SAPPCO DAMMAM FACTORY

Branch of Saudi Plastic Products Co. Ltd.

C.R. 2050050912

مصنع سابكو الدمام

فرع شركة منتجات البلاستيك المحدودة

س.ت. ٢٠٥٠٠٥٠٩١٢

For Water Supply,
Plumbing System,
Irrigation System,
Drain, Waste and Vent.

TÜV NORD
TÜV NORD CERT GmbH
ISO 9001

ISO 9001:2008

RIGID PVC PIPES
TO AMERICAN ASTM STANDARDS

سابكو الدمام
SAPPCO DAMMAM

Publication P. 8 Issue 8
June 2015

CERTIFICATE

Management system as per

DIN EN ISO 9001 : 2008

In accordance with TÜV NORD CERT procedures, it is hereby certified that

SAPPCO DAMMAM FACTORY
(Branch of Saudi Plastic Products Co. Ltd.)
08th Street, Dammam First Industrial City, P. O. Box 4916
31412 Dammam
Kingdom of Saudi Arabia

applies a management system in line with the above standard for the following scope

Manufacture & Sale of uPVC Pipe and Fabricated Fittings, Polythylene Pipes and cPVC Pipes

Certificate Registration No. 04 100 960620
Audit Report No. 5700 0776

Valid from 2015-02-08
Valid until 2018-02-07
Initial certification 1996

Certification Body
at TÜV NORD CERT GmbH

Dammam, 2015-02-08

This certification was conducted in accordance with the TÜV NORD CERT auditing and certification procedures and is subject to regular surveillance audits.

TÜV NORD CERT GmbH Langemarckstraße 20 45141 Essen www.tuev-nord-cert.com

DAkkS Deutsche Akkreditierungsstelle
D-ZM-12007-01-01

INTRODUCTION

This is a technical catalogue for the engineer who designs and installs water and sewage pipelines and it contains the most up-to-date informations now available, based on world wide knowhow and technical knowledge.

Whether specifying or installing our pipe you can be assured that SAPPCO will provide the pipe "Right, On time, All the Time".

SAPPCO DAMMAM FACTORY is equipped with the most modern machinery available, using many automated techniques to produce PVC pipes to exacting manufacturing standards.

The accumulated knowledge of our Technical Advisors is freely offered to engineers and our Technical Service Department is available at all times to offer guidance and advice on the use of SAPPCO PVC pipes.

CUSTOMER SATISFACTION

Our most important objective "Customer Satisfaction" is achieved with the comprehensive provision of high-quality products and services. As a leader in the plastic pipe industry, SAPPCO DAMMAM FACTORY is committed to

- Continuous evaluation and improvement of the process
- Modernize manufacturing extrusion system and testing equipments.
- In addition, our well experienced staff offers extensive industry knowledge and field experience with thermoplastic piping products to our valued clients.

MATERIAL DESIGNATION

Our PVC pipe is manufactured from rigid PVC compound, which fully meet the material requirements of ASTM D 1784 and as stated in relevant PVC pipe manufacturing standards.

Material Classification	ASTM D 1784	Cell Class	12454
Material Designation	ASTM D 1784	Type1, Grade1	1120
Hydrostatic Design Stress	PPI - USA	psi	2000
Hydrostatic Design Base	PPI - USA	psi	4000

MANUFACTURING STANDARDS

ASTM D 1785	Polyvinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120
ASTM D 2241	Polyvinyl Chloride (PVC) Pressure Rated pipe (SDR Series)
ASTM D 2665	Polyvinyl Chloride (PVC) Plastic Drain, Waste and Vent (DWV) pipe and fittings.

These specifications designate the requirements for manufacturing and testing of SAPPCO PVC Pressure and DWV pipe.

COLOUR OF PIPE

Grey Color	Schedule 80 pipes
White Color	Schedule 40, SDR Series and DWV pipes

LENGTH OF PIPE

Standard 6 meter lengths (Other lengths available on request)

PIPE JOINTING

Pipes are supplied with Integral parallel sockets for solvent weld jointing or pipes with plain ends.
Schedule 80 pipes are supplied with plain ends.

QUALITY MANAGEMENT SYSTEM

CERTIFIED

SAPPCO DAMMAM FACTORY operates upgraded Quality Management System (QMS) in accordance with the requirements of EN ISO 9001:2008 and has been successfully assessed and certified in this respect by TUV NORD CERT of Germany since 1996. Our plant undergo the annual surveillance audit by TÜV NORD CERT.

Routine testing of all pipes produced at our factory is carried out as laid down in the relevant ASTM Standards in our well equipped laboratory. Inspection of pipes produced on each machine is carried out "round the clock" to make sure that exact standard piep is delivered to our valued clients.

LISTED

SAPPCO Quality plus PVC pipe Schedule 80 is listed by NSF (USA). Our Pipe meets the requirement of NSF/ ANSI 61 specification for Drinking Water System Components - Health Effects.

FITTINGS

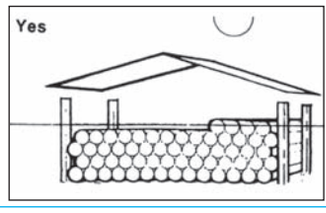
SAPPCO-DAMMAM supply suitable fittings for jointing systems for PVC pipes made by our associated company APLACO and other renowned fittings manufacturers from USA. These fittings are manufactured and conform to the following American Standards:

– ASTM D 2466 : PVC pipe fittings - Schedule 40
– ASTM D 2467 : PVC pipe fittings - Schedule 80
– ASTM D 3311 : Drain, waste and vent (DWV) fittings patterns.

STORAGE AND HANDLING

PVC Pipes should be shaded but not covered directly when stored outdoor. This will provide for free circulation of air and reduce the heat build-up due to direct sunlight exposure. Care should be taken in handling to avoid dragging, scratching and dropping against sharp objects. Pipe ends should be inspected for cracks resulting from the abuse and which should be cut and discarded.

UV -PROTECTION



PVC pipes should always be stored in the shade to avoid ultra-violet (U/V) degradation from the sun's rays.
PVC pipeline systems when continuously exposed to ultraviolet (UV) radiation from sunlight, PVC pipe can suffer surface discoloration. This is commonly termed "UV degradation or sunburning," color change due to UV attack Store pipes in such a manner as to prevent sagging or bending.

WATER HAMMER CONSIDERATIONS

Surge pressure due to water hammer should be considered when designing a piping system. A momentary pressure rise occurs when liquid is started and stopped quickly, and is caused by the momentum of fluid. Pressure rise increases with the velocity of the liquid, the length of the piping system from the fluid source, or with an increase in the speed of starting or stopping. For example hydraulic shock occurs when valves are opened or closed quickly, or pumps are started with an empty pipeline.

Use surge control devices and standpipes wisely to give flow storage during surge. Check valves can be used near pumps to help keep lines full.

Evaluate flow at pump start-up and during shut down. Also determine how much air, if any, is introduced during pump start-up. Fluid velocity not exceeding 1.52 m/sec. will minimize hydraulic shock effects, even with quick-closing valves.

MATERIAL PROPERTIES

MATERIAL Rigid Polyvinyle Chloride (PVC) Compound

TABLE 1 : All values at 23°C (73°F)

PROPERTY	ASTM TEST METHOD	UNIT	VALUE
General Properties:			
Density	D792	g/cm^3	1.42
Water absorption	D-570/24 Hrs	%	<0.03
Co-efficient of friction	Hazen-Williams	C (factor)	150
Poisson's Ratio	-	-	0.38
Light Transmission-Grey	E 308	Opacity (%)	Opaque
Mechanical Properties:			
Tensile Strength	D-638 / Type 1	MPa	>52
Modulus of Elasticity in tension	D-638 / type 1	MPa	>3000
Flexural Strength	D-790 / Proc. B	MPa	93
Compressive Strength	D-695	MPa	66
Izod Impact Resistance	D-256 / notch	J/m	>60
Hardness (Rockwell)	D-785	R	110-120
Thermal Properties:			
Heat Deflection Temp.	D-648 (1.82 MPa)	°C	>80
Vicat Softening Temp.	D-1525 (rate)	°C	>80
Co-efficient of Linear Thermal Expansion	D-696	cm/(cm°C)	6.0×10^{-5}
Thermal Conductivity	C-177	$Wm/°K/m^2$	0.14
Flammability Properties:			
Flammability	D-635	Resistance	Self-extinguishing
Time of burning (Average)	D-635	s	<10
Extent of burning (Average)	D-635	mm	<15
Flammability rating	UL-94/0.062"	Rating	V-0
Electrical Properties:			
Dielectric Strength	D-149	volts/mil	1100
Dielectric Constant	D-150	60 cps @ 30°C	4.00
Volume Resistivity	D-257	ohm/cm	$>10^{14}$

Chemical Properties:

SAPPCO-DAMMAM PVC PIPE has excellent chemical resistance to strong mineral acid and bases. (For specific application consult our Technical Sales Department.)

SAPPCO Rigid PVC Pipes
FOR PRESSURE APPLICATIONS

TABLE 2 : Dimensions based on ASTM D1785

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	2.77	0.248	600	0.147	3.73	0.309	850
3/4	26.67	0.113	2.87	0.329	480	0.154	3.91	0.418	690
1	33.40	0.133	3.38	0.483	450	0.179	4.55	0.614	630
1 1/4	42.16	0.140	3.56	0.652	370	0.191	4.85	0.850	520
1 1/2	48.26	0.145	3.68	0.779	330	0.200	5.08	1.03	470
2	60.32	0.154	3.91	1.04	280	0.218	5.54	1.43	400
2 1/2	73.02	0.203	5.16	1.65	300	0.276	7.01	2.18	420
3	88.90	0.216	5.49	2.16	260	0.300	7.62	2.91	370
4	114.30	0.237	6.02	3.07	220	.0337	8.56	4.26	320
6	168.28	0.280	7.11	5.41	180	0.432	10.97	8.13	280
8	219.08	0.322	8.18	8.15	160	0.500	12.70	12.4	250
10	273.05	0.365	9.27	11.5	140	0.593	15.06	18.3	230

NOTE:
1. Working pressure indicated in psi is maximum value and is based on water temperature of 23°C. For use of Safety factors at higher temperatures please refer to Table 3.
2. Threading of only Schedule 80 pipe is recommended. For threading pipe working pressure consult our Technical Sales Department.
3. 14.5 psi = 0.1 MPa = 0.1 N/mm^2 = 100 kPa = 1 BAR = 1.02 kg/cm^2 = 0.987 atm.

EFFECT OF ELEVATED TEMPERATURE

Rigid PVC pipe is suitable for water application up to 60°C (140°F) and relationship between recommended maximum working pressures and various temperatures for pipes to ASTM Standards is given in Table 3.

TABLE 3: Safety Factors

Working Temperature	°F	73	80	90	100	110	120	130	140
	°C	23	27	32	38	43	49	54	60
Derating Factors Suitable at elevated temp.	Factor	1.0	88	75	62	50	40	30	22

SAPPCO Rigid PVC Pipes

FOR NON-PRESSURE (DWV) APPLICATIONS

TABLE 4 : Dimensions based on ASTM D2665

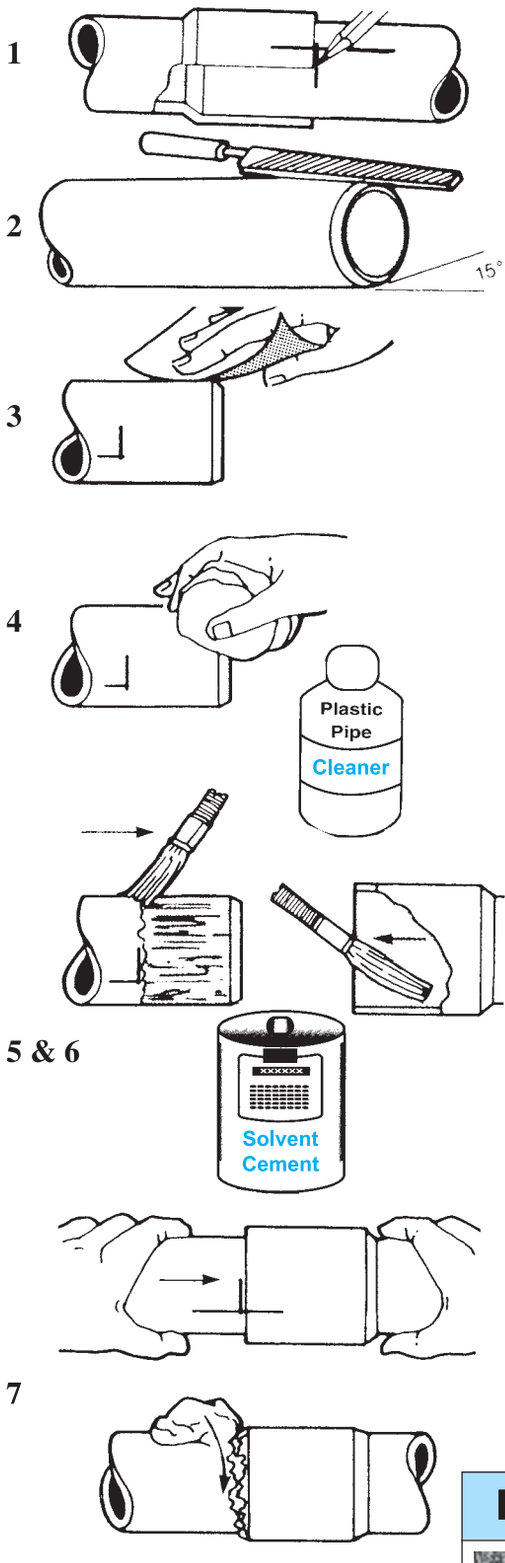
Nominal Pipe Size	Outside Diameter	Minimum Wall Thickness		Nominal Weight
inch	mm	inch	mm	kg/m
1 1/4	42.16	0.140	3.56	0.652
1 1/2	48.26	0.145	3.68	0.779
2	60.32	0.154	3.91	1.04
2 1/2	73.02	0.203	5.16	1.65
3	88.90	0.216	5.49	2.16
4	114.30	0.237	6.02	3.07
6	168.28	0.280	7.11	5.41
8	219.08	0.322	8.18	8.15
10	273.05	0.365	9.27	11.5

TABLE 5 : Dimensions based on ASTM D2241 SDR SERIES

Nominal Pipe Size	Outside Diameter	SDR 32.5 125 psi		SDR 26 160 psi		SDR 21 200 psi		SDR 17 250 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	0.520	2.9	0.634
2	60.32			2.3	0.657	2.9	0.804	3.6	0.970
2 1/2	73.02	2.2	0.772	2.8	0.952	3.5	1.16	4.3	1.39
3	88.90	2.7	1.13	3.4	1.39	4.2	1.68	5.2	2.05
4	114.30	3.5	1.85	4.4	2.28	5.4	2.79	6.7	3.39
6	168.28	5.2	3.99	6.5	4.97	8.0	6.06	9.9	7.39
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	13.0	12.8	15.6	16.1	19.4

JOINTING PROCEDURE FOR SOLVENT WELD JOINTS

Always use solvent cement conforming to ASTM D2564 and check date of expiry on the can.



1. Mark depth of entry of the pipe into the socket and alignment mark. Pipe should be cut square and free from any damage.
2. Make small chamfer on the edge of the pipe end. Protect pipe from serrated holding devices and abrasion.
3. Roughen the outside of the pipe and the inside of the socket using sandpaper or emery cloth up to the entry mark.
4. Clean both surfaces and remove all dust, grease and swarf using a dry clean cloth and cleaner. Read instruction on the can.
5. Use proper solvent cement and read instructions on the can. Observing method of usage, precaution and warning. Do not dilute the solvent cement with cleaning fluid.
6. Apply cement without delay after cleaning, using a flat clean and proper brush. Apply an even unbroken layer brushing axially to the pipe end and socket mouth with a heavier layer on the pipe. Where loose fits are found, the pipe should be given a second coat.
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.
8. Joints should not be moved or disturbed for initial set time depending on size. Then the jointed pipe may be handled with care. Allow 4 hours if the jointed pipe lengths are to be laid in a trench.
9. Solvent Weld Jointing of large diameter pipe requires special care. Use sufficient hand power to maintain proper alignment and to bottom pipe in socket /fitting.

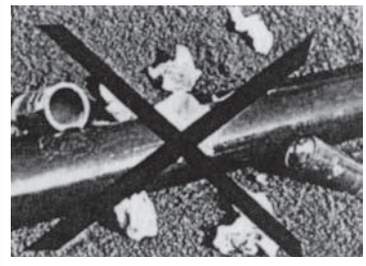
HOT WEATHER PROBLEMS

Frequently, when laying pipe in hot weather, the direct rays of the sun may cause the surface temperature of the pipe to be in the range of >50°C. This is beyond the maximum cementing temperature of 38°C. Following are several suggestions for cementing in hot weather.

1. Cool the pipe surface by wiping a water-dampaned rag, making sure that all traces of moisture are removed from the surface before applying primer and cement. Evaporation of this applied moisture from the pipe surface will lower its temperature several degrees.
2. If practical, keep the ends of the pipe shaded from the hot sun before cementing. Fittings and cement should also be shaded.
3. Assemble the pipe into the socket as quickly as possible after applying cement.
4. Make the cemented joints during the early morning hours or late evening hours.

SAFETY, PRECAUTION

PRECAUTION



⚠ CAUTION

Cleaner and cements are extremely flammable and must not be stored or used near heat or open flame. Read all warnings on cleaner and cement cans.

Note: All solvent-welded PVC pipeline systems should be filled and/or flushed with water immediately after installation.

HYDRAULIC TESTING OF PIPELINE

The pressure testing of pipeline shall be conducted with water at interval initially not exceeding 500 meters and subsequently not exceeding 1000 meters. Pipe should be adequately anchored to prevent movement. The joint and the pipeline should be slowly filled with clean water taking care to prevent surge and air entrapment. All entrapped air must be purged from the line before applying pressure. All air release valves should be installed at high points and a further precaution against air entrapment is to pass a foam swab through the pipe line. The passage of foam swab will additionally clean the line of any debris left in the line during laying.

The temperature of test water should be preferably maximum 23°C. When testing above 23°C please use safety factor given in Table 3 on page 6 in this catalogue. Consideration of safety factor for fittings is also recommended.

The test pressure and duration shall meet the requirements of local regulations where applicable. All Safety measures should be taken care of.

The pipeline should be pressurized to 1.5 times of the system design operating pressure but not less than 15 psi nor in excess of the pressure rating for pipe or appurtenances. Measure the pressure at the lowest elevation possible.

The duration of pressurization shall be preferably 1 hour but not to exceed 3 hours. Testing in hot weather is recommended in early morning.

All visible leaks or any leak in excess of the permitted variation should be repaired and the pipeline retested following the same procedure.

IMPORTANT NOTES

1. Pipeline system should be designed and constructed to avoid excessive water hammer / surge pressure.
2. Air must be purged from pipelines before applying pressure.
3. Joint must be covered and protected from heat and UV particularly in the mid day time.
4. Allow 24 hours for line test pressure, with pipe sizes up to 1 1/2 in it is possible to reduce the time or 8 hours to elapse before working pressure.
5. In hot weather pressure test in early morning is recommended.
6. PVC Non-pressure pipelines installed are tested to low pressures for a specific period of time (leakage tests).

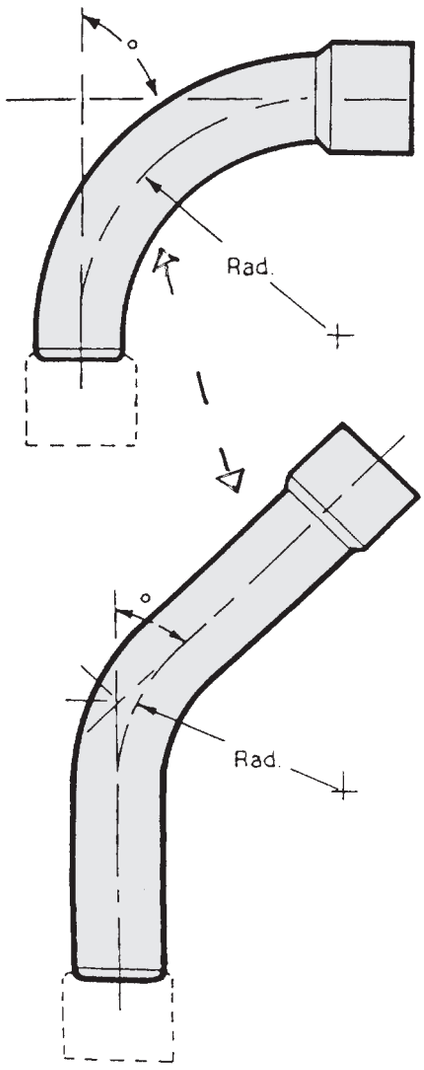
SAFETY MEASURES

⚠ WARNING

- NEVER use compressed air or gas in PVC pipeline.
- NEVER test PVC pipe and fittings with compressed air or gas.
- ONLY use PVC pipe for water and approved chemicals.

Use of compressed air or gas in PVC pipe and fittings can result in explosive failures and cause severe injury or death.

SAPPCO Rigid PVC Fabricated BENDS to ASTM Standards



Long Radius Bends

TABLE 6 : Dimensions of 90°C, 45°, 22 1/2 and 11 1/4 Bends

Nominal Pipe Size	Outside Diameter		Radius	
inch	inch	mm	inch	mm
1/2	0.840	21.34	2.756	70
3/4	1.050	26.67	3.456	88
1	1.315	33.40	4.409	112
1 1/4	1.660	42.16	5.512	140
1 1/2	1.900	48.26	6.89	175
2	2.375	60.32	8.701	221
2 1/2	2.875	73.02	10.354	263
3	3.500	88.90	12.402	315
4	4.500	114.30	15.157	385
6	6.625	168.28	22.047	560
8	8.625	219.08	31.024	788
10	10.750	273.05	38.582	980

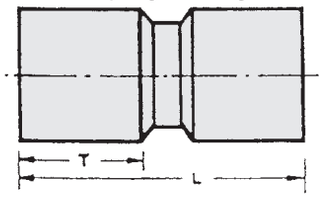
NOTE:

1. Fabricated Bends are supplied with solvent Weld Joint on one end or on both ends.
2. Fabricated Bends in other angles and radii are available on request.
3. Specify Long Radius Bend with or without sockets on one end or on both ends.
4. These Bends are fabricated from “PASS” pipes manufactured to ASTM D 1785 and D 2665 standards.
5. For further inquiries please consult our Technical Sales Department.

SAPPCO AND QUALITY RUN TOGETHER

SAPPCO Rigid PVC
Special Fabricated Fittings

P/S coupling with register



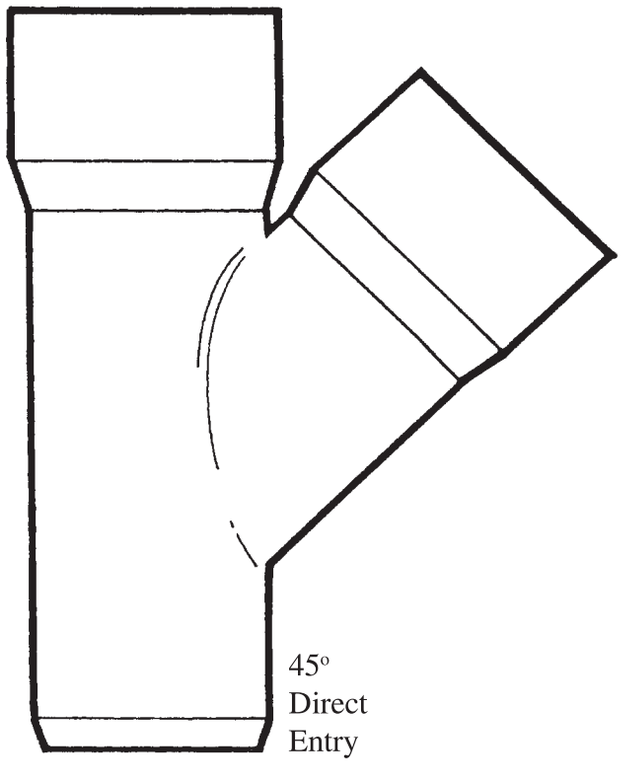
P/S coupling without register

Coupling with register or without register

TABLE 7 : Dimensions of Couplings

Nominal Pipe Size Inch	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10
L = MM Coupling Length	58	66	74	94	96	126	140	160	185	250	360	420

NOTE: 1. Please specify coupling with or without register when ordering.
2. Adapter couplers (from ASTM to metric system) also available.



45° Direct Entry

FABRICATED
Y Branch 45°

TABLE 8 : Y Branch Size

8” x 6”
8” x 4”
6” x 4”

NOTE: Branches in Table 8 are available in Solvent Weld Joint or with Plain ends.

For further information or in case of Technical Enquiry please contact our Technical Sales Department

SAPPCO AND QUALITY RUN TOGETHER

SAPPCO DAMMAM FACTORY
A LEADING MANUFACTURER OF
PVC, CPVC, HDPE & LDPE PLASTIC PIPES

SAPPCO after sales and service provides its customers with advice on any technical problems they may encounter.

For further details and information, contact

SAPPCO DAMMAM FACTORY
Branch of Saudi Plastic Products Co. Ltd.

FACTORY & MAIN OFFICE

1st Dammam Industrial Estate, — 42 Street.
P.O. Box 4916, Dammam 31412 - Saudi Arabia
Tel.: +966 (013) 847 1703 / 847 3323 Telefax : +966 (013) 847 1969
E-mail: sapdam@sappco.com.sa
Website: http//www.sappco-dammam.com

Riyadh Office : P.O. Box 2828 - Riyadh 11461 - Tel.: +966 11 448 0448 - Telefax : +966 11 447 5304
Jeddah Office : P.O. Box 5448 - Jeddah 21422 - Tel.: +966 12 6749402 - Telefax : +966 12 674 7827