation.
4. Pipes and fittings should always be loaded and unloaded with extreme care. Special support frames are to be employed when using cranes for loading or unloading from vehicles.
5. Throwing pipes onto the ground from the bed of the transport truck must be prevented at all times.
6. Sudden shock impacts are to be avoided under all circumstances.
7. Pipes are to be transported and stored in such a way so that they do not become contaminated by earth, mud, sand, stones, water, oils, chemicals, solvents, other liquids and the effects of weather etc.

HANDLING AND STORAGE METHODS

The person receiving the pipe must inspect it for any transportation damage caused by over-tightened tie-down straps, improper handling, or a shift in the load.

Pipes delivered in a closed trailer must be inspected immediately upon opening the trailer. Take extra time to ensure that the pipe has not been damaged by other materials stacked on top of it, load shifts, or rough handling.

Visually inspect the pipe ends for any cracks, splits, gouges, or other forms of damage. Additionally, check the pipe for any severe deformation that could later cause issues during joining.

For larger diameter pipes (4" and above), the entire internal surface must be thoroughly checked for splits or cracks that may have occurred during loading or transit.



PIPE STORAGE

Pipes should be stored under shade or inside a closed warehouse. When this is not possible, they should be stored on level ground that is dry and free of sharp objects.

If different pipe schedules are stacked together, the pipe with the thickest wall should always be placed at the bottom.

If the pipes are packed in pallets, the pallets should be stacked with their wooden frames resting on top of one another—not directly on the pipes—to prevent damage or bending of the lower layers.

When pipes are stored on racks, they should be continuously supported along their entire length. If continuous support is not possible, the spacing between supports should not exceed 3 feet (approximately 1 meter).

The pipes must be protected from direct sunlight and stored in a well-ventilated area. This helps reduce the impact of ultraviolet (UV) rays and minimizes the risk of heat-related deformation.

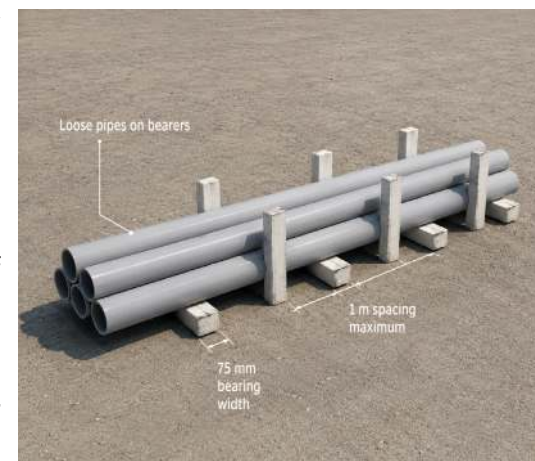
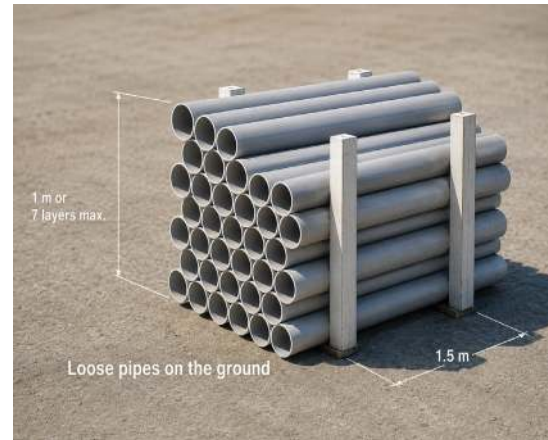
STACKING

Pipes should be given adequate support at all times. They must not be stacked in large piles, especially under warm temperature conditions, as the bottom pipes may become distorted—leading to difficulties in pipe alignment and jointing.

Socket and spigot joint pipes should be stacked in uniform layers, with the sockets placed alternately at each end of the stack to avoid imparting a permanent set to the pipes.

For long-term storage, pipe racks should ideally provide continuous support. However, if this is not possible, timber supports with a minimum bearing width of 75 mm (3 inches) should be used. These supports should be spaced no more than 1 meter (3.2 feet) apart.

If the stacks are rectangular, supports should be spaced at double the distance across the width. When different classes of pipes are stored together, the thickest pipes must always be placed at the bottom.



SITE WORK INSTRUCTIONS

a) Above-Ground Installation:



Above-ground installations must be fully supported—firm enough to avoid strain on joints, yet flexible enough to allow for some thermal expansion of the pipeline.

All flanged joints must be supported on both sides. Rubber ring joints should be anchored to resist end thrust. Pipelines should be protected from abrasion at metal supports using felt or foam rubber padding.

uPVC pipelines must be shielded from direct sunlight and external heat sources. Ring seal joints are not recommended for above-ground installations unless all joints are securely anchored against end thrust.

Plastic pipelines require support at specific intervals, depending on:

- The specific gravity of the conveyed material
- Temperature of the liquid and environment
- Wall thickness and plastic type of the pipe

Some deflection between support brackets and at changes in direction is acceptable, with an average deflection of up to 25 mm between centers.

Where plastic pipelines are connected to metal valves or other heavy fittings, it is crucial to support these components directly to prevent stress on the plastic pipe.

For light-duty applications and small pipe sizes, plastic pipe support brackets are adequate. For fixed points, formed metal supports with cork or PE lining should be used.

B) UNDERGROUND INSTALLATION

1. Cleanliness is essential, especially for spigot ends, which must be kept clear of the ground to avoid contamination from dirt mixed with lubricant. Placing pipes on blocks during jointing reduces friction and facilitates assembly. These blocks must be removed before backfilling. It is also critical to ensure that pipes are not resting on submerged rocks, which may cause damage.
2. The pipeline should be tested after the first few joints (certainly not more than 500 meters) to confirm correct installation, and then at regular intervals, preferably not exceeding 1000 meters.
3. All changes in pipeline direction must be anchored properly. Concrete thrust blocks are suitable, but a flexible membrane should be placed between the concrete and the pipe to prevent damage from abrasion.
4. Before testing, the pipeline should be backfilled except at the joints, which must remain exposed. If covering joints is unavoidable, mark their positions clearly.
5. The trench should not be opened too far ahead of installation, and should be backfilled as soon as possible. At the crown of the pipe, the minimum trench width should be the pipe's outside diameter + 300 mm, allowing for proper side fill compaction. 225 mm above the pipe crown, the trench can be widened as needed.
6. While the flexibility of uPVC pipes can be beneficial, care must be taken to provide adequate trench bedding support to prevent localized sagging or pipe bridging. Any sharp projections must be removed to avoid point loading on the pipe.

TRENCHING:

The bottom of the trench should be as level as possible to ensure that the entire barrel of the pipe is fully supported. The trench base should consist of sandy or loamy soil, free from rocks, stones, or debris, to provide continuous and uniform support for the pipe.

Wet Conditions

In wet or waterlogged ground, difficult working conditions can be improved by either: Placing a layer of hard granular material at the bottom of the trench, Or by dewatering the trench area and its surroundings.

If there are patches of ground too saturated, posing a risk of subsidence and potential damage to the pipeline, these areas must be stabilized by adding suitable fill material.

Trench Excavation

The trench must be excavated to a depth that allows for:

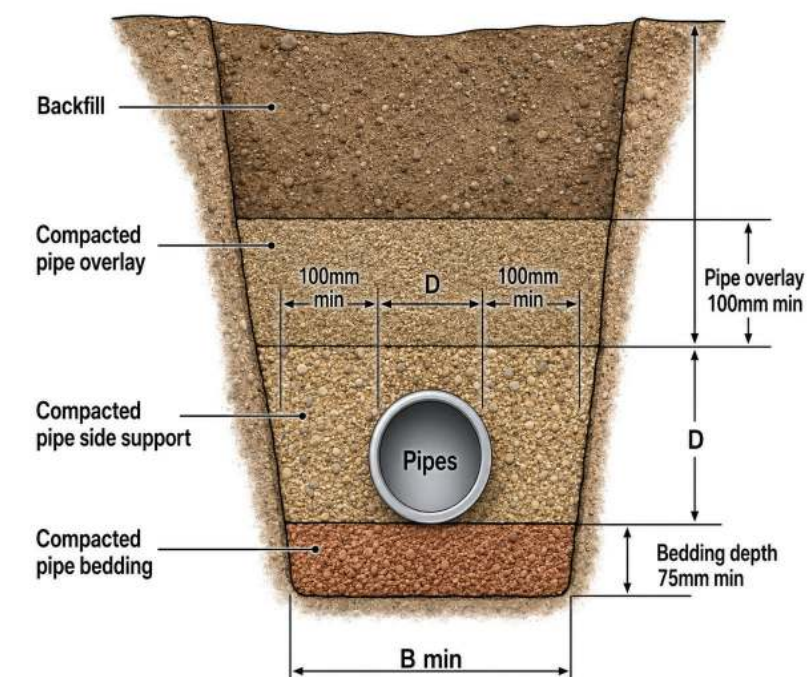
- The specified slope or gradient of the pipe,
- The required bedding thickness,
- The minimum soil cover over the pipe once installed.

BACKFILLING AND SIDE FILL MATERIALS

Some excavated soils — such as free-draining coarse sand, gravel, loam, and friable soils — may be suitable for use as side fill material. However, they must be capable of being compacted adequately to ensure sufficient support for the pipe.

Soils like hard chalk (which disintegrates when wet) and clay should not be used directly around the pipe for bedding, side fill, or initial backfill, unless a rotary type excavator has been used to break them down sufficiently.

Granular materials are highly recommended as they require minimal compaction once placed and still offer excellent support.



When installing flexible pipes, it is crucial that the side backfill is firmly compacted between the sides of the pipe and the trench walls. Trench shoring sheets must be partially withdrawn to allow for proper compaction.

Before starting the backfilling process, remove any levelling pegs, temporary fills, or supports.

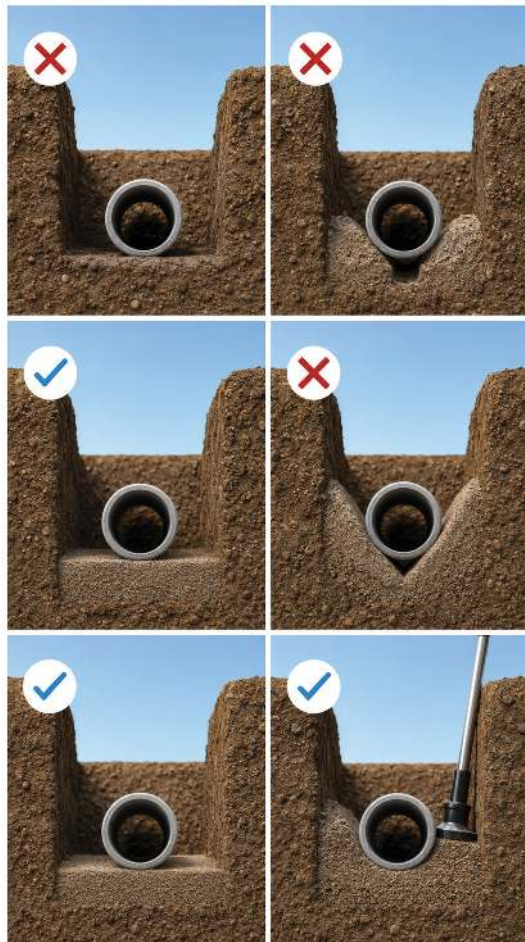
The initial bedding beneath the pipe should be at least one-third of the pipe's diameter, and no less than 100 mm in thickness. In soft or wet soils, or where the trench bottom is uneven, increase this thickness as needed to provide a proper support base.

The bedding material should be thoroughly compacted in layers no more than 150 mm thick to form a uniform bed that follows the intended gradient. Pipes must be laid directly on this compacted bed — bricks or hard objects must never be used for temporary support.

Next, bedding material should be placed around the pipe and compacted in 75 mm layers by careful tamping. This ensures there are no voids under the lower sides (quadrants) of the pipe.

Then, the same material should be placed over the pipe's crown up to at least two-thirds of its diameter, with a minimum thickness of 100 mm and a maximum of 300 mm, and also be thoroughly compacted.

The filling and tamping process must be carried out evenly on both sides of the pipe to maintain balanced pressure and prevent misalignment.



BACKFILLING:

The initial backfill should be placed by hand-shovel in layers not exceeding 100 mm deep. Each layer should be well tamped round and under the pipeline. In this way air pockets are eliminated from beneath the pipe.

Normal Filling of the trench should then proceed in layers not exceeding 300 mm in thickness, each layer being well rammed. Heavy mechanical rammers should not be used until the Fill has reached a depth of 300 mm above the top of the pipe.

- (A) Too much soil is present and the tamping bar cannot compact it properly leaving a void underneath the pipe.
- (B) Shows the correct fill of a 100 mm layer of soil which can be compacted to form a firm bed for the pipe.
- (C) Pipe joints should be temporarily left exposed when placing the initial backfill, to enable pressure tests to be carried out after testing the line, backfilling and final filling may be completed.

MINIMUM AND MAXIMUM DEPTHS:

Under roads and verges or in open area (uPVC pipes may be buried with a maximum cover depth of 6.1 meters. However, a minimum cover depth of 1.2 meters should be allowed when pipes are installed under roads). Tests have shown that traffic loads (wheel loads) do not affect pipes with this amount of cover depth provided they are properly installed and back-filled. At depths less than 1.2 meters, special consideration should be given to all the engineering factors involved, such as class of road, its construction and the position of other services. Under these circumstances, concrete may be used as a protecting raft above the pipeline, provided a cushion of fill is laid between the pipe crown and the raft.

In open area, where top loading is unlikely to occur, pipes may be laid with a minimum cover depth of 0.45 meters without any protection. At depths less than 0.45 meters, elsewhere than under roads, concrete slabs on a cushion of fill materials above the pipe should be used as a protection against picks, gardening implements.

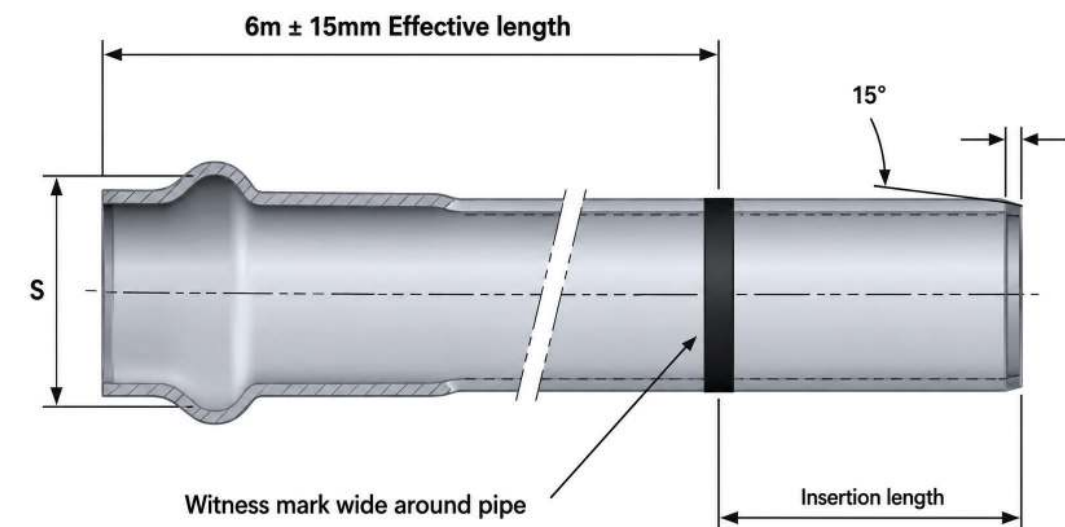
PIPE CUTTING AND CHAMFERING

uPVC pipes may be easily cut on site using a **fine-toothed handsaw** or power driven circular masonry blade.

Pipe should be cut square. A simple method of cutting pipes square is to wrap paper around the pipe with no overlap of the edges. Mark line around pipe (use soft pencil, crayon or felt pen).

Remove any burrs, sharp edges and pipe shavings using a file or reaming tool. Failure to correctly deburr may prevent full pipe penetration and/or cause the detrimental accumulation of solvent cement at the back of the joint.

Ends cut should be chamfered at an angle of approximately 15° to about 1 /3 of the wall thickness with a coarse file, Surform tool or chamfering tool.



JOINTING METHODS:

TAKWEEN **PLAST** uPVC pipes and fittings may be joined using rubber ring joints or solvent cement joints.

A) Solvent Cement Joints

To achieve strong leak free joints, should:

- 1- Select the correct solvent cement and cleaner primer for the application.
- 2- Cleaner primer and solvent cement must be used together to achieve permanent leak-free joints.
- 3- Select the correct pipe and fitting.
- 4- Follow the recommended jointing steps shown below.

SOLVENT CEMENT WELDING PROCEDURE:

1. Ensure the pipe and socket are clean and dry. Moisture contamination may lead to future joint failure.
2. A cleaner primer fluid must be used to clean and prime all surfaces, as it is essential to the jointing process.
3. Apply the cleaner primer to the pipe and socket with a lint-free cloth (preferably made of natural fibers), dampening the joint surfaces with the priming fluid.
4. Apply solvent cement without delay after cleaning, using a flat, clean brush. Apply an even, unbroken layer by brushing axially along the pipe end and socket mouth, with a slightly heavier layer on the pipe.
5. If required, apply a second full, even coat to the pipe. Excess solvent cement on the outer surfaces can easily be wiped away after assembly.
6. Ensure the entire surface area to be joined is covered with cement before assembly. Since solvents evaporate faster from the exposed pipe than from the socket, a dry patch (not lubricated by wet solvent) may prevent full insertion.
7. Immediately insert the pipe into the socket up to the entry mark, align pipe and socket, hold in position for a few seconds, then wipe off excess cement (do not twist).

AFTER JOINTING:

- > Do not move the joint for at least 10–15 minutes. Allow 4 hours before laying the jointed pipe lengths in a trench.
- > Do not fill the pipe with water for at least one hour after completing the last joint. Allow the cement to fully cure before performing any site hydrostatic testing. Joint curing typically takes at least 24 hours at 20°C. If the temperature is below 20°C, allow up to 48 hours for curing.



B) SEAL (RUBBER) RING JOINTS



- 1- Ensure the inside of all pipes and fittings are completely free of dirt, sand, grease, and water before joint assembly begins.
- 2- Thoroughly wipe out, dry and clean the empty pipe socket .
- 3- Be sure the pipe spigot is correctly chamfered and has a clearly visible witness mark at the correct insertion depth.
- 4- Insert pipe into the socket without rubber ring place and mark pipe when it is fully inserted. Place seal in groove of socket ensuring that seal is correct way round.
- 5- Ensure that the rubber ring is dry and clean. Be sure there is no lubricant in the empty socket. With the fingers, form a heart shaped fold in the seal to reduce the ring diameter then place it in the ring groove. Install with the flap facing into the socket. Smooth firmly round the seal until it seats positively in the ring groove.
- 6- Apply jointing lubricant to the spigot, fully covering the circumference up to the witness mark, including the pipe chamfer and also to the inner flap of the rubber ring. Be sure there is no lubricant between the rubber ring outer surface and the rubber ring housing to prevent displacement of the rubber seal during joint assembly.
- 7- Be sure the pipe spigot and socket are axially aligned with one another. If joint deflection is required, do not deflect until after joint assembly is completed, Push the pipe firmly into the socket up to the insertion mark previously made. If an expansion gap is required the pipe is then pulled back by the desired amount.

HYDRAULIC TEST:

The purpose of testing a non-pressure pipeline is to ensure that the line has been correctly laid to line and grade and careful checking and adequate supervision will ensure that sewer lines are laid to line and grade.

Pipeline to be tested should be backfilled leaving all couplings and fittings exposed for inspection during testing. In solvent weld uPVC jointed non-pressure pipelines, at least 24 hours should have elapsed since the last joint was made before testing commissioning.

TEST PROCEDURE:

Fill the pipeline to be tested, with water to a height of not less than 1 meter above the pipeline level at the highest point of the test section and not more than 3 meters at the lowest point of the test section. **Maintain the pressure without leakage for at least 15 minutes.** Locate the source of any leaks and repair any defects. Then retest the pipeline.

TABLE NO. 13:

The following amount of lubricant is recommended to apply 100 joints.

Pipe outer nominal diameter DN	OD diameter(mm)	Adhesive	Primer(kg)
25	25	≈0.8	≈0.5
32	40	≈1.1	≈0.7
40	50	≈1.6	≈0.9
50	63	≈1.7	≈1.7
60	75	≈2.2	≈1.3
80	90	≈4	≈1.4
100	110	≈8	≈1.7
125	125/140	≈13	≈2.1
150	160	≈19	≈2.5
200	200/225	≈26	≈4.5
250	280	≈38	≈6.5
300	315	≈52	≈10.2
400	400	≈62	≈12.9
450	450	≈69.75	≈14.4
500	500	≈77.5	≈16

WATER HAMMER

Water Hammer is a hydraulic phenomenon characterized by a sudden and intense pressure surge in a piping system, caused by the rapid change in velocity of the fluid. This typically occurs when flow is suddenly stopped, started, or its direction is abruptly changed. The abrupt momentum change generates pressure waves that travel through the pipe at the speed of sound in the fluid, causing spikes in pressure that can exceed the normal operating pressure by several times.

HAMMER INCLUDE

Water Hammer is a hydraulic phenomenon characterized by a sudden and intense pressure surge in a piping system, caused by the rapid change in velocity of the fluid. This typically occurs when flow is suddenly stopped, started, or its direction is abruptly changed. The abrupt momentum change generates pressure waves that travel through the pipe at the speed of sound in the fluid, causing spikes in pressure that can exceed the normal operating pressure by several times.

Typical causes of water hammer include:

1. Quick closing of a valve, which abruptly stops fluid flow and generates a pressure surge upstream.
2. Quick opening of a valve, causing sudden acceleration of fluid and pressure fluctuations.
3. Starting pumps with an empty discharge line, resulting in rapid filling and flow acceleration.
4. Rapid changes in flow direction, such as fluid passing quickly through elbows or bends (e.g., 90° elbows), causing momentum shifts.
5. Movement of entrapped air pockets within the system, which can compress and release suddenly, amplifying pressure waves.

Technical implications:

- The pressure surge produced by water hammer must be added to the steady-state fluid pressure to determine the maximum pressure the piping system must withstand.
- If not properly accounted for, water hammer can cause severe mechanical stress, leading to pipe bursts, joint failures, or damage to valves and fittings.
- The magnitude of the pressure spike depends on the fluid velocity, pipe material and thickness, pipe length, and the speed at which flow conditions change.

Mitigation measures:

- Install water hammer arrestors or surge tanks that absorb pressure spikes.
- Use slow-closing valves to gradually stop flow and reduce pressure surges.
- Implement air release valves to prevent entrapped air accumulation.
- Design the system with adequate wall thickness and support to withstand transient pressures.
- Maintain proper operation procedures for pump startup and shutdown.

CAUTION! Failure to consider water hammer effects can result in catastrophic failure of the piping system, costly repairs, and potential safety hazards.

TAKING THE FOLLOWING MEASURES WILL HELP PREVENT PROBLEM

1. Keep fluid velocities below 5 feet per second.
2. Use actuated valves with controlled opening and closing speeds.
3. Instruct operators of manual valves on the proper opening and closing speeds.
4. When starting a pump, partially close the valve in the discharge line to minimize the volume of liquid accelerating through the system. Fully open the valve after the line is completely filled.
5. Use a check valve in the pipeline near the pump to keep the line full.
6. Use air relief valves to control the amount of air admitted or exhausted throughout the piping system.
7. Design the piping system so that the total pressure (operating pressure plus water hammer surge) does not exceed the pressure rating of the lowest-rated component in the system.

HOW TO USE THE NOMOGRAPH ON THE FOLLOWING PAGE

1. Determine the liquid velocity (in feet per second), the piping length (in feet), and the valve closing time (in seconds).
2. Place a straight edge connecting the liquid velocity on the velocity scale (line A) and the pipeline length on the length scale (line D).
3. Mark the point where the straight edge intersects the pivot line (line C).
4. Then, place the straight edge connecting this marked point on the pivot line (line C) to the valve closing time on the valve closing time scale (line A).
5. The intersection of the straight edge with the pressure increase scale (line B) gives the liquid momentum surge pressure (water hammer).

FRICITION LOSS:

Friction loss through PVC pipe is normally obtained by using the Hazen-Williams equation shown below for water:

$$hf = 0.002083 \times L \times (100/d)^{1.85} \times (gpm)^{1.85} / d^{4.8655}$$

where:

hf = head loss in feet in feet of water

L = length of pipe in feet

C = friction coefficient

gpm = gallons per minute (USA gallons not imperial gallons)

d = inside diameter of the pipe in inches

FRICITION LOSS THROUGH FITTINGS

The friction loss through fittings is considered to be equivalent to the loss through a certain number of linear feet of pipe of the same diameter as the fittings. To determine the loss through a piping system, add together the number of "equivalent feet" Calculated for the fittings in system. The chart below shows approximate friction losses, in equivalent feet, for variety of Schedule 80 & 40 PVC fittings of different sizes.

TABLE NO. 14:

Approximate Friction Loss For PVC Fittings In Equivalent Feet of Straight Pipe

Fitting	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"
Tee(Run)	1.0	1.4	1.7	2.3	2.7	4.3	5.1	6.2	8.3	12.5	16.5
Tee(Branch)	4.0	5.0	6.0	7.3	8.4	12.0	15.0	16.4	22.0	32.7	49.0
90° Elbow	1.5	2.0	2.5	3.8	4.0	5.7	6.9	7.9	12.0	18.0	22.0
45° Elbow	.08	1.1	1.4	1.8	2.1	2.6	3.1	4.0	5.1	8.0	10.6
Male/Female Adapter	1.0	1.5	2.0	2.75	3.5	4.5	5.5	6.5	9.0	14.0	----

The table on page shows friction heads in feet and friction losses in psi for schedule 40 pipe. It also shows the gallons per minute (GPM) and velocities (in feet per second) for various pipe sizes.

COMBINED EXTERNAL LOAD

TABLE NO. 15:

DEPTH		EARTH LOAD	Wheel Load	Combined Load
cm	ft	Kg/vm2	Kg/vm2	Kg/vm2
30	1	0.0493	1.226	1.2753
60	2	0.0905	0.546	0.63365
90	3	0.1248	0.313	0.3478
120	4	0.1533	0.204	0.3573
150	5	0.1771	0.144	0.3211
180	6	0.1969	0.107	0.3039
210	7	0.2135	0.083	0.2965
240	8	0.2272	0.066	0.2932

THE LOAD OF BACKFILL ACTING UPON A BURIED PIPE IS CALCULATED FORMULA OF MASTER ANDERON.

PE	=	Cd,VB -2ktan?H/B
CD	=	I-e B 2ktan?
K	=	1-sin? 1-tsin?
Where PE	=	static earth load,kg/cm
V	=	specific weight of backfill In kg/cm (Normal Soil =0.0018kg/cm
H	=	depth of cover ,in cm
?	=	angle of repose of soil ,n deg.
B	=	width of trench,in cm.

Kogler formula is used to calculate the wheel load when live loads such as those of trucks act upon a buried pipe

$$PT = \frac{2w1(1+I)}{(a+2H)(c+b+2H)}$$

where

PT = Wheel load, in kg/cm

I = impact coefficient (normally 0.3).

WT = load per wheel ,in kg.

A = length of wheel in contact with ground, in cm.

B = width of wheel in contact with ground, in cm.

C = distance between wheels of two parallel trucks in cm.

H = depth of cover ,in cm

PVC and cPVC Material :

- PVC and CPVC pipes are some of the **most durable and flexible** types of piping, manufactured from rigid PVC compound. These materials were engineered in the hopes of replacing traditional cast iron, copper, and iron pipes, which are expensive and prone to breakdown.
- The ASTM standard allows PVC pipe to be used in applications not exceeding 140 degrees F (60°C).
- CPVC pipe on the other hand can handle temperatures up to 200 degrees F (93°C).

Manufacturing Standards:

- PVC Pipes Schedule 40 & Schedule 80 according to ASTM D - 1785.
- PVC Pipes Drain, Waste and Vent (DWV) according to ASTM D - 2665.
- PVC Pipes according to D - 2241 (SDR Series).
- cPVC Pipes Schedule 80 according to ASTM F - 441.

Colour of Pipe:

Table No. 1:

TYPE OF PIPE	STANDARD	COLOUR
PVC Pipes Schedule 80	ASTM D - 1785	Grey
PVC Pipes Schedule 40	ASTM D - 1785	White
PVC Pipes Schedule 40 (DWV)	ASTM D - 2665	White
PVC Pipes Schedule 40 (SDR)	ASTM D - 2241	White
cPVC Pipes Schedule 80	ASTM F- 441	Grey

Standard pipe length:

(6 meters).

Jointing pipe:

PVC and cPVC pipes and fittings assemble easily using solvent cement.

Applications of TAKWEEN PLAST Piping. (PVC and cPVC Pipes):

- Potable Water and Food Industrial.
- **Hot and Cold Water Plumbing.**
- Irrigation/Agricultural system.
- Drain, Waste and Vent systems.
- Chemical Industries (Pharmaceutical and Biotechnology - Chemical Manufacturing - Health Care - Ultra-pure Water).
- Industrial Processing (Water Desalination - Water Distribution Stations - Cooling Water).
- Water and Waste Water Treatment - HVAC Control - etc.).

PVC and cPVC Pipes Features and Benefits:

- 1- Rigid Means fewer hangers and supports compared to other plastic pipe materials.
- 2- High quality.
- 3- Clean and uncontaminated for use in Potable water and other liquids.
- 4- Chemically resistant to a wide range of chemicals.
- 5- **High tensile strength.**
- 6- Smooth surfaces mean less friction loss.
- 7- Corrosion resistant.
- 8- Easy installation methods.
- 9- Lightweight.
- 10- Low thermal conductivity.

Quality Control Department:

Our company applies a strict quality control system through an independent quality control department to ensure quality at all levels. The quality control department works round the clock to synchronize with shift system of the plant and reports to the top management of the company to insure ascendancy free.

Table No. 2: Physical Properties of PVC & cPVC Pipe.

General	Test Method	PVC Value	cPVC Value
Cell Classification	ASTM D 1784	12454	23447
Maximum Service Temp.		140° F	200° F
Color		White, Dark Gray	Medium Gray
Specific Gravity, (g/cu.cm @ 73°F)	ASTM D 792	1.41	1.51
Water Absorption % increase 24 hrs @ 25°C	ASTM D 570	0.05	0.03
Hardness, Rockwell	ASTM D 785	110-120	117-119
Poisson's Ratio @ 73°F		0.39	0.38
MECHANICAL	Test Method	PVC Value	cPVC Value
Tensile Strength, psi @ 73°F	ASTM D 638	7450	7900
Tensile Modulus of Elasticity, psi @ 73°F	ASTM D 638	420000	426000
Flexural Strength, psi @ 73°F	ASTM D 790	14450	15000
Flexural Modulus, psi @ 73°F	ASTM D 790	360000	360000
Compressive Strength, psi @ 73°F	ASTM D 695	9600	10000
Izod Impact, notched, ft-lb/in @ 73°F	ASTM D 256	0.75	2.9
Thermal	Test Method	PVC Value	cPVC Value
Coefficient of Linear Expansion (in/in/°F)	ASTM D 696	3 x 10-5	3.2 x 10-5
Coefficient of Thermal Conductivity	ASTM C 177		
Calories • cm/second • cm2 • °C		3.4 x 10-4	3.27 x 10-4
BTU • inches/hour • Ft.2 • °F		1.02	0.95
Watt/m/K		0.147	0.137
Under Load (264 psi, annealed)	ASTM D 648	170	235
ELECTRICAL	Test Method	PVC Value	cPVC Value
Dielectric Strength	ASTM D 149	1, 113	1,240
Dielectric Constant	ASTM D 150	4	3.7
Volume Resistivity	ASTM D 257	1.2 x 10 ¹²	3.4 x 10 ¹²
Flammability	Test Method	PVC Value	cPVC Value
Flammability	ASTM D 635	Self Extinguishing	Self Extinguishing
Average Time of Burning (sec.)	ASTM D 635	< 5	< 5
Average Extent of Burning (mm)	ASTM D 635	< 10	< 10
Flammability rating	UL-94	V-0	V-0,5VB

Chemical Resistance of PVC & cPVC Pipe.

PVC and cPVC pipe has excellent chemical resistance to strong mineral acid and bases.

Temperature Pressure Relationship:

- Maximum PVC Service Temperature 140°F (60°C).
- Maximum cPVC Service Temperature 200°F (93°C).
- The pressure ratings for water at 73°F. To calculate elevated temperature rating use the following formula:

$$\text{Max Pressure} = (73) \times (\text{De-rating Factor})$$

Table No. 3:

	Operating Temp (°C)	Operating Temp (°F)	Percentage of Working Pressure (De-Rating Factor)
PVC Pipe	23	73	100
	27	80	88
	32	90	75
	38	100	62
	43	110	51
	49	120	40
	54	130	31
	60	140	22

EX: 1" PVC SCHEDULE 80 @ 120°F

= 630 psi x 0.40 = 252 psi (max pressure @ 120°F)

Table No. 4:

	Operating Temp (°C)	Operating Temp (°F)	Percentage of Working Pressure (De-Rating Factor)
cPVC Pipe	23	73	100
	32	90	91
	38	100	82
	49	120	65
	60	140	50
	71	160	40
	82	180	25
	93	200	20

EX: 1" cPVC SCHEDULE 80 @ 120°F

= 630 psi x 0.65 = 409.5 psi (max pressure @ 120°F)

Rigid PVC Pipe Dimensions.

Table No. 5: Dimensions based on ASTM D 1785.

Rigid PVC Pipe
PRESSURE APPLICATIONS.

Nominal Pipe Size	Outside Diameter	SCHEDULE 40				SCHEDULE 80			
		Minimum Wall Thickness		Nominal Weight	Working Pressure	Minimum Wall Thickness		Nominal Weight	Working Pressure
inch	mm	inch	mm	kg/m	PSI	inch	mm	kg/m	PSI
1/2	21.34	0.109	2.770	0.248	600	0.147	3.730	0.309	850
3/4	26.67	0.113	2.870	0.329	480	0.154	3.910	0.418	690
1	33.40	0.133	3.380	0.483	450	0.179	4.550	0.614	630
1 1/4	42.16	0.140	3.560	0.652	370	0.191	4.850	0.850	520
1 1/2	48.26	0.145	3.680	0.779	330	0.200	5.080	1.030	470
2	60.32	0.154	3.910	1.040	280	0.218	5.540	1.430	400
2 1/2	73.02	0.203	5.160	1.650	300	0.276	7.010	2.180	420
3	88.90	0.216	5.490	2.160	260	0.300	7.620	2.910	370
4	114.3	0.237	6.020	3.070	220	0.337	8.560	4.260	320
6	168.28	0.280	7.110	5.410	180	0.432	10.970	8.130	280
8	219.08	0.322	8.180	8.150	160	0.500	12.700	12.400	250
10	273.05	0.365	9.270	11.500	140	0.593	15.060	18.300	230

Notes:

- 1- All PVC pipe sizes listed above are standard nominal pipe size.
- 2- Schedule 40 & 80 PVC pipe pressure ratings vary based on pipe size.
- 3- Using schedule 40 parts on a primarily schedule 80 pipe system is not recommended.
- 4- Be aware that Schedule 40 PVC pipe has a lower pressure rating than Schedule 80.
- 5- All our PVC pipe schedule 80 is NSF approved for potable water service (NSF-61).

Table No. 6: Dimensions based on ASTM D 2665.

Rigid PVC Pipe
NON-PRESSURE (DWW).

Nominal Pipe Size	Outside Diameter	Minimum Wall Thickness		Nominal Weight
		inch	mm	
inch	mm	inch	mm	kg/m
1 1/4	42.16	0.140	3.560	0.652
1 1/2	48.26	0.145	3.680	0.779
2	60.32	0.154	3.910	1.040
2 1/2	73.02	0.203	5.160	1.650
3	88.90	0.216	5.490	2.160
4	114.30	0.237	6.020	3.070
6	168.28	0.280	7.110	5.410
8	219.08	0.322	8.180	8.150
10	273.05	0.365	9.270	11.500

Table No. 7 : Dimensions based on ASTM D 2241 (SDR SERIES).

Nominal Pipe Size	Outside Diameter	SDR 32.5 -125 PSI		SDR 26 -160 PSI		SDR 21 - 200 PSI		SDR17 - 250 PSI	
		Wall Thickness	Nominal Weight	Wall Thickness	Nominal Weight	Wall Thickness	Nominal Weight	Wall Thickness	Nominal Weight
inch	mm	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m
1 1/2	48.26					2.3	0.52	2.9	0.63
2	60.32	1.9	0.56	2.3	0.66	2.9	0.81	3.6	0.98
2 1/2	73.02	2.2	0.77	2.8	0.95	3.5	1.16	4.3	1.39
3	88.9	2.7	1.13	3.4	1.39	4.2	1.68	5.2	2.05
4	114.3	3.5	1.85	4.4	2.28	5.4	2.79	6.7	3.4
6	168.28	5.2	3.99	6.5	4.97	8	6.06	9.9	7.4
8	219.08	6.7	6.72	8.4	8.35	10.4	10.2	12.9	12.5
10	273.05	8.4	10.5	10.5	13	12.8	15.6	16.1	19.4

Rigid cPVC Pipe Dimensions for Hot and Cold Water.

Table No. 8: Dimensions based on ASTM F 441 SCHEDULE 80.

Nominal Pipe Size	Outside Diameter	SCHEDULE 80					
		Minimum Wall Thickness		Nominal Weight	Working Pressure		
inch	inch	mm	kg/m	mm	kg/m	PSI	Mpa
1/2	0.840	21.340	0.1470	3.730	0.337	850	5.86
3/4	1.050	26.670	0.1540	3.910	0.457	690	4.76
1	1.315	33.400	0.1790	4.550	0.671	630	4.34
1 1/4	1.660	42.160	0.1910	4.850	0.928	520	3.59
1 1/2	1.900	48.260	0.2000	5.080	1.130	470	3.24
2	2.375	60.320	0.2180	5.540	1.560	400	2.76
2 1/2	2.875	73.020	0.2760	7.010	2.370	420	2.90
3	3.500	88.900	0.3000	7.620	3.180	370	2.55
4	4.500	114.300	0.3370	8.560	4.650	320	2.21
6	6.625	168.280	0.4320	10.970	8.870	280	1.93
8	8.625	219.080	0.5000	12.700	13.500	250	1.72

Notes:

- 1- All PVC pipe sizes listed above are standard nominal pipe size.
- 2- Schedule 40 & 80 PVC pipe pressure ratings vary based on pipe size.
- 3- Using schedule 40 parts on a primarily schedule 80 pipe system is not recommended.
- 4- Be aware that Schedule 40 PVC pipe has a lower pressure rating than Schedule 80.
- 5- All our PVC pipe **schedule 80** is NSF approved for potable water service (NSF-61).



Handling and Storage.

To store PVC and cPVC pipes safely, consider the following:



- 1- All storage areas should be flat and kept free from stones and sharp-edged objects.
- 2- Pipes are to be stored in such a way to prevent any contamination of the insides.
- 3- Storage zones and stack heights are to be chosen which avoid possible damage or permanent deformation.
- 4- Large diameter pipes with low wall-thicknesses are to be provided with stiffener rings.
- 5- Single point or longitudinal contact support for any pipe is to be avoided.
- 6- Non-pelleted pipes should be stacked in heights not exceeding 1 meter. This is not applicable for pipes which are stacked on pallets providing their full weight is supported by the frame of the pallet. In principle, coiled pipes are to be either laid flat or placed in a suitable protective framework for storage.
- 7- Pipes should not be allowed to come into contact with fuels, solvents, oil, greases, paints (silicones) or heat sources during storage.
- 8- Dragging pipes above ground should always be avoided.

- 3- Pipes should be protected from possible damageduring transportation and not dragged over the bed of the truck or across open ground prior to installation.
- 4- Pipes and fittings should always be loaded and unloaded with extreme care. Special support frames are to be employed when using cranes for loading or unloading from vehicles.
- 5- Throwing pipes onto the ground from the bed of the transport truck must always be prevented.
- 6- Sudden shock impacts are to be avoided under all circumstances.



If pipes are stored in the open area (for example, on construction sites) they must be covered with suitable colored or plain black sheeting to protect them from the effects of weather (e.g. UV radiation). Furthermore, a one-sided exposure to direct sunshine can ultimately lead to deformation of the pipe.

Transportation of PVC and cPVC pipes:

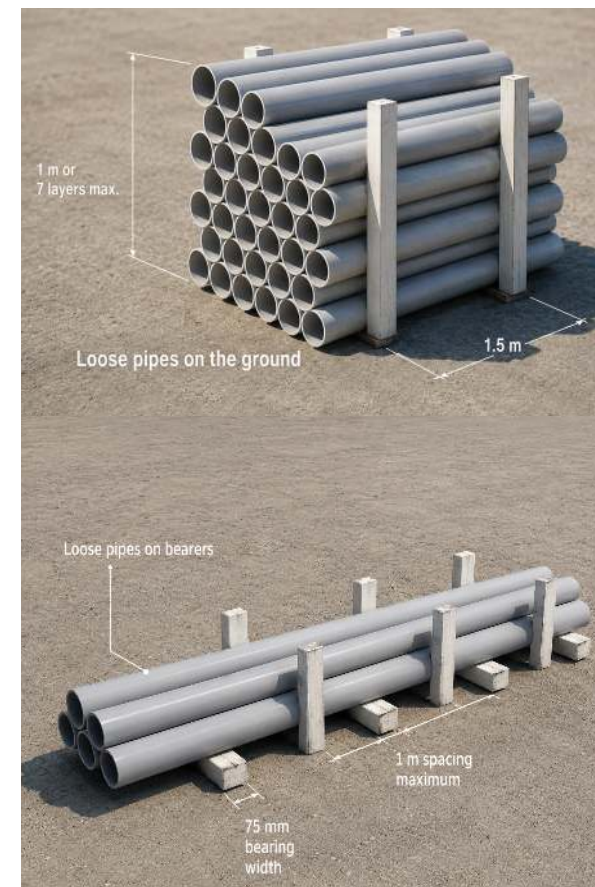
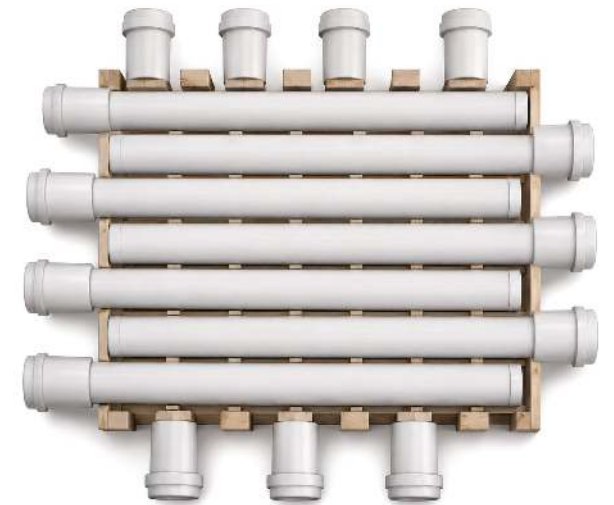
Vehicles for transporting pipes should be selected in such a way so that the pipes can lay completely flat on the bed of the vehicle without any over-hang.

- 1- All pipes are to be supported so that they cannot bend or become deformed.
- 2- The area of the truck where the pipes are laid should be covered with either protective sheeting or cardboard(including all side supports) in order to prevent any possible damage from protruding rivets or nails etc.

Handling and Storage Methods.

Pipe Storage:

Pipes should be stored under shade or inside a closed warehouse. When this is not possible, the pipe should be stored on level ground which is dry and free from sharp objects. If different schedules of pipe are stacked together, the pipe with the thickest walls should be on the bottom. If the pipe is packed in pallets, the pallets should be sacked with the pallet wooden frames on top of each other's rather than having them placed on the pipes. This will prevent damage to or bowing underlying pipes. If the pipe is stored in racks, it should be continuously supported along its length. If this is not possible, the spacing of the supports should not exceed their feet (3"). The pipe should be protected from the sun and be in an area with proper ventilation. This will reduce the effects of ultraviolet rays and help prevent heat deflection impact.



Stacking:

Pipes should always be given adequate support. They should not be stacked in large piles, especially under warm temperature conditions. As the bottom pipes may distort, thus giving rise to difficulty in pipe alignment and jointing. Socket and spigot pipe joints should be stacked in large layers with sockets placed at alternate ends of the stack and imparting of a permanent set to the pipes. For the long-term storage, pipe racks should preferably provide continuous support but, if this is not possible, timber supports of at least 75 mm (3 in) Bearing width, at spacing not greater than 1 m (3.2 ft.) centers should be placed beneath the pipes and, if the stacks are rectangular, at twice this spacing at the different classes of pipe are kept in the same racks then the thickest classes must always be at the bottom.

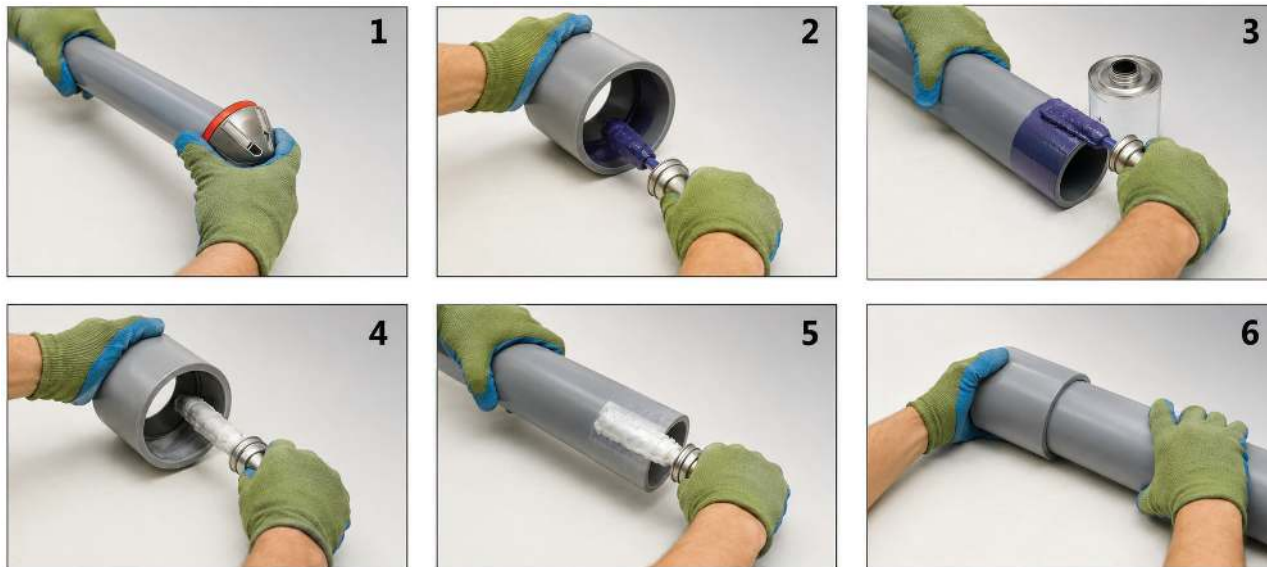
Jointing Methods:

TAKWEEN PLAST PVC and cPVC pipes and fittings may be joined using rubber ring joints or solventcement joints.

A) Solvent Cement Joints.

To achieve strong leak free joints, should:

- 1- Select the correct solvent cement and cleaner primer for the application.
- 2- Cleaner primer and solvent cement must be used together to achieve permanent leak-free joints.
- 3- Select the correct pipe and fitting.
- 4- Follow the recommended jointing steps shown below:



Solvent Cement Welding Procedure:

- 1- Ensure the pipe and fitting are clean and dry. Moisture contamination may lead to future joint failure.
- 2- Cleaner primer fluid must be used to clean and prime all surfaces, it is important to the jointing process.
- 3- Apply cleaner primer to the pipe and fitting with a lint-free cloth (natural fibres) dampen the joint with priming fluid.
- 4- Apply solvent cement without delay after cleaning, using a flat clean brush. Apply an even unbroken layer brushing axially to the pipe end and fittings .
- 5- Apply a second full even coat to the pipe if required. Excessive solvent cement on the outer can easily be wiped away after assembly.
- 6- Ensure the entire surface is covered and are with cement before assembly. As solvents evaporate faster from the exposed pipe than from the fitting. (a dry patch not lubricated by wet solvent, may prevent full insertion).
- 7- Immediately insert the pipe into the fitting up to the entry mark, align pipe and fitting. Hold in position for a few seconds, then wipe off excess cement (do not twist).

After Jointing:

Do not move the joint for at least 10 - 15 minutes, allow 4 hours if the jointed pipe lengths are to be laid in a trench. Do not fill the pipe with water for at least one hour after making the last joint. Allow the cement to fully cure before attempting any site hydrostatic testing. Joint curing normally takes at least 24 hours at 20° C. Allow up to 48 hours of cure time if the temperature is less than 20° C.



Disclaimer

The content and data in this brochure are licensed to TAKWEEN PLAST , and no photocopies or microfilms are permitted without written authorization from the licensee.
TAKWEEN PLAST has the right to modify the published data in this brochure without prior notice to meet specific project needs. For any technical inquiries, it is advised to contact TAKWEEN PLAST .