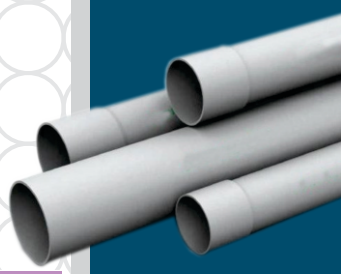


DIN 8061 & 8062

Minimum Wall Thickness & Weight

Nominal Size	Series 1 2.5 Bar / Ventilation		Series 2 4 Bar / PN4		Series 3 6 Bar / PN6		Series 4 10 Bar / PN10		Series 5 16 Bar / PN16	
	M/Thickness	Mass kg/m	M/Thickness	Mass kg/m	M/Thickness	Mass kg/m	M/Thickness	Mass kg/m	M/Thickness	Mass kg/m
20	-	-	-	-	-	-	-	-	1.5	0.137
25	-	-	-	-	-	-	1.5	0.174	1.9	0.212
32	-	-	-	-	-	-	1.6	0.264	2.4	0.342
40	-	-	-	-	1.8	0.334	1.9	0.350	3.0	0.525
50	-	-	-	-	1.8	0..422	2.4	0.552	3.7	0.809
63	-	-	-	-	1.9	0.562	3.0	0.854	4.7	1.290
75	-	-	1.8	0.642	2.2	0.782	3.6	1.220	5.6	1.820
90	-	-	1.8	0.724	2.7	1.130	4.3	1.750	6.7	2.610
110	1.8	0.95	1.9	1.160	3.2	1.640	5.3	2.610	8.2	3.900
125	1.8	1.08	2.5	1.480	3.7	2.130	6.0	3.340	9.3	5.010
140	1.8	1.21	2.8	1.840	4.1	2.650	6.7	4.180	10.4	6.270
160	_ 1.8	1.39	3.2	2.410	4.7	3.440	7.7	5.470	11.9	8.170
200	1.8	1.74	4.0	3.700	5.9	5.370	9.6	8.510	14.9	12.800
225	_ 1.8	1.96	4.5	4.700	6.6	6.760	10.8	10.800	16.7	16.100
250	2.0	2.40	4.9	5.650	7.3	8.310	11.9	13.200	18.6	19.900
280	2.3	3.11	5.5	7.110	8.2	' 10.400	13.4	16.600	20.8	24.900
315	2.5	3.78	6.2	9.020	9.2	13.200	15.0	20.900	23.4	31.500
400	3.2	6.10	7.9	14.500	11.7	21.100	19.1	33.700	29.7	50.800
500	4.0	9.38	9.8	22.400	14.6	32.900	23.9	52.600	-	-
630	5.0	14.70	12.4	35.700	18.4	52.200	30.0	83.200	-	-
710	5.7	18.90	14.0	45.300	20.7	66.100	-	-	-	-

PVC (Polyvinyl Chloride) Electrical Conduit

PVC conduit is the lightest in weight compared to other conduit materials, and usually lower in cost than other forms of conduit. It is available in three different wall thicknesses, with the thin-wall variety only suitable for embedded use in concrete, and heavier grades suitable for direct burial and exposed work. The various fittings made for metal conduit are also made for PVC. The plastic material resists moisture and many corrosive substances, but since the tubing is non-conductive an extra bonding (grounding) conductor must be pulled into each conduit. PVC conduit may be heated and bent in the field. Joints to fittings are made with slip-on solvent-welded connections, which set up rapidly after assembly and attain full strength in about one day. Since slip-fit sections do not need to be rotated during assembly. Since PVC conduit has a higher thermal coefficient of expansion than other types, it must be mounted so as to allow for expansion and contraction of each run. Care should be taken when installing PVC underground in multiple or parallel run configurations due to mutual heating effect of cable

Zeenat meets the requirements prescribed by the following standards organizations:

1) **National Electrical Manufacturer's Association (NEMA - USA)**
2) **American Society for Testing & Material, (ASTM)**
3) **British Standards Conduits for Electrical Installation.**

Product Specification

SCOPE

This specification designates general requirements for 5" through 6" diameter polyvinyl chloride (PVC) Electrical Conduit and Power Duct pipe for the conveyance of electrical wires in above/below ground and/or indoor applications.

Zeenat offers a complete line of Electrical Conduit and Power Duct pipe products which include: Schedule 40 and 80 Conduit (NEMA TC-2, ANSI/UL651), Encased and Direct Burial Conduit (ASTM F512, NEMA TC-6 & 8 and/or ANSI/UL 651A), and Type C Telephone Duct. All **Zeenat** Electrical Conduit and Power Duct pipe products are offered in 4 meters laying lengths (10 foot and 20 foot lengths are also manufactured on special order by customer. This means that more ground can be covered during installation while eliminating the cost of unnecessary joints.

PVC MATERIALS

Zeenat Schedule 40 and 80 Electrical Conduit shall be made from quality PVC resin, compounded to provide physical and mechanical properties as defined in ANSI/ UL 651 and NEMA TC-2.

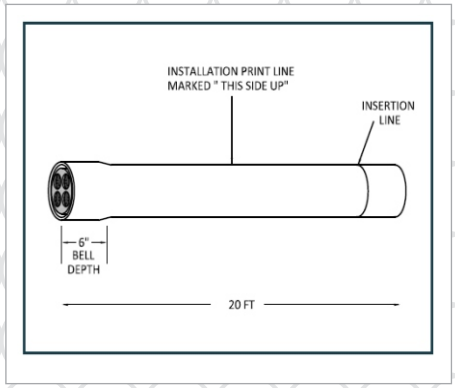
Reference Standards:

ASTM D 1784	Rigid Vinyl Compounds
ASTM D 1785	PVC Plastic Pipe, Schedule 40
ASTM D 2466	PVC Plastic Fittings, Schedule 40
ASTM D 2564	Solvent Cements for PVC Pipe and Fittings
ASTM D 2774	Underground Installation of Thermoplastic Pressure Piping
ASTM F 656	Primers for PVC Pipe and Fittings
ASTM F 1668	Procedures for Buried Plastic Pipe

Multi Conduit PVC Pipes

These guidelines should help you install Multi Conduit in the simplest way possible and should be read in their entirety before attempting to install the system to haveas smooth an installation as possible.

To be certain that the conduit has been properly placed, the conduit work should be inspected throughout the construction period by a trained inspector who is completely familiar with the job and construction specifications. The inspector should confirm the Multi Conduit run is in the correct location, proper conduit depth is maintained, the trench bottom is level, all joints are properly made, horizontal and vertical alignment is maintained and select backfill is used.

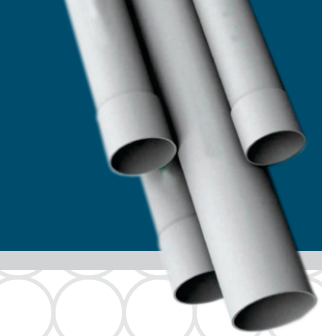


Multi Conduit is packaged from the factory in bundles. Each section of pipe is shipped with a protective wrap on both ends which prevents any foreign material from entering the Multi Conduit before being installed in the ground.

Standard PVC Duct

The standard 4-way or 3-way PVC Multi Conduit is available in several configurations. We can provide a boreable 4-way or 3-way Multi Conduit with locking sch-40 outer duct.

Product Code	No.s of Duct	Description	Max. inner Dia	Min. Wall Thickness
KEEC4MGS4	3 Cell	3" SCH-40 with three inner ducts	3.28	0.216
KEEC4MGS4	4 Cell	4" SCH-40 with three inner ducts	4.26	0.237



APPLICATIONS

- Underground and Above
- Ground Electric Supply
- Data Transmission
- Telecommunication
- Power Transmission lines

ADVANTAGES

- Reliable Joints & easy pull through
- Light weight Easy to Install
- Fire Resistance
- Non Magnetic
- Non CorrosiveSafety

ZEENAT produces a wide variety of conduit pipe suitable for most applications. ZEENAT Schedule 40 and 80 products are rated for 90° C conductors and conform to ANSI/UL 651 and NEMA TC-2. This conduit is designed with safety in mind and can be used in a variety of everyday applications. ZEENAT offers telephone duct for networking applications. ZEENAT telephone duct is made in compliance with ASTM F512 and/or other specified specifications for consistency and safety.

ZEENAT ELECTRICAL CONDUIT PIPE

ZEENAT electrical products are suitable for use as electrical Conduit and/or power duct. Provisions must be made for expansion and contraction of the pipe structure. The bell section shall be designed to meet the requirements of the appropriate specification for the pipe. Sizes and dimensions shall be as shown in this specification.

EXPANSION AND CONTRACTION

PVC non-metallic conduit will expand and contract with temperature variations. The amount of movement due to temperature changes can be determined from the chart on the following pages. The coefficient of thermal expansion of ZEENAT PVC conduit is 3.0 x 10-5 in/ in/°F. If major temperature variations are expected, the use of expansion joints should be considered and should be installed in accordance with the engineer's design

CORROSION RESISTANCE

ZEENAT Electrical Conduit unaffected by electrolytic or galvanic corrosion, or any known corrosive soil or water condition.

SMOOTH INTERIOR

This PVC pipe has a smooth interior that allows for wires to be pulled through easily without hanging or binding. ZEENAT pipe is carefully designed and manufactured to provide an interior surface that will not nick or tear the wiring insulation.

SCHEDULE 40 AND SCHEDULE 80 CONDUIT

ZEENAT Schedule 40 and Schedule 80 PVC rigid nonmetallic conduit is designed and produced for use in both above ground and underground installations.

ZEENAT PVC SCHEDULE 40 AND 80 CONDUIT OFFERS:

- Highest quality control standards
- Rated for use with 90 ° C conductors
- Ultraviolet protection
- Solvent cemented joints
- Smooth solid wall
- Compliance to ANSI/UL 651 and NEMA TC-2
- Light weight
- High impact and deformation proper ties
- Superior Dielectric Strength
- Easy installation

KAWSAR Rigid PVC Electrical Plastic Tubing (EPT) & Conduit(EPC-40 and EPC-80)

Table No: 1. NEMA TC-2 Dimension

Nominal Pipe Size	Outside Dia	EPT-A-PVC		EPT-40-PVC		EPT-80-PVC	
		W/thick	N.Weight	W/thick	N.Weight	W/thick	N.Weight
Inch	mm	mm	Kgs/m	mm	Kgs/m	mm	Kgs/m
½"	21.34	1.52	0.155	2.77	0.248	3.73	0.309
3/4"	26.67	1.52	0.197	2.87	0.329	3.91	0.418
1"	33.40	1.52	0.250	3.38	0.483	4.55	0.614
1 1/4"	42.16	1.78	0.365	3.56	0.652	4.85	0.850
1 ½ "	48.26	2.03	0.468	3.68	0.779	5.08	1.030
2"	60.32	2.54	0.717	3.91	1.04	5.54	1.430
2½"	73.02	2.79	0.952	5.16	1.65	7.01	2.180
3"	88.9	3.18	1.310	5.49	2.160	7.62	2.900
4"	114.30	3.81	2.000	6.02	3.070	8.56	4.260
5"	141.30	----	----	6.55	4.17	9.52	5.910
6"	168.28	----	----	7.11	5.410	10.97	8.130
8"	219.08	----	----	8.18	8.143	12.70	12.40

EPT-A-PVC Electrical Plastic Tubing for encasement in concrete | EPC 40 Electrical Plastic Conduit for normal duty application | EPC 80 Electrical Plastic Conduit for heavy-duty application

KAWSAR Rigid PVC Utilities Duct for Underground Installation. NEMA TC-6 and ASTM F 512 Dimension

Table No: 2.

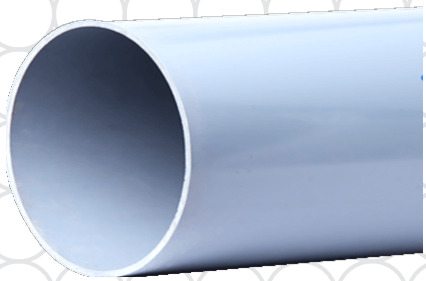
Nominal Pipe Size	Outside Dia	PVC Type EB 20		PVC Type DB 60	
		W/thick	N.Weight	W/thick	N.Weight
Inch	mm	mm	Kgs/m	mm	Kgs/m
2"	60.32	1.52	0.463	1.52	0.465
3"	88.90	1.55	0.702	2.34	1.000
4"	114.30	2.08	1.170	3.07	1.650
5"	141.30	2.62	1.710	3.86	2.500
6"	168.28	3.18	2.530	4.62	3.570

Type EB for Encased Burial in concrete Type DB for Direct Burial without Concrete Pipe Length: Standard 6 meters (6m)

PROPERTIES

MECHANICAL PROPERTIES

	ASTM	TYPICAL VALUE
Specific Gravity	D792	1.4 –1.
Tensile Strength (psi) @ 73.4 F	DN 638	75,000
Izod Impact t-ftlbs/ in of notch	D256	0.65 –1.50
Flexural Strength (psi)	D790	12,500
Comprehensive Strength (psi)	D695	9000
Hardness (Durometer D)	D2240	95



THERMAL PROPERTIES

	ASTM	TYPICAL VALUE
Coefficient of Thermal Expansion – in/in C	D696	5.13 x 10-5
Coefficient of Thermal Expansion – in/in 0F	D696	3.0 x 10-5
Deflection Temp. 0F Under Load @ 264 psi	D648	140 0F
Thermal Conductivity BTU (hr) (ft) (0F/In)	C177	1.3

ELECTRICAL PROPERTIES

	ASTM	TYPICAL VALUE
Dielectric Strength Volts/mil	D149	1,100
Dielectric Constant 60 CPS @ 30 C	D150	4,00
Power Factor 60CPS @ 30C	D150	1,93

Support of ZEENAT PVC Conduit in Above Ground Installations

Size	Maximum Space Between Supports (ft)
1 1/4 - 2	5
2 ½ - 3	6
3 ½ - 5	7
6	8

ZEENAT RIGID PVC EXTRA STRENGTH UNDERGROUND INSTALLATON

NEMA TC-8 and ASTM F 512 Dimension

Trade Size	Metric Designators	Average Outside Dia	Type EB-35		Type DB-I00		Type DB-120	
			W/thick	N.Weight	W/thick	N.Weight	W/thick	N.Weight
		mm	mm	Kgs/m	mm	Kgs/m	mm	Kgs/m
1"	27	33.40	–	–	–	–	1.52	0.251
1 ½"	41	48.26	--	--	--	--	1.52	0.369
2"	53	60.32	1.52	0.465	--	--	1.96	0.576
3"	78	88.90	1.93	0.847	2.84	1.160	3.00	1.290
4"	103	114.30	2.54	1.390	3.68	1.930	3.91	2.050
5"	129	141.30	3.20	2.090	4.55	2.940	4.85	3.120
6"	155	168.28	3.86	3.020	5.41	4.170	5.77	4.420

BS-6099

ZEENAT PVC Electrical Conduit Pipes as per BS-6099

Nominal Size	Outer Diameter (mm)		Wall Thickness	
Inch	Min.	Max.	Min.	Max.
½	17.0	17.3	0.96	1.16
¾	21.2	21.5	1.09	1.29
1	26.6	26.9	1.16	1.36
1 ¼	33.4	33.7	1.44	1.67
1 ½	42.1	42.4	1.60	1.84
2	60.2	60.5	1.70	1.90
3	88.7	89.1	1.80	2.00
4	114.1	114.5	1.90	2.10

Pvc Electrical Conduit Pipe Specification BS-6099

Nominal Dia	Mean Outside Diameter Mm		Thickness mm	Thickness Allowance	Weight Kg/m
	Min.	Max			
½″	17.0	17.0	1.04	±.025	0.086
3/4″	21.0	21.5	1.25	±.025	0.125
1″	26.6	26.9	1.33	±.025	0.173
1 1/4″	33.4	33.7	1.51	±.025	0.245
1 ½″	42.1	42.2	1.86	±.025	0.398
2″	60.2	60.5	2.04	±.025	0.612
3″	89.7	89.1	1.8	±.025	0.798
4″	114.1	114.5	1.9	±.025	1.032

Electrical conduit pipes are available in ½″, 3/4″, 1″, 1 1/4″, 1 ½″,2″,3″,4″ Diameter and 3 meter lengths.

Non Pressure Pvc For Drain Sewer Pipe Specifications

Nominal Dia	Mean Outside Diameter Mm		Thickness mm	Thickness Allowance	Weight Kg/m
	Min.	Max			
3″	88.7	89.1	1.8	±.01	0.797
4″	114.1	114.5	1.8	±.01	1.029
5″	140.0	140.4	2.5	±.01	2.125
6″	168.0	168.5	3.0	±.01	2.375

Pvc Electrical Conduit Pipe Specification

Dielectric constant Test cycle : 50 c/s	5.1 - 5.25
Dielectric Power Factor Test Cycle: 50 c/s Shoering - Bridge Method	0.1 - 0.146
Specific (volume) resistance Electronic insulation resistance A1 DC 1000 Volt	1.27 x 1013Ω - CM
Critical Supported Voltage AC 50 C S 11 KV One Minute	No Change

Pressure Flow

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

$$F = 0.2083 \times \left(\frac{100}{C}\right)^{1.852} \times \frac{Q^{1.852}}{di^{4.8655}}$$

Where:
F = friction head loss in feet of water per 100 feet of pipe
C = constant for inside pipe roughness (C = 150 for PVC pipe)
Q = flow in U.S. gallons per minute
Di = inside diameter of pipe in inches

Water Velocities

Water velocities in feet per second may be calculated as follows:

$$V = 0.408709 \frac{Q}{di^2}$$

Where:

V = velocity in feet per second
Q = flow in U.S. gallons per minute
Di = inside diameter of pipe in inches

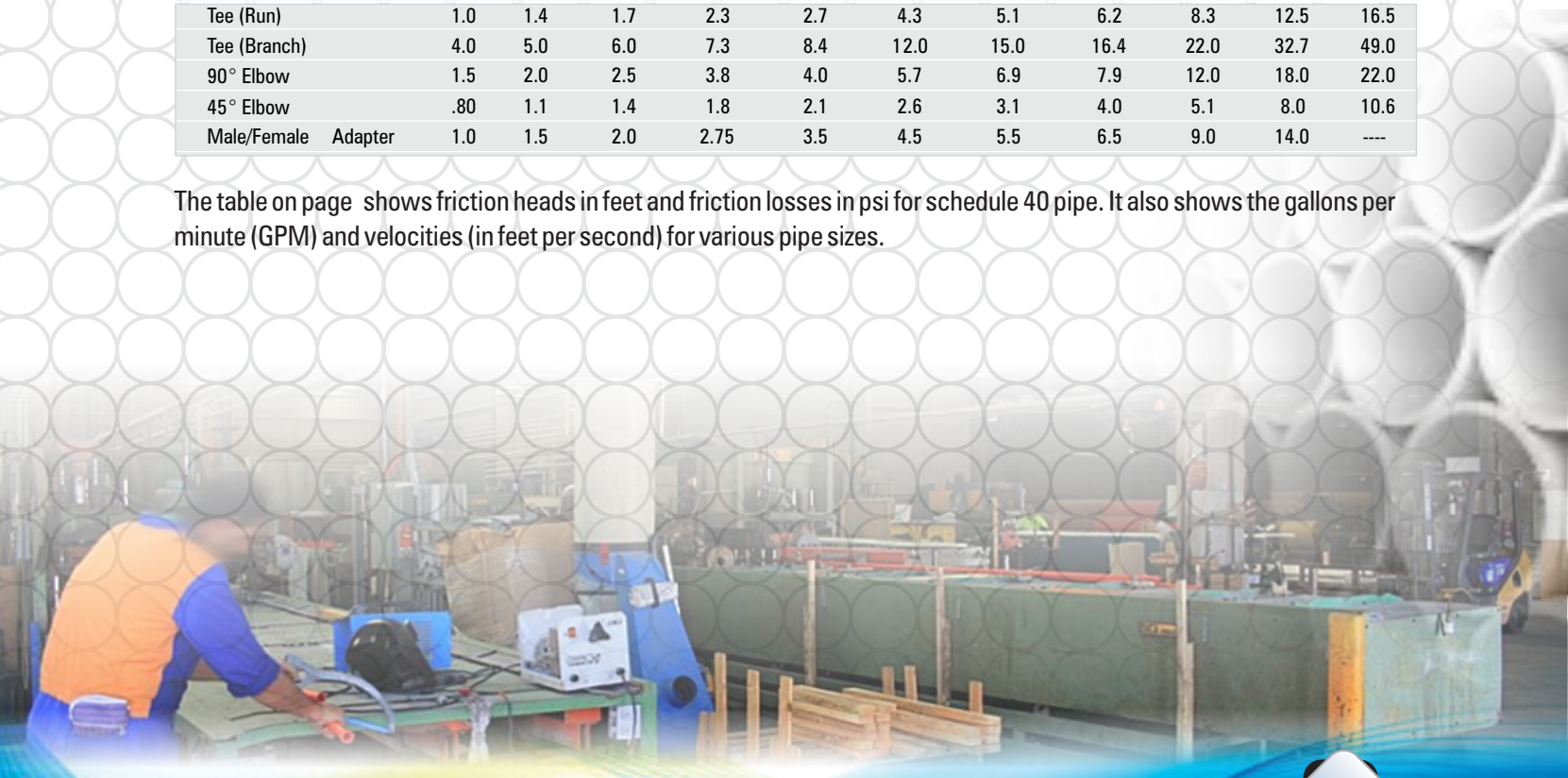
Friction Loss Through Fittings

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.

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

Fitting	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	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	.80	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.



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