

PVC

Pipes & Fittings

Bright Water Rubber And Plastic Manufacturing Company



PRICE
PRODUCT
PROMOTION

كيف اخاف من الفقر وانا عبد الغنى

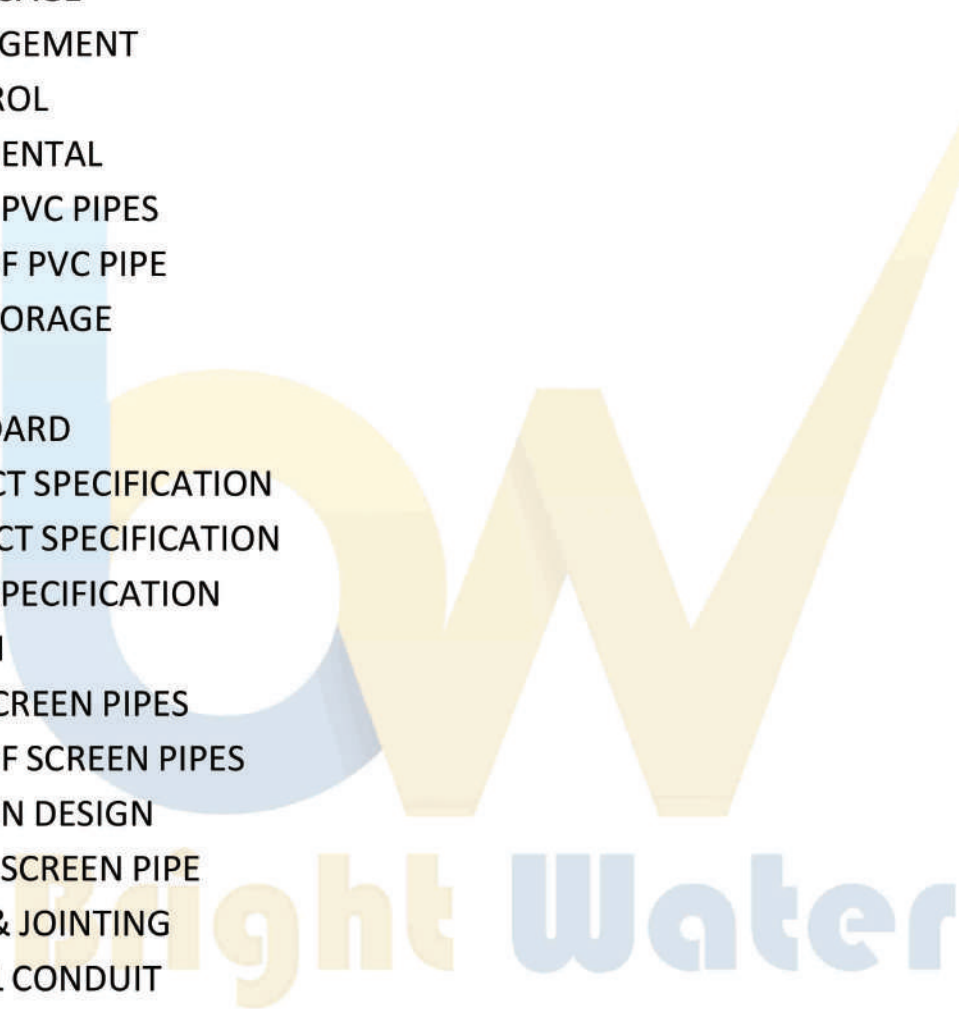
'How can I be afraid of poverty when I am the slave of the Richest (Allah)''





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CERTIFICATIONS





INTRODUCTION

Bright Water Rubber & Plastic manufacturing company has been established in 2013 as a manufacturer of Plastic Polyvinyl Chloride PVC Pressure and non-Pressure pipe system for cold and potable water and other industrial uses. Bright Water After succeeding in PVC & U-PVC piping system, has Started the production of PVC, U-PVC, PPR- C, HDPE pipes & Fittings with Advance Technology. Customer focus, quality and innovation are reflected in every aspect of our business.

Our strength lies in pre-empting customer expectations and product demands. Bright Water today is a trademark of reliability, durability and stability. Our team is highly skilled and experienced which uses the most advanced technology on its production line and retains the modern management system.

As a group, we are committed to high ethical business values, quality of products, committed deliveries and competitive pricing. These factors have contributed to our success ensuring our success at all levels.

We have developed and designed a setup and system in place which can meet your requirements and needs beyond your hopes and expectations.

We believe that our strength lies in satisfying our customers and clients. That is why, providing quality products backed by superior technical support services, is the Bright Water promise to all our valued customers. Besides its unique place in Afghanistan plastic and Hand Pumps industry, Bright Water products are exported to various other countries and thus play an important role in economy of Afghanistan.





PRESIDENT MESSAGE

First of all I, on behalf of Bright Water Rubber & Plastic Manufacturing Company; would like to introduce you Bright Water, Bright Water like many other companies invests millions of Afghanis in its communities annually through different programs and events. They understand that community investment is a necessary component of a sustainable business and its subsequent growth and recognizes that corporations can utilize unique resources, including the expertise of their employees through volunteerism, to positively impact societal problems and issues. Founded in 2013 & continued to inspire and challenge leaders in the private and public sector to find innovative ways to fulfil unmet community needs and to lead the way towards better management of business and societal strategies and policies. Through our convening power, a focus on measurement, and the extensive resources we provide to customers, employees, investors, nonprofits organizations, governments, and other businesses.

We provide thought leadership in the field through our recognized events and forward-looking research reports in the time of economic volatility and uncertainty. Today's business leaders are keenly aware of the heightened needs in their communities around the world. Bright Water encourages corporate CEOs to think carefully about the societal issues that will affect their companies in the next decade,

and to proactively engage in addressing those issues, in collaboration with customers, employees, investors, nonprofits organizations, governments, and other businesses. To develop, grow, struggle to achieve perfection through advanced technology and utilize all its resources in order to ensure long lasting customer satisfaction are the objectives of Bright Water. Thanks to reliable, strong, easily accessible and easy-to-use products and perfect after sale support, Bright Water achieves its target perfection. Bright Water is ready to achieve its goals and objectives through regular investments in communities by implementing various mechanisms and Technics.

I, on behalf of Bright Water; would like to request you to kindly consider our request favorably to add us in the list of your vendors and to give us the opportunities to work close with you in the categories of all activities which is included in our Corporation.

I am looking forward to working close with your organization on a long term basis.

Hamid Ahmadzai
President



QUALITY MANAGEMENT

At Bright Water quality is high priority and the foundation of all our processes and operations. Each and every one of us here at Bright Water is committed to consistently achieving the highest quality standards in our products and services, with the aim of satisfying and exceeding the requirements and expectations of our customers. This goes for every area of our business.

Bright Water Rubber & Plastic Manufacturing Company is Germany (DAB) ISO 9001:2008 for Quality Management System, 14001:2015 for Environmental Management System & 18001:2007 for Health & Safety Management System Certified Company. Which have been dedicated itself through the production of superior materials ensuring cost effectiveness, hurdle freedom and high quality in all aspects of business. We are using innovative, adoptive and modern technologies available in the industry to ensure all specific customers' requirements and expectations are met all the times with comfort and satisfaction which will enhance our production quality, performance and profitability. This is the culmination of our dedicated efforts to manufacture superior product to our national and international clients by providing exceptional value, consistent performance and creative production solutions by which we have been promoting our ever-lasting and productive working relationship.

Each and every single piece of pipes & fittings are subjected to a detailed inspection & testing by trained and experienced staff to detect dimensional inaccuracies, surface imperfections and its conformity with applicable standards.

Our quality policy includes:

- ❖ Strict observance to a quality management system that complies with all quality oriented standards.
- ❖ Our quality policy is maintained throughout our business in accordance with our commitment to customer and regulatory requirements.

- ❖ Our quality policy is communicated to all employees and they are actively involved in the development of its objectives.
- ❖ A proactive culture of continuous improvement aiming to "get the job done in first time".
- ❖ Highly qualified and experienced staff with expertise in their individual fields.
- ❖ Periodically conducting ongoing training sessions for all staff.

We believe in open and honest communication to all our customers and staff within a trusted environment.

VISION

To become the leading manufacturing Company for PVC, U-PVC, PPRC & HDPE Pipes & Fittings and services at national and international levels.

MISSION

Profitable growth through superior customer service, innovation, quality and commitment. To be the leader in every market we enter and serve, to the benefit of our customers and shareholders. The company's primary objective is to maximize long – term customer value, while adhering to the highest manufacturing standards

WHY BRIGHT WATER?

Bright Water Pipes & Fittings offer the greatest combination of versatility, durability and longevity, and gives importance to quality control and:

1. Uses the most advanced technology.
2. Has highly skilled and experienced team.
3. Uses the most suitable raw materials.
4. Produces pipes & fittings as per international standard.
5. Controls Quality at each stage of production & has well equipped laboratory
6. Committed to high ethical business values and competitive pricing.



QUALITY CONTROL

Profitable growth through superior customer service, innovation, quality and commitment. To be the leader in every market we enter and serve, to the benefit of our customers and shareholders The company's primary objective is to maximize long – term customer value, while adhering to the highest manufacturing standards

RAW MATERIAL QUALITY CONTROL

All types of Raw material from our supplier are subject to input quality control test .Before Production Samples chosen from raw material for Test being carried out obtain suitable for Production approval.

PROFITABLE GROWTH THROUGH SUPERIOR

All types of Raw material from our supplier are subject to input quality control test . Before Production Samples chosen from raw material for Test being carried out obtain suitable for Production approval.

PROCESS QUALITY CONTROL

To assure quality of the PVC Pipes during production process and finish product, Quality Control department ensures that materials 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

The quality and performance of PVC Pipes are assured by a wide array of tough standards, control tests and independent certifications Bright Water PVC Pipes maintain the quality of the products as per the revised and the latest standard ISO 9001/ which also is in line with the international standards on product quality.

EXTENSIVE QUALITY CONTROL

Bright Water pipe undergoes numerous quality control tests, including regular measurements of critical dimensions, tests for extrusion quality, pipe flattening, burst pressure, impact resistance, joint integrity, and hydrostatic soundness , Melt Flow rate, Internal Hydrostatic Pressure Resistance (ICPR), Longitudinal Reversion (Heat Reversion) , Tensile Strength This ensures optimum quality, reliability and long-term strength.

1) Heat Reversion

2) Opacity

3) Density

4) Burst Pressure

5) Fracture Toughness

1) Methylene Chloride

2) Impact Strength

3) Flattening (ASTM)

4) Acetone Resistance

5) Resistance to Sulphuric Acid





PVC ENVIRONMENTAL FRIENDLY

Producing by the use of “Environmental Friendly Production Technologies” since its foundation, Bright Water proves its sensitivity toward environmental health through its Environmental Management System. Upon obtaining Australia, Netherlands (JAS-ANZ) & Germany (DAB) ISO 9001- 2008 “Environment Management System”. The environmentally friendly raw materials is used for manufacture of Bright Water PPRC Pipe system. To insure its environmental compatibility, all contained additives (color pigments & stabilizers) are extensively tested, not only by Bright Water own laboratory, but also by prominent independent laboratories.

Bright Water not only retains its established environmental consciousness within its organization but also transforms this consciousness into an environmental policy and shares it with its neighbors, suppliers and customers. Especially during domestic and foreign seminars held for its end-users, Bright Water shares its efforts made toward environmental problems and importance that should be attached to the environmental health primarily with its business partners.

95% of the products of Bright Water consists of re-cycled re-processable materials. It sends its non-household wasted and non-recyclable waster products to “Disposal Facilities”.

Environment Management Programs and Projects oriented to Environmental Health Protection drawn up by the Environmental Group consisting of our environmental engineers are being realized within Bright Water Rubber & Plastic Manufacturing Company. Committing its compliance with all national and international Environmental Legislative Directives and Environmental regulations, Bright Water fulfills all its legal liabilities and declares statutory assessment reports to the relevant Ministry.

Bright Water always gives precedence to the importance of environmental health and shows necessary sensitivity in all its investments.



BRIGHT WATER PVC PIPES

Bright Water uses the Best quality PVC resin and compound to ensure that desirable physical properties are maintained with every production run. Bright Water PVC piping exhibits exceptional consistent quality with uniform properties; making it the preferred choice of fabricators and custom houses. Bright Water's product line has grown to include standard and custom extrusions of PVC pipe in schedules 40, 80, and 120; as well as SDR series pipe produced to 13.5, 21, 26 and 41 dimensions. In addition to a full range of sizes, Bright Water also offers various options including: belled end, gasket end/Z-joint and threaded pipe ends, as well as custom dimensions and lengths. Bright Water PVC pipe is ideal for numerous applications including chemical processing, high purity applications, water and waste water treatment, potable water systems, agricultural, irrigation, plating, and many other industrial applications involving corrosive fluid transfer. Bright Water PVC Pipes have a wide range of products in PVC for different usage as below:

BRIGHT WATER PVC PIPES ARE APPLICABLE FOR:

- Water Supply
- Pressure Piping
- Sewerage
- Vent & Drain System
- Irrigation
- Potable Water Supply
- Chemical Installation
- Water treatment
- Swimming Pools
- Food Stuff Industrials
- Industrial Piping

JOINTING SYSTEM

- Solvent Weld Pipes
- Mechanical (Tapper Ring) Pipes
- Z-Joint Rubber Ring Pipes
- Threaded Pipes





ADVANTAGES OF PVC PIPE

While PVC is very different materials, they share numerous advantages common to plastic piping Systems. Advantages include ease of installation, corrosion Resistance, Low friction loss, Initial cost, and longevity.

EASY INSTALLATION

PVC systems are light in weight (Approximately onehalf the weight of aluminum 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.

STRENGTH

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

FREEDOM FROM TOXICITY, ODORS, TASTES

PVC piping systems designed for domestic water applications. This standard ensures the safety of products

CORROSION FREE EXTERNAL AND INTERNAL

With many other pipe materials, slight corrosion may occur. The corroded particles can contaminate the piped fluid, complicating further processing, or causing bad taste, odors, or discoloration. This is particularly undesirable when the piped fluid is for domestic consumption. With PVC there are no corrosive by-products, therefore, no contamination of the piped fluid.

IMMUNITY TO GALVANIC OR ELECTROLYTIC ATTACK

PVC is inherently immune to galvanic or electrolytic action. They can be used underground, underwater, in the presence of metals, and can be connected to metals.

FIRE RESISTANCE

PVC 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. PVC will not pass the ASTM E-84 25/50 flame spared/smoke developed test and is not acceptable for use in plenum areas. For plenum applications, flow prevailing code requirements.

LOW FRICTION LOSS

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

LOW THERMAL CONDUCTIVITY

PVC pipe have a much lower thermal conductivity factor than metal pipe. Therefore, fluids being piped maintain a more constant temperature. In many cases, pipe insulation is not required.

COST EFFECTIVE

PVC products are extremely light weight, convenient to handle, relatively flexible, and easy to install. These features lead to lower installed cost than other piping system.





VIRTUALLY MAINTENANCE FREE

PVC systems are light in weight (Approximately one-half the weight of aluminum 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. Once PVC system is properly selected designed, and installed, it is virtually maintenance free. Therefore, years of trouble-free service can be expected when using Bright Water PVC pipe system.

HANDLING AND STORAGE OF PVC PIPE

RECEIVING PIPE

As pipe is received, it must always be thoroughly inspected, prior to unloading. The person receiving the pipe must look for any transportation damage cause by over-tightened tie-down straps, improper treatment, or a shift in the load. Pipe received in a closed trailer must be inspected as the trailer is opened. Take extra time to ensure that the pipe has not been damaged by other materials having been stacked on top of it, load shift, or rough handling. Visually examine the pipe ends for any cracks, splits, gouges, or other forms of damage. Additionally, the pipe should be inspected for severe deformation which could later cause joining problems. The entire inside diameter of larger diameter pipe (4" and above) must be checked for any internal splits or cracks which could have been caused by loading or transit. The use of a flashlight may be necessary to perform this inspection. Any damages must be observed by all parties involved, including the driver, and should be clearly noted on the bill of lading and/or delivery ticket. A copy of this document should be retained by the receiver. In addition, the manufacturer and carrier should be notified, within 24 hours of any damages, shortages, or miss-shipped products.

HANDLING PIPE

The pipe should be handled with reasonable care. Because thermoplastic pipe is much lighter in weight than metal pipe, there is sometimes a tendency to throw it around. This should be avoided. The pipe should never be dragged or pushed from a truck bed. Removing and handling pallets of pipe should be done with a forklift. Loose pipe lengths require special handling to avoid damage. Precautions to follow when unloading and handling loose pieces include not banging,

even from low heights, on hard or uneven surface. In all cause, severe contact with any sharp objects (rocks, angle iron, forks on forklifts, etc.) should be avoided. Also the pipe should never be lifted or moved by inserting the forks of a forklift in to the pipe ends. Handling PVC pipe particularly diameter greater than 4-inch requires extra care as the added pipe weight can cause cracking from relatively minor impacts. Also plastic pipe becomes more brittle as the temperature decrease. The impact strength and flexibility of PVC and pipe are reduced. Therefore take extra care when handling skids or loose lengths when the temperature drops below 50°F.

STORING PIPE

If possible, pipe should be stored inside. 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 pallets, the pallets should be sacked with the pallet boards touching, rather than pallet boards being placed on the pipe. This will prevent damage to or bowing of the pipe. 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.



PROPERTIES OF PVC MATERIALS

• PHYSICAL PROPERTIES OF PVC MATERIALS

| PROPERTY | UNITS | ASTM NO. | PVC | ASTM NO. |
|---|------------------------|----------|--------------------|----------|
| Specific Gravity | g/cc | D 792 | 1.4 | D 792 |
| Tensile Strength (73°F) Minimum | Psi | D 638 | 7,000 | D 638 |
| Modulus of Elasticity in Tension (73°F) Minimum | Psi | D 638 | 400000 | D 638 |
| Flexural Strength (73°F) | Psi | D 790 | 14,000 | D 790 |
| Izod Impact (notched at 73°F) Minimum | ft lb/ in. of notch | D 256 | 0.65 | D 256 |
| Hardness (Durometer D) | | D 2240 | 80 ± 3 | D 2240 |
| Hardness (Rockwell R) | | D 785 | 110 -120 | D 785 |
| Compressive Strength (73°F) | Psi | D 695 | 9,600 | D 695 |
| Hydrostatic Design Stress | Psi | | 2000 | D 1598 |
| Coefficient of Linear Expansion | in./ in./ °F | D 696 | 3×10 ⁻⁵ | D 696 |
| Heat Distortion Temperature at 264 psi Minimum | degrees F | D 648 | 160 | D 648 |
| Coefficient of Thermal Conductivity | BTU/ hr/sq ft/ °F/ in. | C 177 | 1 | C 177 |
| Specific Heat | BTU/ °F/lb | D 2766 | 0.25 | D 2766 |
| Water Absorption (24 hrs at 73°F) | % weight gain | D 570 | 0.05 | D 570 |
| Cell Classification- nP ipe | | D 3965 | 12454 | D 1784 |
| Cell Classification- nF ittings | | D 3965 | 12 454 | D 1784 |
| Burning Rate | | | Self-Ext. | D 635 |
| Burning Class | | | V-0 | UL 94** |

Above data is based upon information provided by the raw material manufactures. It should be used only as a recommendation and not as a guarantee of performance. Underwriters Laboratories standard.

• PHYSICAL & MATERIALS PROPERTIES OF PVC PIPES

| PROPERTY | VALUE | UNIT |
|--------------------|--|--------|
| Specific Gravity | 1.42 - 1.46 | |
| Shore Hardness | 70 - 90 | ---- |
| Rockwell | 110 - 120 | Degree |
| Weather resistance | Colour fading but no decrease in strength. | |

| MECHANICAL | VALUE | UNIT |
|-----------------------------------|-----------|-----------------------|
| Tensile Strength AT 23 °C | 450 - 600 | Kgf/cm ² |
| o Modulus of Elasticity at 200 °C | 30000 | 2 kgf/cm ² |
| Elongation at Break | >80% | ft lb/in of Notch |
| o Impact strength at °Co | 0.5 - 1 | ft lb/in of Notch |
| Impact strength at 20 °C | 1 - 2 | ft lb/in of Notch |
| Compressive Strength | 600 - 700 | Kgf/cm ² |
| Bending Strength | 1000 | Kgf/cm ² |



• **THERMAL & ELECTRICAL PROPERTIES OF PVC PIPES**

| THERMAL | | |
|--|-------------|-----------|
| Specific Heat at 20 °C | 0.24 | Cal/gm/C |
| Vicat Softening Point | 85 | oC |
| Heat Distortion Temperature at 18.5 kgf / Cm | 75 | oC |
| Thermal Conductivity | 0.12 - 0.14 | cal m/mhc |
| Coefficient of Linear Expansion | 7 - 8x10 | m/m/C |

| ELECTRICAL | | |
|---|-----------------------------|-----------|
| Dielectric Constant (800 Cycle) | 3.0 | |
| Dielectric Strength | 425 | Volts/mil |
| Inflammability | will not support combustion | % |
| Water Absorption (24 Hours at Ambient Temperature) | 0.07 | |





RANGE & STANDARD OF BRIGHT WATER PVC PIPES

PRESSURE PIPES:

ASTM D 1785, Sch - 40 & ASTM D2665 Dual Rated

ASTM D1785, Sch - 80

BS - 3505 & PSI 3051

DIN 8061 & DIN 8062

SEWERAGE, DRAIN & VENTILIZATION

ASTM D2665 DWV

ASTM D2241 SDR Series

PVC SDR 35 Sewer Pipe

PVC ASTM D2729 Sewer & Drain Pipe

BS - 5255 Thermoplastic Waste Pipe

BS - 4515 Soil & Ventilation

BS - 4660 & Underground Sewerage

PVC ELECTRICAL CONDUIT PIPES:

NEMA TC-2 Sch-40 & Sch-80

NEMA TC-6, TC-8 & ASTM F512

BS - 6099

PVC WELL CASING AND SCREEN PIPES

ASTM F480

ASTM D1785

BS 3505

PVC FITTINGS

ASTM D 2466 Pressure Fittings

ASTM D 2665 DWV Fittings

ASTM F512 Fabricated Fittings and Long Elbows





PRODUCT SPECIFICATIONS

RECEIVING PIPE

SYSTEM: PVC Schedule 40 Pressure Pipe and Fittings System

SCOPE: This specification covers PVC Schedule 40 pipe and fittings for pressure applications. This system is intended for pressure applications where the operating temperature will not exceed 140° F.

SPECIFICATION: Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) Vinylcompounds with a Cell Class of 12454 as identified in ASTM D 1784. PVC Schedule 40 pipe shall be iron Pipe Size (IPS) conforming to ASTM D 1785. PVC Schedule 40 fittings shall conform to ASTM D 2466. Pipe and fittings shall be manufactured as system. Installation shall comply with the lasts installation instructions published by Bright water Pipe and Foundry and shall conform to all applicable plumbing, building, and fire code requirements. Buried pipe shall be installed in accordance with ASTM F 1668 and ASTM D 2774. Solvent cement joints shall be made in a two-step process with primer conforming to ASTM F 656 and solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agent not compatible with PVC compounds. Systems shall be hydrostatically tested after installation.



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 |



PRODUCT SPECIFICATIONS

SYSTEM: PVC Schedule 40 Solid Wall Pipe and PVC DWV Fitting System

This specification cover PVC Schedule 40 solid wall pipe and PVC DWV fitting used in sanitary drain, waste, and vent (DWV), sewer, and storm drainage applications. This system is intended for use in non-pressure application where the operating temperature will not exceed 140°F

SPECIFICATION:

Pipe and fitting shall be manufactured from virgin rigid PVC (polyvinyl Chloride) vinyl compounds with a Cell Class of 12454 as identified in ASTM D 1784. PVC Schedule 40 pipe shall be Iron Pipe Size (IPS) conforming to ASTM D 1785 and ASTM D 2665. PVC DWV fittings shall conform to ASTM D 2665. All system shall utilize a separate waste and vent system. Installation shall comply with the latest installation instructions published by and shall conform to all applicable plumbing, building, and fire code requirements. Buried pipe shall be installed in accordance with ASTM D 2321 and ASTM F 656 and solvent cement conforming to ASTM D 2564

, the system shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agent not compatible with PVC compounds. System shall be hydrostatically tested after installation.

Referenced Standards:

ASTM D 1784 Rigid Vinyl Compounds
ASTM D 1785 PVC Plastic Pipe, Schedule 40
ASTM D 2665 PVC Drain, Waste, and Vent Pipe & Fittings
ASTM D 2564 Solvent Cements for PVC pipe and Fittings
ASTM D 2321 Underground Installation of Thermoplastic Pipe (non- pressure application)
ASTM F 656 Primers for PVC Pipe and Fittings
ASTM F 1668 Procedures for Buried Plastic Pipe

REFERENCE STANDARDS

| | |
|-------------|--|
| ASTM D 1784 | Rigid Vinyl Compounds |
| ASTM D 1785 | PVC Plastic Pipe, Schedule 40 |
| ASTM D 2665 | PVC Drain, Waste, and Vent Pipe & Fittings |
| ASTM D 2564 | Solvent Cements for PVC pipe and Fittings |
| ASTM D 2321 | Underground Installation of Thermoplastic Pipe (non- pressure application) |
| ASTM F 656 | Primers for PVC Pipe and Fittings |
| ASTM F 1668 | Procedures for Buried Plastic Pipe |

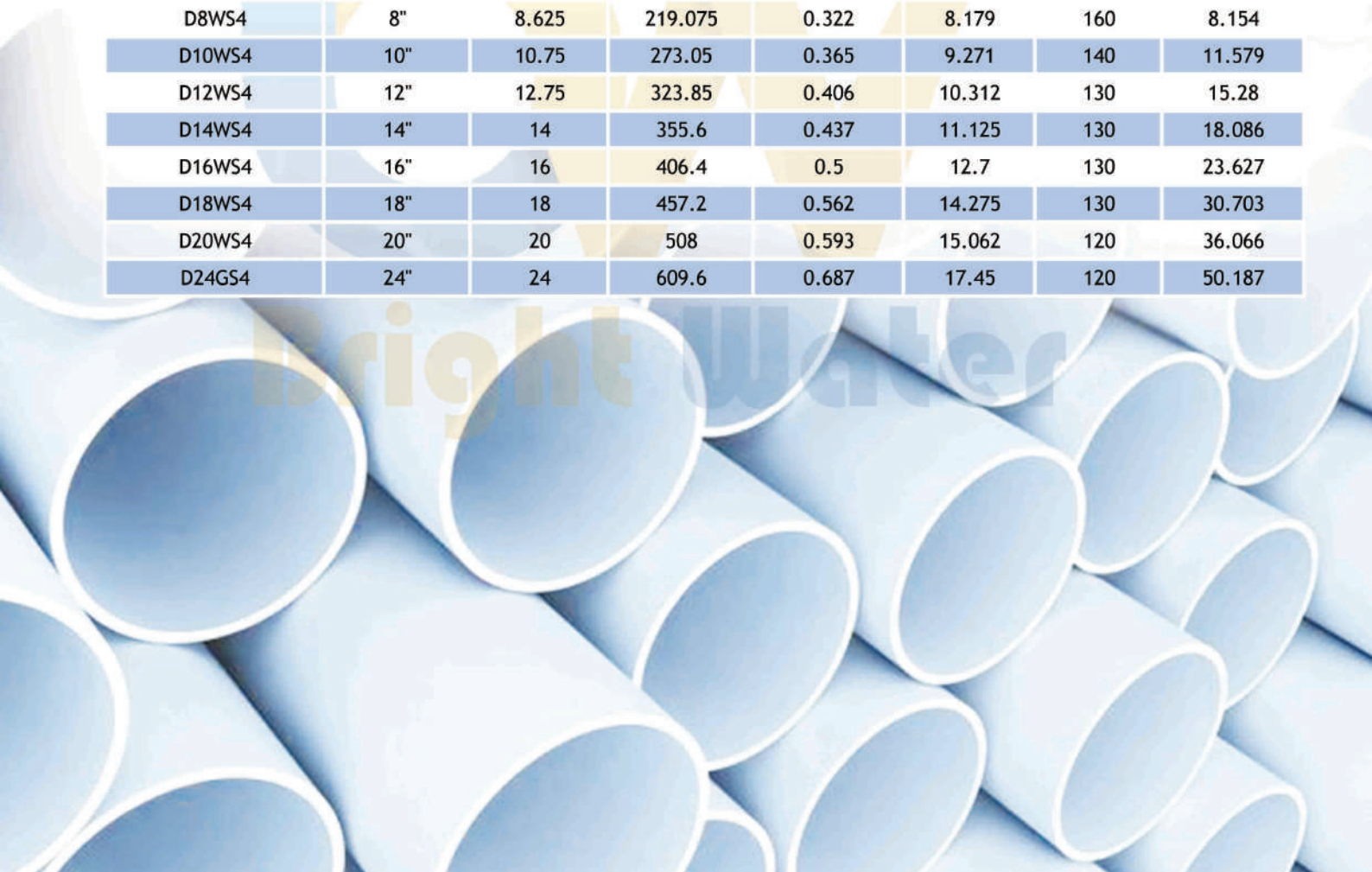




PVC SCH-40 ASTM D 2665 & 1785

| Product Code | Nominal Size | Outside Diameter (mm) | | SCH-40 Dimensions | | | |
|--------------|--------------|-----------------------|---------|--------------------|--------|----------|-------------|
| | | | | Min wall thickness | | Max. W.P | Weight /mtr |
| | | Inch | mm | Inch | mm | PSI | |
| D1/4WS4 | 1/4 | 0.54 | 13.716 | 0.088 | 2.235 | 780 | 0.128 |
| D3/8WS4 | 3/8" | 0.675 | 17.145 | 0.091 | 2.311 | 620 | 0.167 |
| D 1/2WS4 | 1/2" | 0.84 | 21.336 | 0.109 | 2.769 | 600 | 0.248 |
| D3/4WS4 | 3/4" | 1.05 | 26.67 | 0.113 | 2.87 | 480 | 0.329 |
| D1WS4 | 1" | 1.315 | 33.401 | 0.133 | 3.378 | 450 | 0.483 |
| D11/4WS4 | 1-1/4" | 1.66 | 42.164 | 0.14 | 3.556 | 370 | 0.653 |
| D11/2WS4 | 1-1/2" | 1.9 | 48.26 | 0.145 | 3.683 | 330 | 0.779 |
| D2WS4 | 2" | 2.375 | 60.325 | 0.154 | 3.912 | 280 | 1.045 |
| D21/2WS4 | 2-1/2" | 2.875 | 73.025 | 0.203 | 5.156 | 300 | 1.65 |
| D3WS4 | 3" | 3.5 | 88.9 | 0.216 | 5.486 | 260 | 2.16 |
| D4WS4 | 4" | 4.5 | 114.3 | 0.237 | 6.02 | 220 | 3.074 |
| D5WS4 | 5" | 5.563 | 141.3 | 0.258 | 6.553 | 190 | 4.169 |
| D6WS4 | 6" | 6.625 | 168.275 | 0.28 | 7.112 | 180 | 5.414 |
| D8WS4 | 8" | 8.625 | 219.075 | 0.322 | 8.179 | 160 | 8.154 |
| D10WS4 | 10" | 10.75 | 273.05 | 0.365 | 9.271 | 140 | 11.579 |
| D12WS4 | 12" | 12.75 | 323.85 | 0.406 | 10.312 | 130 | 15.28 |
| D14WS4 | 14" | 14 | 355.6 | 0.437 | 11.125 | 130 | 18.086 |
| D16WS4 | 16" | 16 | 406.4 | 0.5 | 12.7 | 130 | 23.627 |
| D18WS4 | 18" | 18 | 457.2 | 0.562 | 14.275 | 130 | 30.703 |
| D20WS4 | 20" | 20 | 508 | 0.593 | 15.062 | 120 | 36.066 |
| D24GS4 | 24" | 24 | 609.6 | 0.687 | 17.45 | 120 | 50.187 |

Bright Water





PRODUCT SPECIFICATIONS

SYSTEM: PVC Schedule 80 Pressure Pipe and Fitting System

SCOPE:

This specification cover PVC Schedule 80 pipe and fittings for pressure applications. This system is intended for pressure applications where the operating temperature will not exceed 140°F.

SPECIFICATION:

Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a Cell Class of 12454 as identified in ASTM D 1784. PVC Schedule 80 pipe shall be iron Pipe Size (IPS) conforming to 00 ASTM D 1785. PVC Schedule 80 fittings shall conform to ASTM D 2467. PVC Schedule 80 threaded fittings shall conform to ASTM D 2464. Pipe and fittings shall be manufactured as a system. Installation shall comply with the latest installation instructions published by Kawsar Pipe and shall conform to all applicable plumbing, building, and fire code requirements. Buried pipe shall be installed in accordance with

ASTM F 1668 and ATM D 2774. Solvent cement joints shall be made in a two-step process using IPS P-70 or Oatey Industrial Grade premiers and solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents not compatible with PVC compounds. Systems shall be hydrostatically tested after installation.

REFERENCE STANDARDS

| | |
|-----------------------|---|
| ASTM D 1784 | Rigid Vinyl Compounds |
| ASTM D 1785 | PVC plastic pipe schedule 80 |
| ASTM D 2464 or D 2467 | PVC Thread fitting schedule 80 |
| ASTM D 2467 | PVC Socket Fittings, schedule 80 |
| ASTM D 2564 | Solvent Cements for PVC Pipe and Fittings |
| ASTM D 2774 | Underground Installation of Thermoplastic Pressure Piping |
| ASTM F 1668 | Procedures for Buried Plastic Pipe |



PVC PRESSURE PIPE SCH-80 ASTM D 1785

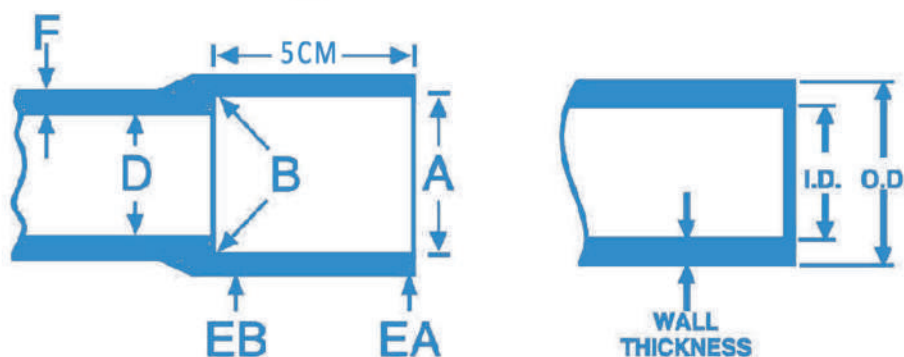
| Product Code | Nominal Size | Outside Diameter (mm) | | SCH-80 Dimensions | | | |
|--------------|--------------|-----------------------|---------|--------------------|--------|----------|-------------|
| | | | | Min wall thickness | | Max. W.P | Weight /mtr |
| | | Inch | mm | Inch | mm | PSI | |
| KEP1/4GS8 | 1/4 | 0.54 | 13.716 | 0.119 | 3.023 | 1130 | |
| KEP3/8GS8 | 3/8" | 0.675 | 17.145 | 0.126 | 3.2 | 920 | 0.211 |
| KEP 1/2GS8 | 1/2" | 0.84 | 21.336 | 0.147 | 3.734 | 850 | 0.309 |
| KEP3/4GS8 | 3/4" | 1.05 | 26.67 | 0.154 | 3.912 | 690 | 0.419 |
| KEP1GS8 | 1" | 1.315 | 33.401 | 0.179 | 4.547 | 630 | 0.615 |
| KEP11/4GS8 | 1-1/4" | 1.66 | 42.164 | 0.191 | 4.851 | 520 | 0.85 |
| KEP11/2GS8 | 1-1/2" | 1.9 | 48.26 | 0.2 | 5.08 | 470 | 1.032 |
| KEP2GS8 | 2" | 2.375 | 60.325 | 0.218 | 5.537 | 400 | 1.428 |
| KEP21/2GS8 | 2-1/2" | 2.875 | 73.025 | 0.276 | 7.01 | 420 | 2.177 |
| KEP3GS8 | 3" | 3.5 | 88.9 | 0.3 | 7.62 | 370 | 2.916 |
| KEP4GS8 | 4" | 4.5 | 114.3 | 0.337 | 8.56 | 320 | 4.264 |
| KEP5GS8 | 5" | 5.563 | 141.3 | 0.375 | 9.525 | 290 | 5.915 |
| KEP6GS8 | 6" | 6.625 | 168.275 | 0.432 | 10.973 | 280 | 8.139 |
| KEP8GS8 | 8" | 8.625 | 219.075 | 0.5 | 12.7 | 250 | 12.364 |
| KEP10GS8 | 10" | 10.75 | 273.05 | 0.593 | 15.062 | 230 | 18.362 |
| KEP12GS8 | 12" | 12.75 | 323.85 | 0.687 | 17.45 | 230 | 25.223 |
| KEP14GS8 | 14" | 14 | 355.6 | 0.75 | 19.05 | 220 | 30.26 |
| KEP16GS8 | 16" | 16 | 406.4 | 0.843 | 21.412 | 220 | 38.902 |
| KEP18GS8 | 18" | 18 | 457.2 | 0.937 | 23.8 | 220 | 50.026 |
| KEP20GS8 | 20" | 20 | 508 | 1.031 | 26.187 | 220 | 61.216 |
| KEP24GS8 | 24" | 24 | 609.6 | 1.218 | 30.937 | 210 | 86.847 |





SOCKET DIMENSION FOR BELLED-END PIPE

| NOM. Pipe Size | ASTM Standard | Socket Entrance (A) | | Socket Bottom (B) | | Socket Length (C) |
|----------------|---------------|---------------------|----------|-------------------|----------|-------------------|
| | | I.D M in | I.D Max. | I.D M in | I.D Max. | Schedu le 40 |
| ½ | D 2672 | 0.844 | 0.852 | 0.832 | 0.84 | 2.0 00 |
| ¾ | D 2672 | 1.054 | 1.062 | 1.042 | 1.05 | 2.2 50 |
| 1 | D 2672 | 1.32 | 1.33 | 1.305 | 1.315 | 2.5 00 |
| 1¼ | D 2672 | 1.665 | 1.675 | 1.65 | 1.66 | 2.7 50 |
| 1½ | D 2672 | 1.906 | 1.918 | 1.888 | 1.9 | 3.0 00 |
| 2 | D 2672 | 2.381 | 2.393 | 2.357 | 2.369 | |
| 2 | F 480 | 1.380 | 2.392 | 2.357 | 2.369 | 4.0 00 |
| 2½ | D 2672 | 2.882 | 2.896 | 2.854 | 2.868 | |
| 2½ | F 480 | 2.880 | 2.894 | 2.854 | 2.868 | 4.0 00 |
| 3 | D 2672 | 3.508 | 3.524 | 3.476 | 3.492 | |
| 3 | F 480 | 3.506 | 3.522 | 3.476 | 3.492 | 4.0 00 |
| 4 | D 2672 | 4.509 | 4.527 | 4.473 | 4.491 | |
| 4 | F 480 | 4.508 | 4.526 | 4.473 | 4.491 | 5.0 00 |
| 6 | D 2672 | 6.636 | 6.658 | 6.592 | 6.614 | |
| 6 | F 480 | 6.637 | 6.659 | 6.592 | 6.614 | 6.5 00 |
| 8 | D 2672 | 8.640 | 8.67 | 8.583 | 8.613 | |
| 8 | D 2672 | 8.634 | 8.664 | 8.583 | 8.613 | 7.0 00 |
| 10 | D 2672 | 10.761 | 10.791 | 10.707 | 10.737 | 9 |
| 12 | D 2672 | 12.763 | 12.793 | 12.706 | 12.736 | 10.0 00 |
| 14 | D 2672 | 14.020 | 14.05 | 13.97 | 14 | 10.0 00 |
| 16 | D 2672 | 16.030 | 16.06 | 15.965 | 15.995 | 10.0 00 |





ASTM D 1785

| Nominal Size Pipe | Pressure Required for Test PSI | | | Pressure Required for Test PSI | | |
|-------------------|--------------------------------|-------------|--------------|--------------------------------|-------------|--------------|
| | Schedule 40 | Schedule 80 | Schedule 120 | Schedule 40 | Schedule 80 | Schedule 120 |
| 1/2 | 1250 | 1780 | 2130 | 1910 | 2720 | 3250 |
| 3/4 | 1010 | 1440 | 1620 | 1540 | 2200 | 2470 |
| 1 | 950 | 1320 | 1510 | 1440 | 2120 | 2300 |
| 1 1/2 | 690 | 990 | 1130 | 1060 | 1510 | 1720 |
| 2 | 580 | 850 | 990 | 890 | 1290 | 1510 |
| 3" | 590 | 790 | 930 | 840 | 1200 | 1420 |
| 4" | 470 | 680 | 900 | 710 | 1040 | 1380 |
| 6" | 370 | 590 | 780 | 560 | 890 | 1190 |
| 8" | 330 | 520 | 760 | 500 | 790 | 1160 |
| 10" | 300 | 490 | 770 | 450 | 750 | 1170 |
| 12 | 280 | 480 | 710 | 420 | 730 | 1090 |

ASTM D2665

o Minimum Hydrostatic Burst Pressure at 73 F (23)

Minimum Hydrostatic Burst Pressure (1 PSI = 6.89 kpa)

| Size | PSI | KPI |
|------|------|------|
| 1 ¼ | 1180 | 8140 |
| 1 ½ | 1060 | 7310 |
| 2 | 890 | 6140 |
| 3 | 840 | 5790 |
| 4 | 710 | 4900 |
| 6 | 560 | 3680 |
| 8 | 500 | 3450 |
| 10 | 450 | 3100 |
| 12 | 420 | 2890 |
| 14 | 410 | 2830 |
| 16 | 410 | 2830 |
| 18 | 410 | 2830 |
| 20 | 390 | 2690 |
| 24 | 380 | 2620 |

* These burst pressure are calculated using a hoop stress of 6400 psi (44.1 MPA)

Temperature De-Rating For Schedule 40 & 80 PVC

The operating pressure of PVC pipe will be reduced as the operating temperature increases above 73°F. To calculate this reduction, multiply the operating pressures pages by the correction

| Operating Temperature (°F) | Correction PVC |
|----------------------------|----------------|
| 73 | 1 |
| 80 | 0.88 |
| 90 | 0.75 |
| 100 | 0.62 |
| 110 | 0.5 |
| 120 | 0.4 |
| 130 | 0.3 |
| 140 | 0.22 |
| 150 | NR |
| 160 | NR |
| 170 | NR |
| 180 | NR |
| 200 | NR |



PRODUCT SPECIFICATIONS

SYSTEM: PVC SDR PRESSURE PIPE AND FITTING SYSTEM

SCOPE:

This specification covers PVC Standard Dimensional Ratio (SDR) pipe and fittings for pressure applications. This system is intended for pressure applications where the operating temperature will not exceed 140°F.

plasticized vinyl products, or other aggressive chemical agents not compatible with PVC compounds. System shall be hydrostatically tested after installation.

SPECIFICATION: Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a Cell Class of 12454 as identified in ASTM D 1784. PVC SDR pipe shall be iron Pipe Size (IPS) conforming to ASTM D 2241 for plain end pipe and ASTM D 2672 for belled-end pipe. PVC Schedule 40 (IPS) fittings shall conform to ASTM D 2466. Pipe and fittings shall be manufactured as a system. Installation shall comply with the latest installation instructions published by Kawsar Pipe and shall conform to all applicable plumbing, building, and fire code requirements. Buried pipe shall be installed in accordance with ASTM F 1668 and ASTM D 2774. Solvent cement joints shall be made in a two-step process with primer conforming to ASTM F 656 and solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents not compatible with PVC compounds. System shall



REFERENCE STANDARDS

| | |
|-----------------------|--|
| ASTM D 1784 | Rigid Vinyl Compounds |
| ASTM D 1785 | PVC Pressure Rated Pipe and Fittings |
| ASTM D 2464 or D 2467 | Joints for IPS PVC Pipe Using Solvent Cement |
| ASTM D 2467 | PVC Plastic Fitting Schedule |
| ASTM D 2564 | Solvent Cements for PVC Pipe and Fittings |
| ASTM D 2774 | Primers for PVC Pipe and Fitting |
| ASTM F 1668 | Procedures for Buried Plastic Pipe |

ASTM 2241 (SDR SERIES)

| D/A | Nominal DIA | | SDR 64 | | SDR 41 | | SDR 32.5 | | SDR 26 | | SDR 21 | | SDR 17 | | SDR 13.5 | |
|--------|-------------|------|----------------|------|----------------|------|----------------|------|----------------|------|----------------|------|----------------|------|----------------|-------|
| | Value mm | Min. | Wall Thickness | Min. | Wall Thickness | Min. | Wall Thickness | Min. | Wall Thickness | Min. | Wall Thickness | Min. | Wall Thickness | Min. | Wall Thickness | Min. |
| 1/2" | 21.34 | | | | | | | | | | | | | | | 1.57 |
| 3/4" | 26.67 | | | | | | | | | | 1.52 | | 1.57 | | | 1.98 |
| 1" | 33.4 | | | | | | | | 1.52 | 1.52 | 1.6 | | 1.96 | | | 2.46 |
| 1 1/4" | 42.16 | | | | | | 1.52 | | 1.63 | | 2.01 | | 2.49 | | | 3.12 |
| 1 1/2" | 48.26 | | | | | | 1.52 | | 1.85 | | 2.29 | | 2.84 | | | 3.58 |
| 2" | 60.32 | | | | | | 1.85 | | 2.31 | | 2.87 | | 3.56 | | | 4.47 |
| 2 1/2" | 73.02 | | | | | | 2.24 | | 2.79 | | 3.48 | | 4.29 | | | 5.41 |
| 3" | 88.9 | | | | | | 2.74 | | 3.43 | | 4.24 | | 5.23 | | | 6.58 |
| 4" | 114.3 | | 1.78 | | | | 3.51 | | 4.39 | | 5.44 | | 6.73 | | | 8.46 |
| 5" | 141.3 | | 2.64 | | | | 4.34 | | 5.43 | | 6.73 | | 8.3 | | | 10.1 |
| 6" | 168.28 | | 2.64 | | | | 5.18 | | 6.48 | | 8.03 | | 9.91 | | | 12.47 |
| 8" | 219.08 | | 3.43 | | | | 6.73 | | 8.43 | | 10.41 | | 12.9 | | | |
| 10" | 273 | | | | | | 8.41 | | 10.5 | | 12.98 | | -- | | | |
| 12" | 323.9 | | | | | | 9.96 | | 12.5 | | 15.39 | | | | | |
| 14" | 355.6 | | | | | | 8.95 | | 13.7 | | | | | | | |
| 16" | 406.4 | | | | | | 10.1 | | 15.6 | | | | | | | |
| 18" | 457.2 | | | | | | 11.2 | | 17.6 | | | | | | | |
| 20" | 508 | | | | | | 12.4 | | 19.5 | | | | | | | |
| 24" | 609 | | | | | | 14.9 | | 23.4 | | | | | | | |



PRODUCT SPECIFICATIONS

SYSTEM: PVC SDR Pressure Pipe and Fitting System

SCOPE:

This specification covers PVC Standard Dimensional Ratio (SDR) pipe and fittings for pressure applications. This system is intended for pressure applications where the operating temperature will not exceed 140°F.

SPECIFICATION: Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a Call Class of 12454 as identified in ASTM D 1784. PVC SDR pipe shall be iron Pipe Size (IPS) conforming to ASTM D 2241 for plain end pipe and ASTM D 2672 for belled-end pipe. PVC Schedule 40 (IPS) fittings shall conform to ASTM D 2466. Pipe and fittings shall be manufactured as a system. Installation shall comply with the latest installation instructions published by Kawsar Pipe and shall conform to all applicable plumbing, building, and fire code requirements. Buried pipe shall be installed,

in accordance with ASTM F 1668 and ASTM D 2774. Solvent cement joints shall be made in a two-step process with primer conforming to ASTM F 656 and solvent cement conforming to ASTM D 2564.

The system shall be protected from chemical agents, fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents not compatible with PVC compounds. System shall be hydrostatically tested after installation.

REFERENCE STANDARD

| | |
|-------------|---|
| ASTM D 1784 | Rigid Vinyl Compounds |
| ASTM D 3034 | PVC Gravity Sewer Pipe (SDR) 35 PS 46 |
| ASTM D 2855 | Joints For Sewer Pipe Using Solvent Cement |
| ASTM D 2264 | Solvent Cements for PVC Pipe and Fitting |
| ASTM D 2321 | Underground Installation of Thermoplastic Pipe(non-pressure applications) |
| ASTM F 477 | Elastomeric Seals (Gaskets) For Joining Plastic Pipe |
| ASTM F 656 | Primers for PVC Pipe and Fitting |
| ASTM F 1668 | Procedures for Buried Plastic Pipe |

PVC SDR - 35 GASKETED - PS 46

| PART NO. | NOM.SIZE | LAYING LENGTH | WT.PER 100 FT. (LBS.) | AVG. OD (IN.) | MIN.WALL (IN.) |
|----------|----------|---------------|-----------------------|---------------|----------------|
| S3D4W4 | 4"X13" | 13" -0" | 110.4 | 4.215 | 120 |
| S3D4W6 | 4"X20" | 20" -0" | 109.7 | 4.215 | 120 |
| S3D4W4 | 6"X13" | 13" -0" | 249.6 | 6.275 | 180 |
| S3D4W6 | 6"X20" | 20" -0" | 247.0 | 6.275 | 180 |
| S3D4W4 | 8"X13" | 13" -0" | 451.0 | 8.400 | 0.24 |

PVC SDR 35 SLOVENT WELD - PS 46

| PART NO. | NOM.SIZE | LAYING LENGTH | WT.PER 100 FT. (LBS.) | AVG. OD (IN.) | MIN.WALL (IN.) |
|----------|----------|---------------|-----------------------|---------------|----------------|
| S3D4W3 | 4"X10" | 10" -0" | 112.00 | 4.215 | 120 |
| S3D4W6 | 4"X20" | 20" -0" | 109.70 | 4.215 | 120 |
| S3D4W3 | 6"X10" | 10" -0" | 252.00 | 6.275 | 180 |
| S3D4W6 | 6"X20" | 20" -0" | 246 | 6.275 | 180 |



PRODUCT SPECIFICATIONS

SYSTEM: PVC D 2729 Sewer and Drain Pipe

SCOPE:

This specification covers PVC D 2729 Sewer Pipe for drainage applications. This pipe is intended for drainage applications where the operating temperature will not exceed 140°F

SPECIFICATION:

Pipe shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a Cell Class of 12454 as identified in ASTM D 1784. PVC D 2729 Sewer Pipe dimensions and physical properties shall conform to ASTM D 2729. All Pipes are manufactured in Pakistan. Installation shall comply with the latest installation instructions published by Kawsar Pipe and shall conform to all applicable plumbing, building, and fire code requirements. Buried pipe shall be installed in accordance with ASTM 2321 and ASTM F 1668. Solvent cements joints shall be made in a two-step process with primer conforming to ASTM F 656 and solvent cement conforming to ASTM D 2564.

The system shall be protected from chemical agents, Fire stopping materials, thread sealant, plasticized vinyl products, or other aggressive chemical agents not compatible with PVC compounds. Systems shall be hydrostatically tested after installation.

sealant, plasticized vinyl products, or other aggressive chemical agents not compatible with PVC compounds. Systems shall be hydrostatically tested after installation.

REFERENCE STANDARD

| | |
|-------------|--|
| ASTM D 1784 | Rigid Vinyl Compounds |
| ASTM D 2729 | PVC Sewer Pipe |
| ASTM D 2564 | Solvent Cements for PVC Pipe and Fittings |
| ASTM F 656 | Primer for PVC pipe and Fittings |
| ASTM D 2321 | Underground Installation of Thermoplastic Pipe(non-pressure application) |
| ASTM F 656 | Primers for PVC Pipe and Fittings |
| ASTM F 1668 | Procedures for Buried Plastic Pipe |

| NominalSize | Part No. | UPCType | O.D.(In.) | Min. Wall(In.) | F t/Skid | Wt/100'(Lbs.) |
|-------------|----------------|------------|-----------|----------------|----------|---------------|
| 3" | KEP P3SD2729 | Solid | 3.25 | 0.07 | 8 10 | 52.8 |
| 3" | KEPP3S D2729-1 | Perforated | 3.25 | 0.07 | 8 10 | 52.8 |
| 4" | KEPP4SD2729 | Solid | 4.215 | 0.075 | 500 | 70.4 |
| 4" | KEPP4SD2729-1 | Perforated | 4.215 | 0.075 | 500 | 70.4 |



PVC SEWER AND DRAIN PIPE

PVC ASTM D 2729 Pipe

| Product Code | NOM.SIZE | AVG. OD(IN.) | MIN. WALL(IN.) | BELL DEPTH(IN.) | WT. PER100 FT.(LBS.) |
|--------------|----------|--------------|----------------|-----------------|----------------------|
| KEPP3D2729 | 3" | 3.25 | 0.07 | 1.5 | 52.8 |
| KEPP4D2729 | 4" | 4.125 | 0.075 | 1.75 | 70.4 |

PERFORATED PVC ASTM 2729 PIPE

| Product Code | NOM.SIZE | AVG. OD(IN.) | MIN. WALL(IN.) | BELL DEPTH(IN.) | WT. PER100 FT.(LBS.) |
|--------------|----------|--------------|----------------|-----------------|----------------------|
| KEPP3D2729P | 3" | 3.25 | 0.07 | 1.5 | 52.8 |
| KEPP4D2729P | 4" | 4.125 | 0.075 | 1.75 | |

Perforated pipe is supplied with two rows of ½" diameter holes every five inches. Rows are parallel to the pipe axis and are 120° apart.

Weight is approximate and is for shipping purposes only.
Pipe listed in this section meets or exceeds the requirements of ASTM D 2729

WORKING PRESSURE BSS 3505

Maximum sustained working and field test pressure as per BSS 3505

WORKING PRESSURE

FIELD PRESSURE

| Class | Bar | Kgf/cm2 | lbf/in2 | Bar | Kgf/cm2 | lbf/in2 |
|-------|-----|---------|---------|-----|---------|---------|
| B | 6 | 6.12 | 87 | 9 | 9.18 | 130 |
| C | 9 | 9.18 | 130 | 14 | 13.77 | 195 |
| D | 12 | 12.25 | 173 | 18 | 18.38 | 259 |
| E | 15 | 15.3 | 217 | 23 | 22.95 | 325 |

| Class of Pipe | | Maximum 1h failure pressure |
|---------------|---------|-----------------------------|
| 6 bar | Class-B | 21.6 bar |
| 9 bar | Class-C | 32.4 bar |
| 12 bar | Class-D | 43.2 bar |
| 15 bar | Class-E | 54.0 bar |



PVC SEWERAGE PIPE

BS 5255 Thermoplastic Waste Pipe

| Nominal Size | | Outside diameter (mm) | | Wall Thickness (mm) Thermoplastic Waste Pipe | |
|--------------|----|-----------------------|------|---|------|
| Inch | mm | Min. | Max. | Min. | Max. |
| 1.25 | 32 | 42.1 | 42.4 | 1.8 | 2.2 |
| 1 ½ | 40 | 48.1 | 48.4 | 1.9 | 2.3 |
| 2 | 50 | 60.2 | 60.5 | 2 | 2.4 |

BS 4514 Soil & Ventilating Pipes

| Nominal Size | | Outside diameter (mm) | | Wall Thickness (mm) Soill Ocven tilsting pipes | |
|--------------|-----|-----------------------|-------|---|------|
| Inch | mm | Min. | Max. | Min. | Max. |
| 3 | 82 | 88.7 | 89.1 | 3.2 | 3.8 |
| 4 | 110 | 114.1 | 114.5 | 3.2 | 3.8 |
| 6 | 160 | 168.0 | 168.5 | 3.2 | 3.8 |

BS 4660 AND 5481 Underground Sewerage

| Nominal Size | | Outside diameter (mm) | | Wall Thickness (mm) Underground Sewerage | | | |
|--------------|-----|-----------------------|-------|--|-----|---------|------|
| | | | | BS 4660 | | BS 5481 | |
| Inch | mm | Min. | Max. | Inch | mm | Min. | Max. |
| 4 | 110 | 114.1 | 114.5 | 3.2 | 3.8 | | |
| 6 | 160 | 168 | 168.5 | 4.1 | 4.8 | | |
| 8 | 200 | 218.8 | 219.4 | | | 4.9 | 5.6 |
| 10 | 250 | 272.6 | 273.4 | | | 6.1 | 7 |
| 12 | 315 | 323.4 | 324.3 | | | 7.7 | 8.7 |
| 14 | 355 | 355 | 356 | | | 8.7 | 9.7 |
| 16 | 400 | 405.9 | 407 | | | 9.8 | 11 |
| 18 | 450 | 456.7 | 457 | | | 11 | 12.2 |
| 20 | 500 | 507.5 | 508.5 | | | 12.2 | 13.7 |

BS - 5255, 4514, 4660 & 5481



PVC PRESSURE PIPES BS-3505 & PSI -3051

| Nominal Size | Outside Diameter | | Wall Thickness | | | | | | | | | | | | Class | 0 | | |
|--------------|------------------|-------|------------------|----|------------------|------------------|------------------|----|-------------------|----|------------------|-------------------|------------------|----|--------|----|------|-------|
| | | | Class B, 6.0 bar | | | Class C, 9.0 bar | | | Class D, 12.0 bar | | | Class E, 15.0 bar | | | | | | |
| | min | max | Individual Value | | Individual Value | | Individual Value | | Individual Value | | Individual Value | | Individual Value | | | | min | MAX |
| min | mm | min | mm | mm | WEIGHT | mm | WEIGHT | mm | WEIGHT | mm | WEIGHT | mm | WEIGHT | mm | WEIGHT | mm | mm | |
| 3/8" | 17 | 17.3 | | | | | | | | | | | | | | | 1.5 | 0.11 |
| 1/2" | 21.2 | 21.5 | | | | | | | | | | | | | | | 1.7 | 0.15 |
| 3/4" | 26.6 | 26.9 | | | | | | | | | | | | | | | 1.9 | 0.22 |
| 1" | 33.4 | 33.7 | | | | | | | | | | | | | | | 2.2 | 0.32 |
| 1-1/4" | 42.1 | 42.4 | | | | | | | | | | | | | | | 2.7 | 0.5 |
| 1-1/2" | 48.1 | 48.4 | | | | | | | | | | | | | | | 3.1 | 0.65 |
| 2" | 60.2 | 60.5 | | | | | | | | | | | | | | | 3.9 | 1.03 |
| 2-1/2" | 75 | 75.3 | | | | | | | | | | | | | | | 4.8 | 1.31 |
| 3" | 88.7 | 89.1 | | | | | | | | | | | | | | | 5.7 | 1.58 |
| 4" | 114.1 | 114.5 | | | | | | | | | | | | | | | 7.3 | 2.22 |
| 5" | 140 | 140.4 | | | | | | | | | | | | | | | 9 | 3.65 |
| 6" | 168 | 168.5 | | | | | | | | | | | | | | | 10.8 | 5.51 |
| 7" | 193.5 | 194 | | | | | | | | | | | | | | | 12.4 | — |
| 8" | 218.8 | 219.4 | | | | | | | | | | | | | | | 12.6 | 12.17 |
| 9" | 244.1 | 244.8 | | | | | | | | | | | | | | | 14.1 | — |
| 10" | 272.6 | 273.4 | | | | | | | | | | | | | | | 15.7 | 18.89 |
| 12" | 323.4 | 324.3 | | | | | | | | | | | | | | | 18.7 | 26.68 |
| 14" | 355 | 356 | | | | | | | | | | | | | | | 20.5 | 32.16 |
| 16" | 405.9 | 406.9 | | | | | | | | | | | | | | | 23.4 | 46.61 |
| 18" | 456.7 | 457.7 | | | | | | | | | | | | | | | 23.4 | 46.61 |
| 20" | 507.5 | 508.5 | | | | | | | | | | | | | | | 4.6 | 5.3 |
| 22" | 558.3 | 559.3 | | | | | | | | | | | | | | | 5.1 | 5.9 |
| 24" | 609.1 | 610.1 | | | | | | | | | | | | | | | 5.3 | 6.1 |
| | | | | | | | | | | | | | | | | | 5.5 | 6.3 |

DIN 8061 & 8062

| 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 | |
|--------------|-----------------------------------|-----------|-------------------------|-----------|-------------------------|-----------|---------------------------|-----------|---------------------------|-----------|
| | SW/Thickness | Mass kg/m | SW/Thickness | Mass kg/m | SW/Thickness | Mass kg/m | SW/Thickness | Mass kg/m | SW/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 | 0.35 | 3 | 0.525 |
| 50 | | | | | 1.8 | 0.422 | 2.4 | 0.552 | 3.7 | 0.809 |
| 63 | | | | | 1.9 | 0.562 | 3 | 0.854 | 4.7 | 1.29 |
| 75 | | | 1.8 | 0.642 | 2.2 | 0.782 | 3.6 | 1.22 | 5.6 | 1.82 |
| 90 | | | 1.8 | 0.724 | 2.7 | 1.13 | 4.3 | 1.75 | 6.7 | 2.61 |
| 110 | 1.8 | 0.95 | 1.9 | 1.16 | 3.2 | 1.64 | 5.3 | 2.61 | 8.2 | 3.9 |
| 125 | 1.8 | 1.08 | 2.5 | 1.48 | 3.7 | 2.13 | 6 | 3.34 | 9.3 | 5.01 |
| 140 | 1.8 | 1.21 | 2.8 | 1.84 | 4.1 | 2.65 | 6.7 | 4.18 | 10.4 | 6.27 |
| 160 | _ 1.8 | 1.39 | 3.2 | 2.41 | 4.7 | 3.44 | 7.7 | 5.47 | 11.9 | 8.17 |
| 200 | 1.8 | 1.74 | 4 | 3.7 | 5.9 | 5.37 | 9.6 | 8.51 | 14.9 | 12.8 |
| 225 | _ 1.8 | 1.96 | 4.5 | 4.7 | 6.6 | 6.76 | 10.8 | 10.8 | 16.7 | 16.1 |
| 250 | 2 | 2.4 | 4.9 | 5.65 | 7.3 | 8.31 | 11.9 | 13.2 | 18.6 | 19.9 |
| 280 | 2.3 | 3.11 | 5.5 | 7.11 | 8.2 | 10.400 | 13.4 | 16.6 | 20.8 | 24.9 |
| 315 | 2.5 | 3.78 | 6.2 | 9.02 | 9.2 | 13.2 | 15 | 20.9 | 23.4 | 31.5 |
| 400 | 3.2 | 6.1 | 7.9 | 14.5 | 11.7 | 21.1 | 19.1 | 33.7 | 29.7 | 50.8 |
| 500 | 4 | 9.38 | 9.8 | 22.4 | 14.6 | 32.9 | 23.9 | 52.6 | | |
| 630 | 5 | 14.7 | 12.4 | 35.7 | 18.4 | 52.2 | 30 | 83.2 | | |
| 710 | 5.7 | 18.9 | 14 | 45.3 | 20.7 | 66.1 | | | | |





PVC WELL CASING / SCREEN PIPES

Bright Water Casing & Screen pipes ensure that the water well remains a perennial source of clean water. Some Year ago the choice was only was metal pipe and Screens. The disadvantages were corrosion of casing pipes, deterioration of screens and formation of bacteria, resulting in abandonment of wells and, even worse contamination of the water source. Pvc well casing and screen is widely used because it is light strong, easy to install durable corrosion resistance and relatively inexpensive . The choice of any material depend upon its strength and weakness in relation to the particular intended use .Condition at a water well drilling site and within a borehole or generally aggressive. PVC casing and screens is easily able to with stand most condition but it is important for a driller engineer or hydro geologist to be aware of conditions or circumstances that might prejudice the

integrity of PVC and consequently the bore hole. The aim is to provide a basis for the correct selection and handling of PVC casing and screen. PVC is a plastic. it has a low compressive and tensile strength related to steel. It can be a softened by heat, deform by sudden or gradual stress and shattered by strong impact. Generally PVC casing is stronger than PVC screen, and thick wall Pvc casing is stronger than thin walled casing. PVC is much more flexible than steel, therefore it should be supported both on the ground and in the boreholes. It strength can be reduced by prolonged exposure to strong sunlight. It is attacked by solvent such as vinyl chloride. Volatile organic chemicals can pass through PVC by a process that is not fully understood. Today the modern technologies have enabled us to makes use of plastic pipes for this application.

Bright Water





ADVANTAGES

EASY INSTALLATION

Maximum hydraulic loading on casing pipes occurs during installation, gravel packing, back filling and development of water wells. Hydrostatic pressure is caused by the column of drilling fluid or water present in the borehole. Rapid installation of a gravel pack or back fill increases the pressure on casing and screens pipes. Bridging and later collapse of gravel or backfill into the borehole can further subject casing pipes and screens pipes to shock loads.

Poor mud control during water well development can also subject the casing to hydrostatic or differential pressure loading.

RESISTANCE TO CORROSION

All Bright Water PVC pipes are resistance to corrosion. As PVC is inherently more resistance than conventional steel products to clogging and encrustation, at a fraction of the cost. Bright Water PVC screen pipes are generally unaffected by substances encountered in well: hence no deterioration in slots takes place. The raw material used for manufacturing fully complies with drinking water regulation and does not affect the quality of water.

LONG LIFE:

Well rehabilitation cost are minimized, as PVC screens are inherently more resistance than conventional steel products to clogging and encrustation. PVC also outperforms stainless steel in highly corrosive environments, at a fraction of the cost. All screens are

MANUFACTURED FROM PVC CASING PIPES.

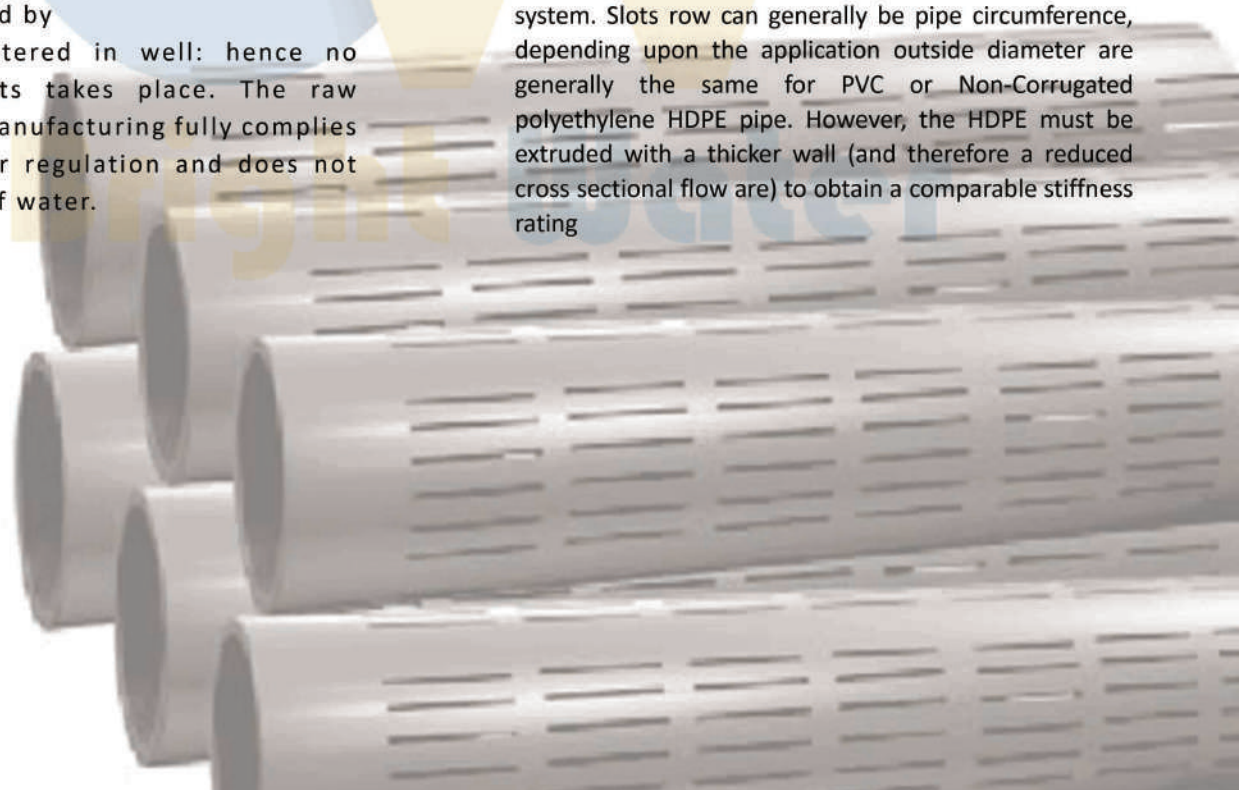
UNDER DRAIN

Slotted PVC pipe is ideal pipe for under drain pipe system. Application includes, but not limited to

1. Leachate collection system for solid waste landfills.
2. Drainage and Dewatering application
3. Mining Heap Leach Products.

PVC under drain pipe is supplied with precision machine slots which provide greater intake capacity and continues, clog resistance, drainage of fluid, as compared to standard round hole as perforated pipe.

Slotted under drain reduce entrance velocity into the pipe, into the possibility that solid will be carried into the system. Slots row can generally be pipe circumference, depending upon the application outside diameter are generally the same for PVC or Non-Corrugated polyethylene HDPE pipe. However, the HDPE must be extruded with a thicker wall (and therefore a reduced cross sectional flow area) to obtain a comparable stiffness rating.





TYPES OF SCREEN DESIGN

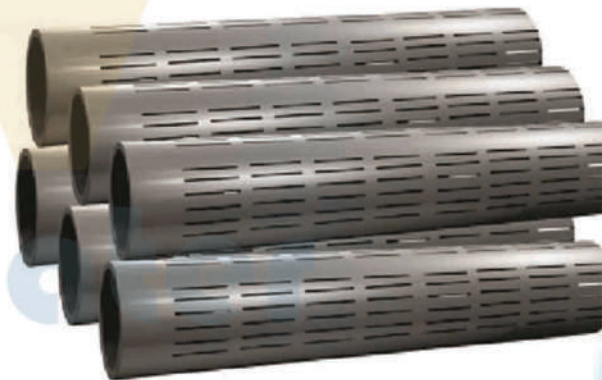
Bright Water Slotted screens are obtained by making cuts all over the PVC pipe in order to exploit the screen collecting capability to maximum level. Slots are horizontal to pipes generatrices. Data show that horizontal opening are very hydraulically efficient and provide high collapse resistance thanks to the arc shapes of the material around them.

PVC slotted screens are usually used in fine soils to build up artesian wells, for drainage etc. The product is manufactured according to customers need: the slots length and the number depend on the requested open area, moreover, cuts can be made on one, two, three or four sides of the pipes whereas the slots width is related to soil granulometry.

VERTICAL SCREEN



HORIZONTAL SCREEN

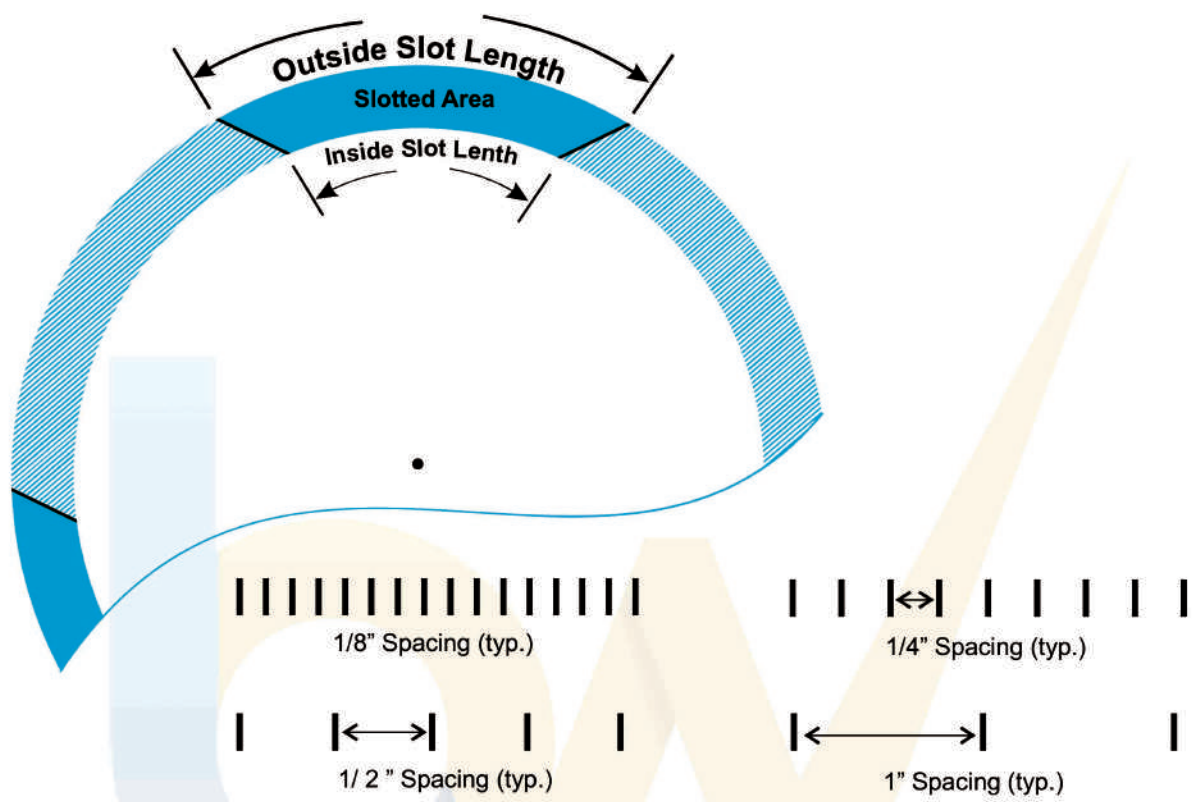


PERFORATED SCREEN

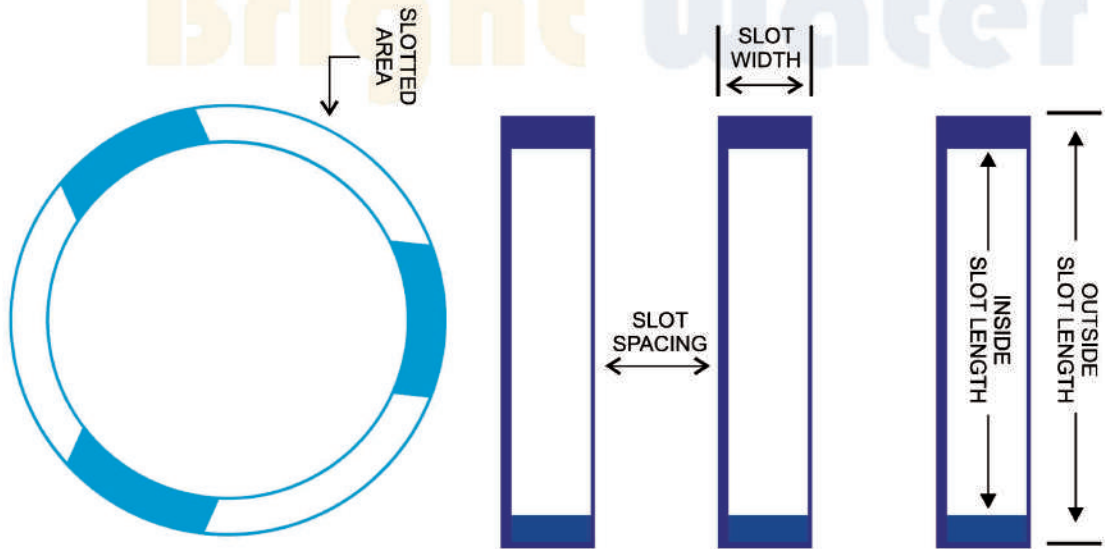




SLOTTED PIPE



Typical Slot Widths





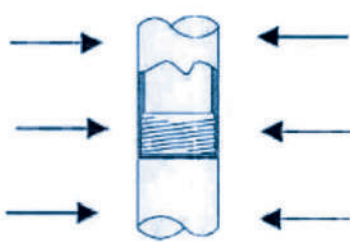
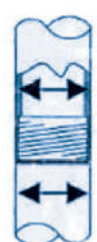
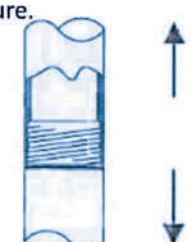
PVC SCREEN TRANSMITTING CAPACITY-SCHEDULES 40 & 80

| PVC SCHEDULE 40 SCREEN TRANSMITTING CAPACITY - STD CONSTRUCTION | | | | | | |
|---|-----------------------|--------------------------------|-------|-------|-------|-------|
| Transmitting Capacity (gallons Per Minute Per Foot) | | | | | | |
| Slot Spacing (inches) | Slot Spacing (inches) | Standard Slot Opening (Inches) | | | | |
| | | 0.04 | 0.05 | 0.06 | 0.1 | 0.125 |
| 2 | 3/16 | 2.94 | 3.52 | 4.06 | 5.82 | 6.7 |
| 2- 1/2 | 3/16 | 2.78 | 3.33 | 3.83 | 5.5 | 6.32 |
| 3 | 3/16 | 3.92 | 4.7 | 5.41 | 7.76 | 8.93 |
| 4 | 1/4 | 3.65 | 4.42 | 5.13 | 7.57 | 8.84 |
| 5 | 1/4 | 4.04 | 4.88 | 5.67 | 8.37 | 9.77 |
| 6 | 1/4 | 6.16 | 7.44 | 8.64 | 12.75 | 14.88 |
| 8 | 1/4 | 6.96 | 8.41 | 9.77 | 14.42 | 16.82 |
| 10 | 1/4 | 8.21 | 9.92 | 11.52 | 17.01 | 19.84 |
| 12 | 1/4 | 10.58 | 12.79 | 14.85 | 21.92 | 25.58 |
| 14 | 1/4 | | 15.5 | 18 | 26.57 | 31 |
| 16 | 1/4 | | 15.89 | 18.44 | 27.24 | 31.78 |

| PVC SCHEDULE 40 SCREEN TRANSMITTING CAPACITY - STD CONSTRUCTION | | | | | | |
|---|-----------------------|--------------------------------|------|-------|-------|-------|
| Transmitting Capacity (gallons Per Minute Per Foot) | | | | | | |
| Slot Spacing (inches) | Slot Spacing (inches) | Standard Slot Opening (Inches) | | | | |
| | | 0.04 | 0.05 | 0.06 | 0.1 | 0.125 |
| 2 | 3/16 | 2.58 | 3.08 | 3.55 | 5.09 | 5.86 |
| 2- 1/2 | 3/16 | 2.45 | 2.94 | 3.38 | 4.85 | 5.58 |
| 3 | 3/16 | 3.43 | 4.11 | 4.73 | 6.79 | 7.81 |
| 4 | 1/4 | 3.46 | 4.19 | 4.86 | 7.17 | 8.37 |
| 5 | 1/4 | 4.62 | 5.58 | 6.48 | 9.57 | 11.16 |
| 6 | 1/4 | 5.2 | 6.28 | 7.29 | 10.76 | 12.56 |
| 8 | 1/4 | 5.16 | 6.24 | 7.24 | 10.7 | 12.48 |
| 10 | 1/4 | 6.41 | 7.75 | 9 | 13.29 | 15.5 |
| 12 | 3/8 | | 9.41 | 11.03 | 16.84 | 20 |
| 14 | 3/8 | | 8.97 | 10.52 | 16.05 | 19.07 |
| 16 | 3/8 | | | 11.54 | 17.62 | 20.93 |

| PVC Well Casing ASTM F 480 | | | | | |
|---|----------|-------------|----------------|-----------------|------------|
| PVC SCHEDULE 40 (WHITE) B E L L E N D WELL CASING PVC 1120 ASTM F 480 | | | | | |
| PART NO. | NOM SIZE | AVG OD(IN.) | NIN. WALL(IN.) | BELL DEPTH(IN.) | WT PER NTR |
| KEEP2GS4 | 2" | 2.75 | 0.154 | 4 | 1.045 |
| KEEP21/2GS4 | 2 1/2" | 2.875 | 0.2 | 4 | 1.65 |
| KEEP3GS4 | 3" | 3.0 | 0.216 | 4 | 2.16 |
| KEEP4GS4 | 4" | 4.5 | 0.23 | 5 | 3.074 |
| KEEP6GS4 | 6" | 6.625 | 0.28 | 6.5 | 5.414 |
| KEEP8GS4 | 8" | 8.625 | 0.32 | 7 | 8.154 |



| COLLAPSE PRESSURE | BURST PRESSURE | TENSILE PRESSURE |
|---|--|--|
| <p>Pounds per square inch of external hydrostatic pressure that can be safely applied.</p>  | <p>Pounds per square inch of internal hydrostatic pressure that can be safely applied.</p>  | <p>The suspended weight the threaded joint can sustain in a vertical position without causing stretching or failure.</p>  |

Testing methods and procedures used are in compliance with ASTM F480 standards for thermoplastic pipe in all applicable areas.

PVC PRESSURE AND STRENGTH TABLES

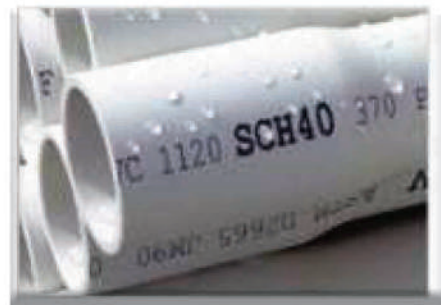
| Pvc Pressure And Strength Tables | | | | | | |
|----------------------------------|---------|---------|---------|---------|---------|---------|
| Pipe Size | Sch. 40 | Sch. 80 | Sch. 40 | Sch. 80 | Sch. 40 | Sch. 80 |
| 0.50" | 1100 | 2700 | 300 | 425 | 264 | 344 |
| 0.75" | 630 | 1590 | 240 | 345 | 362 | 487 |
| 1.00" | 520 | 1270 | 225 | 315 | 581 | 727 |
| 1.25" | 300 | 770 | 185 | 260 | 859 | 878 |
| 1.50" | 220 | 590 | 165 | 235 | 954 | 1225 |
| 2.00" | 140 | 390 | 140 | 200 | 942 | 1542 |
| 2.50" | 180 | 450 | 150 | 210 | 2093 | 2890 |
| 3.00" | 120 | 320 | 130 | 185 | 2786 | 3839 |
| 4.00" | 70 | 210 | 110 | 160 | 4119 | 5,82. |
| 5.00" | 50 | 150 | 95 | 145 | 5491 | 6864 |
| 6.00" | 40 | 140 | 90 | 140 | 7165 | 11384 |
| 8.00" | 30 | 100 | 80 | 125 | 10384 | 17332 |
| 10.00" | 20 | 85 | 70 | 115 | 15086 | 25124 |
| 12.00" | 16 | 80 | 65 | 115 | 19548 | 34430 |
| 14.00" | 15 | 80 | 65 | 110 | 20894 | 37651 |
| 16.00" | 15 | 70 | 65 | 110 | 26864 | 48033 |

JOINTING TYPES

THREADED JOINTS



BELL END JOINTS



INSTALLATION & JOINTING PROCEDURE:

Arrange the pipe assembly on the ground.

Fix the centering guides the pipes once in every 15 meters (minimum), just below the neck of the socket, with the open end of the centering guides facing upwards while lowering . Always use a plain casing pipe (sand trap) for the first pipe to be lowered, with a conical end cap(Bull-nose) blanking the spigot end of the pipe. Fill this pipe with water or drilling fluid before lowering into the well.

Wash the remain borehole thoroughly with fresh drilling fluid (Bentonite Solution) for 40 – 45 minutes from the bottom , keeping the specific gravity of the drilling fluid to below 1.4 This will prevent heavy sedimentation at the bottom of the borehole and also easy lowering of the assembly.

To obtain better result, ensure that the reamed borehole is at least 15 to 20cms more than the outside diameter of the casing pipe.

The Sand trap is the lowest pipe in a tubewell and is the first to be selected. Fit this pipe with an end plug (cap) and centering guide.

Lower the sand trap into the borehole and hold with a split clamp with the socketed end facing upward.

The next pipe, which is either a screen pipe or a plain pipe(depending on lithology of well) is fitted to sand trap by screwing them together.

Joining pipe can be done either by strap wrench or with manila rope. Never used a chain range. Clean the threads to remove mud or burrs using wire brush. Soap solution maybe used to lubricate the joints Avoid grease or waste oil.

Fit the socked end of the next pipe (Which can be a screen /plain casing) with the fitting cap.

Connect the lifting cap securely with the wire rope of the drilling fram. Use winch of drilling machine to lift the threaded pipe string.



Fix the centering guides the pipes once in every 15 meters (minimum), just below the neck of the socket, with the open end of the centering guides facing upwards while lowering . Always use a plain casing pipe (sand trap) for the first pipe to be lowered, with a conical end cap(Bull-nose) blanking the spigot end of the pipe. Fill this pipe with water or drilling fluid before lowering into the well.

This pipe string is jointed to the pipe already lowered into the borehole.

Center the assembly pipe string and permit it to descend into the borehole by releasing the split clamp, Fill the pipe with water or mud solution to equalize pressure.

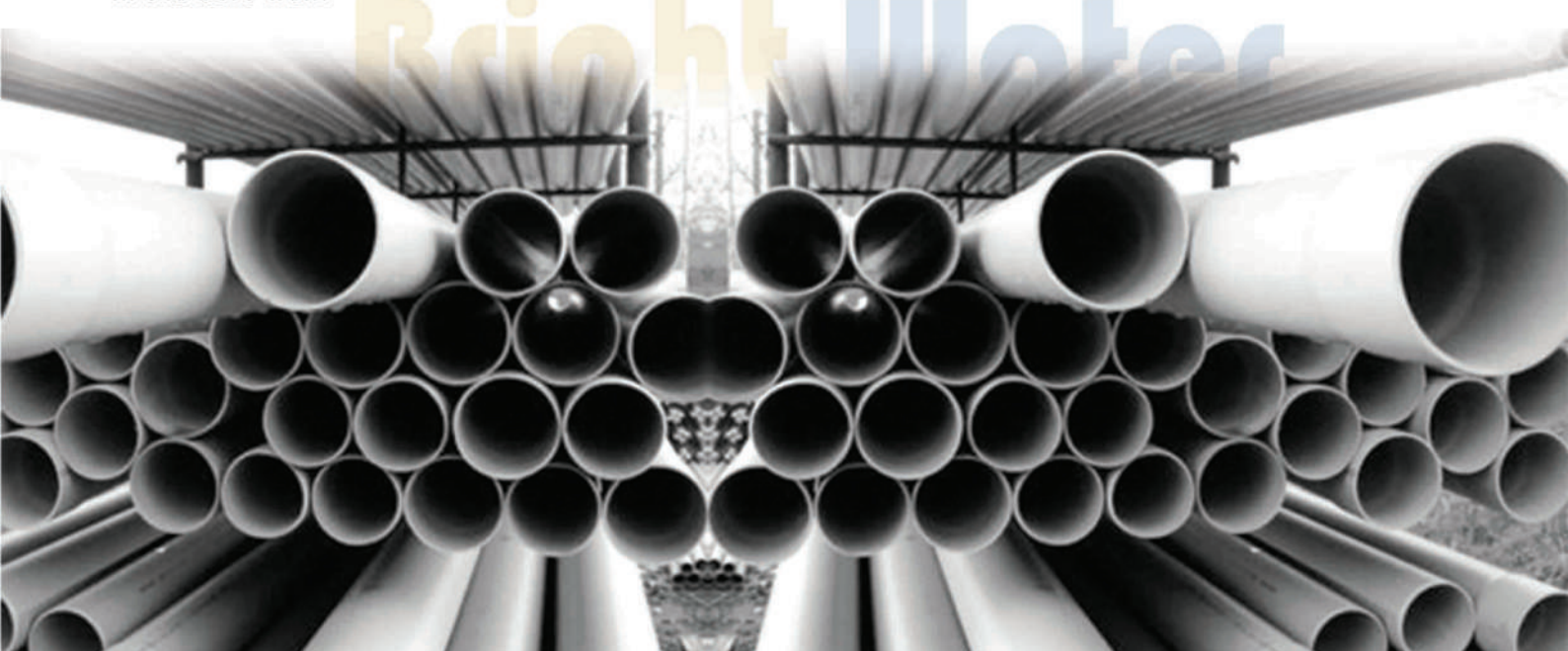
Repeat the operation till all the casing and screens are lowered according to the lithology of the well. The time needed to make each joint is less than 5 minutes.

Lowering time can be reduced by the casing and screens on the ground to make additional lengths. Do this correctly as per lithology of the well to avoid wrong placement of screens in the bore well.

Do not set the lowered pipe assembly at the bottom of the borehole. Ensure at least 10 feet of free bore below the sand trap. This help the lowered casing and screen pipes to remain hanging and achieve a vertical installation.

Centering guides should always be fixed at a minimum interval of 1.5 meter to ensure uniform gravel asking around the casing and screen pipes.

BRIGHT WATER Well casing are made available up on orders within shortest possible time period in vertical & horizontal slots along the length, however customized screening pipes provided with pores can also be produced fulfilling all requirements while considering requisite technical parameters.





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

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.

BRIGHT WATER 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 Bright Water 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

BRIGHT WATER 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.

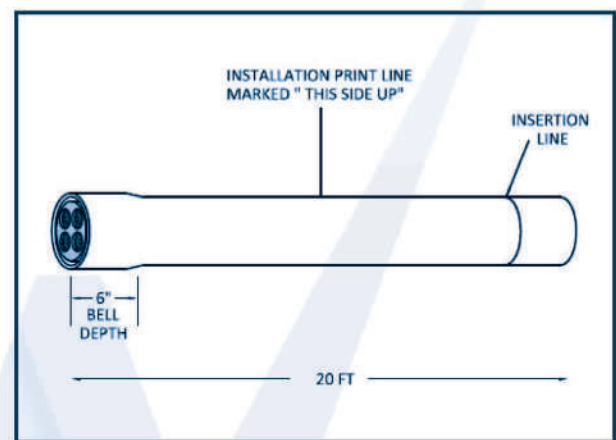
REFERENCE STANDARD

| | |
|-------------|---|
| 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 have as 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

BRIGHT WATER 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 |



BRIGHT WATER produces a wide variety of conduit pipe suitable for most applications. Bright Water 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. Bright Water offers telephone duct for networking applications. Bright Water telephone duct is made in compliance with ASTM F512 and/or other specified specifications for consistency and safety.

BRIGHT WATER ELECTRICAL CONDUIT PIPE

Bright Water 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 & 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 KAWSAR PVC conduit is 3.0×10^{-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

BRIGHT WATER 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. BRIGHT WATER 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

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

BRIGHT WATER'S PVC SCHEDULE 40 AND 80 CONDUIT OFFERS:

- Highest quality control standards
- Rated for use with 90 ° C conductors
- Superior Dielectric Strength
- 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



BRIGHT WATER RIGID PVC ELECTRICAL PLASTIC TUBING (EPT) & CONDUIT(EPC-40 AND EPC-80)

| Table No# 1. Name 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 |
| ¾" | 26.67 | 1.52 | 0.197 | 2.87 | 0.329 | 3.91 | 0.418 |
| 1" | 33.4 | 1.52 | 0.25 | 3.38 | 0.483 | 4.55 | 0.614 |
| 1 1/4" | 42.16 | 1.78 | 0.365 | 3.56 | 0.652 | 4.85 | 0.85 |
| 1 ½ " | 48.26 | 2.03 | 0.468 | 3.68 | 0.779 | 5.08 | 1.03 |
| 2" | 60.32 | 2.54 | 0.717 | 3.91 | 1.04 | 5.54 | 1.43 |
| 2½" | 73.02 | 2.79 | 0.952 | 5.16 | 1.65 | 7.01 | 2.18 |
| 3" | 88.9 | 3.18 | 1.31 | 5.49 | 2.16 | 7.62 | 2.9 |
| 4" | 114.3 | 3.81 | 2 | 6.02 | 3.07 | 8.56 | 4.26 |
| 5" | 141.3 | | | 6.55 | 4.17 | 9.52 | 5.91 |
| 6" | 168.28 | | | 7.11 | 5.41 | 10.97 | 8.13 |
| 8" | 219.08 | | | 8.18 | 8.143 | 12.7 | 12.4 |

BRIGHT WATER RIGID PVC UTILITIES DUCT FOR UNDERGROUND INSTALLATION. NEMA TC-6 AND ASTM F 512 DIMENSION

| Table No: 20 | | | | | |
|-------------------|-------------|----------------|-----------|----------------|-----------|
| 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" | 88.9 | 1.55 | 0.702 | 2.34 | 1 |
| 4" | 114.3 | 2.08 | 1.17 | 3.07 | 1.65 |
| 5" | 141.3 | 2.62 | 1.71 | 3.86 | 2.5 |
| 6" | 168.28 | 3.18 | 2.53 | 4.62 | 3.57 |



PROPERTIES

MECHANICAL PROPERTIES

| | ASTM | TYPICAL VALUE |
|----------------------------------|--------|---------------|
| Specific Gravity | D792 | 1.4 -1. |
| Tensile Strength (psi) @ 73.4 F | DN 638 | 75000 |
| Izod Impact t-ftlbs/ in of notch | D256 | 0.65 -1.50 |
| Flexural Strength (psi) | D790 | 12500 |
| 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 OF | D696 | 3.0 x 10-5 |
| Deflection Temp. OF Under Load @ 264 psi | D648 | 140 OF |
| Thermal Conductivity BTU (hr) (ft) (OF/In) | C177 | 1.3 |

ELECTRICAL PROPERTIES

| | ASTM | TYPICAL VALUE |
|-----------------------------------|------|---------------|
| Dielectric Strength Volts/mil | D149 | 1100 |
| Dielectric Constant 60 CPS @ 30 C | D150 | 4,00 |
| Power Factor 60CPS @ 30C | D150 | 1,93 |

Support of Bright Water PVC Conduit in Above Ground Installations

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



BRIGHT WATER RIGID PVC EXTRA STRENGTH UNDERGROUND INSTALLATION

NEMA TC-8 AND ASTM F 512 DIMENSION

| Trade W/thick N.Weight Size | Metric Designators | Average Outside Dia | Type EB-35 | | Type DB-I00 | | Type DB-I20 | |
|-----------------------------------|-----------------------|---------------------------|------------|----------|-------------|----------|-------------|----------|
| | | | W/thick | N.Weight | W/thick | N.Weight | W/thick | N.Weight |
| | | | mm | Kgs/m | mm | Kgs/m | mm | Kgs/m |
| 1" | 27 | 33.4 | | | | | 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 | 88.9 | 1.93 | 0.847 | 2.84 | 1.16 | 3 | 1.29 |
| 4" | 103 | 114.3 | 2.54 | 1.39 | 3.68 | 1.93 | 3.91 | 2.05 |
| 5" | 129 | 141.3 | 3.2 | 2.09 | 4.55 | 2.94 | 4.85 | 3.12 |
| 6" | 155 | 168.28 | 3.86 | 3.02 | 5.41 | 4.17 | 5.77 | 4.42 |

BS-6099

BRIGHT WATER PVC ELECTRICAL CONDUIT PIPES AS PER BS-6099

| Nominal Size | Outer Diameter (mm) | | Wall Thickness | |
|--------------|---------------------|-------|----------------|------|
| | Min | Max. | Min | Max. |
| ½ | 17.0 | 17.3 | 1.0 | 1.16 |
| ¾ | 21.2 | 21.5 | 1.1 | 1.29 |
| 1.0 | 26.6 | 26.9 | 1.2 | 1.36 |
| 1 ¼ | 33.4 | 33.7 | 1.4 | 1.67 |
| 1 ½ | 42.1 | 42.4 | 1.6 | 1.84 |
| 2 | 60.2 | 60.5 | 1.7 | 1.9 |
| 3 | 88.7 | 89.1 | 1.8 | 2.0 |
| 4 | 114.1 | 114.5 | 1.9 | 2.1 |



PVC ELECTRICAL CONDUIT PIPE SPECIFICATION BS-6099

| Nominal Dia | Mean Outside Diameter Mm | | Thickness mm | Thickness Allowance | Weight Kg/m |
|-------------|--------------------------|--------|--------------|---------------------|-------------|
| | min | mix | | | |
| 1/2" | 17.0 | 17.0 | 1.0 | +0.25 | 0.1 |
| 3/4" | 21.00 | 21.50 | 1.25 | +0.25 | 0.125 |
| 1" | 26.6 | 26.9 | 1.3 | +0.25 | 0.2 |
| 1 1/4" | 33.40 | 33.70 | 1.51 | +0.25 | 0.245 |
| 1 1/2" | 42.1 | 42.2 | 1.9 | +0.25 | 0.4 |
| 2" | 60.20 | 60.50 | 2.04 | +0.25 | 0.612 |
| 3" | 89.7 | 89.1 | 1.8 | +0.25 | 0.8 |
| 4" | 114.10 | 114.50 | 1.90 | +0.25 | 1.032 |

NON PRESSURE PVC FOR DRAIN SEWER PIPE SPECIFICATIONS

| Nominal Dia | Mean Outside Diameter Mm | | Thickness mm | Thickness Allowance | Weight Kg/m |
|-------------|--------------------------|--------|--------------|---------------------|-------------|
| | min | mix | | | |
| 3" | 88.70 | 89.10 | 1.80 | +0.1 | 0.80 |
| 4" | 114.10 | 114.50 | 1.80 | +0.1 | 1.029 |
| 5" | 140.00 | 140.40 | 25.00 | +0.1 | 2.13 |
| 6" | 168.00 | 168.50 | 3.00 | +0.1 | 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 | 1.27x10 ¹³ Ω-CM |
| Critical Supported Valtage AC 50 Cs 11KV One Minte | No Change |



FLUID FLOW PROPERTIES

GRAVITY FLOW MANNING ROUGHNESS FACTOR ("N" VALUE)

Fluid velocity, pipe size and hydraulic slope for gravity drainage can be determined using the Manning "N" value. This coefficient relates to the interior wall smoothness of pipe and is used for liquids with a steady flow, at a constant depth, in a prismatic open channel. The Manning's equation is shown below.

$$V = 1.486 \frac{R^{2/3} S^{1/2}}{N}$$

Where:

Velocity of flow, ft./second

N= Manning's value

R= hydraulic radius, ft. obtained by dividing the cross sectional area of flow by the wetted perimeter of the pipe in contact with the flow. R is a special case for v with pipes either 1/2 full of full:

R= Inside diameter / 4, in feet

S= Upstream elevation – Downstream elevation (ft. /ft.)
Pipe length

Example 1:

2" diameter schedule 40 PVC,

Flow full 30 foot pipe run, 7.5 inch drop

$$S = \frac{17.5" - 10.0"}{30 \text{ ft.} \times 12"} = 0.0208 \text{ ft./ft.}$$

$$R = \frac{2.067"}{4} = 0.043 \text{ ft.}$$

$$V = 1.486 \frac{R^{2/3} S^{1/2}}{N}$$

Manning's "N" value is generally accepted as 0.0009 for Designing gravity sewer system

$$V = \frac{1.486 (0.043)^{2/3} (0.0208)^{1/2}}{0.009}$$

$$V = 2.9 \text{ ft./second}$$

Example 2:

4" diameter schedule 40 ABS, flowing 1/2 full

10 foot pipe run, 1.5 inch drop

$$S = \frac{20" - 18.5"}{10 \text{ ft.} \times 12"} = 0.0125 \text{ ft./ft.}$$

$$R = \frac{4.026"}{4} = 0.0839 \text{ ft.}$$

Assume "N" to be 0.010

$$V = \frac{1.486 (0.0839)^{2/3} (0.0125)^{1/2}}{0.010}$$

$$V = 3.2 \text{ ft./second}$$

It is widely recommended that the flow velocity in sanitary sewer system to be equal to or greater than 2.0 feet per second for self-cleaning drain lines.

Laboratory tests have shown that the "N" value for PVC pipe ranges from .008 to .012. The table below shows "N" values for other piping materials.

| PIPING MATERIAL | "N" values |
|---------------------|-------------|
| Cast Iron | .011- .015 |
| Finished Concrete | .011- .015 |
| Unfinished Concrete | .013- .017 |
| Corrugated Metal | .021 - .027 |
| Glass | .009 - 0.13 |
| Clay | .011 - 0.17 |

FLUID FLOW TARE

Calculation of Volume Flow Rate:

$$Q = aV$$

Where:

a = Cross sectional area of flow, ft.²

V = Flow Velocity, ft/sec

Q = Volume flow rate, ft³/sec

Example 1:

2" Schedule 40 PVC

Where:

Di = inside diameter of pipe in inches

$$A = \frac{\pi d_i^2}{4} = \frac{\pi (2.06712)^2}{4} = 0.0233 \text{ ft}^2$$

$$V = 2.9 \text{ ft./sec}$$

$$Q = 0.0233 \times 2.9 = 0.0676 \text{ ft}^3/\text{sec}$$

$$Q = \frac{0.0676 \text{ ft}^3}{\text{Sec}} \times \frac{7.48 \text{ gal}}{\text{ft}^3} \times \frac{60 \text{ sec}}{\text{min}} = 30.3 \text{ gals/min}$$

Example 2:

4" Schedule 40 PVC

$$a = \frac{1}{2} \frac{\pi d_i^2}{4} = \frac{\pi (4.02612)^2}{2 \times 4} = 0.0442 \text{ ft}^2$$

$$V = 3.2 \text{ ft/sec}$$

$$Q = 0.0442 \times 3.2 = 0.141 \text{ ft}^3/\text{Sec}$$

$$Q = \frac{0.141 \text{ ft}^3}{\text{Sec}} = \frac{0.141 \text{ gal}}{\text{ft}^3} \times \frac{60 \text{ sec}}{\text{min}} = 63.5 \text{ gals/min}$$



PRESSURE FLOW

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

$$F = 0.2083 \times (100)^{1.852} \times \frac{Q^{1.852}}{C^{1.49} \times d_i^{4.8655}}$$

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

PRESSURE FLOW

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

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

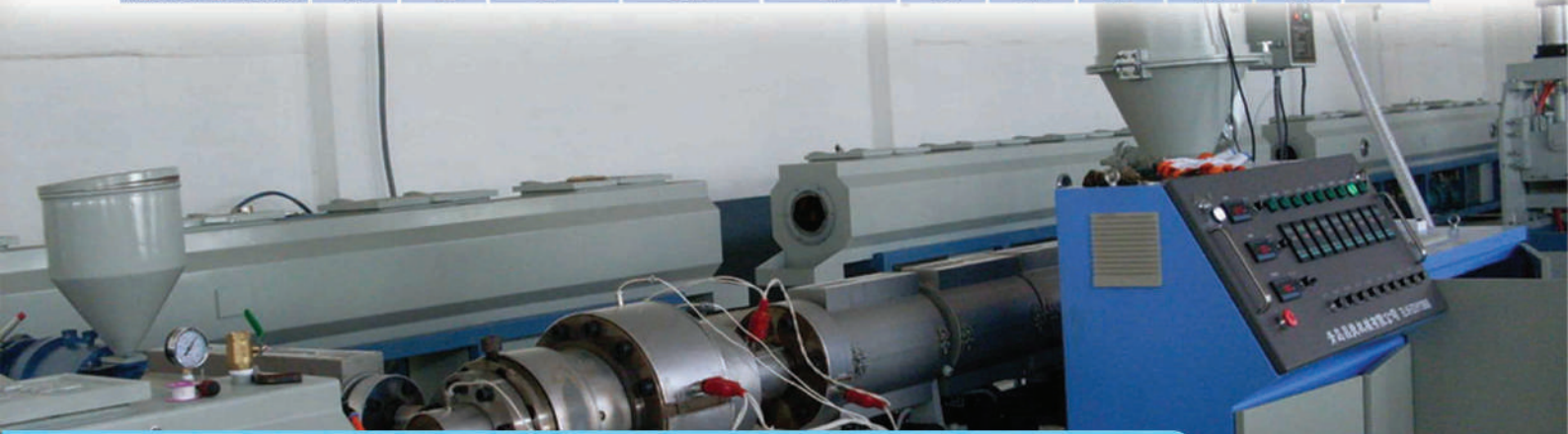
- V = velocity in feet per second
- Q = flow in U.S. gallons per minute
- Di = inside diameter of pipe in inches

FRICION 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 40 & 80 PVC fittings of different sizes.

| 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 | 0.8 | 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 | --- |





WATER HAMMER

Water hammer is a term used to describe the sudden increase in pressure created by quick stopping, starting, or changing the direction of the flow of fluid in piping system. Typical actions which cause water hammer are:

- 1) Quick closing a valve.
- 2) Quick Opening a valve.
- 3) Starting pumps with an empty discharge line.
- 4) A high speed wall of liquid (such as starting pump) suddenly changes direction (such as going through a 90° elbow).
- 5) Moving entrapped air through the system.

The pressure increase generated must be added to the fluid pressure already existing in the piping system to determine the total pressure the system must, withstand. CAUTION! If water hammer is not accounted for, the sudden pressure surge could be enough to burst the pipe, or break the fittings or valves.

- 1) Keep fluid velocities under 5 feet per second.
- 2) Use actuated valves with controlled opening and closing speeds.
- 3) Instruct operator 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
- 5) after the line is completely filled.
- 6) Use a check valve in the pipe line, near the pump to keep the line full.
- 7) Use air relief valves to control the amount of air that is
- 8) admitted or exhausted throughout the piping system.
- 9) Design the piping system so that the total pressure (operating plus water hammer surge) does not exceed the pressure rating of the lowest rated of the lowest rated component in the system.

HOW TO USE THE NOMOGRAPH ON THE FOLLOWING PAGE.

- 1) Liquid Velocity (feet/second), pipeline length (feet), and valve closing time (seconds) must be known. Place a straight edge on the liquid velocity
- 2) in pipe (line A) and the pipeline length (line D).
- 3) Mark intersection of straight edge with pivot line (line C).
- 4) Place straight edge on mark just placed on pivot line (line C) and on valve closing time for valve being used (line A).
- 5) The intersection of the straight edge with the pressure increase line (line B) is the liquid momentum surge pressure (water hammer).
- 6) The liquid momentum surge pressure should be added to the operating line pressure to determine the system's maximum line pressure.
- 7) The maximum line pressure is used to select the proper pipe schedule or wall thickness.

The nomograph is based on the formula

$$P = 0.070VL$$

T

Where P is increase in pressure due to momentum surge in psi, L

is

inline length in feet, V is liquid velocity in feet per second, and

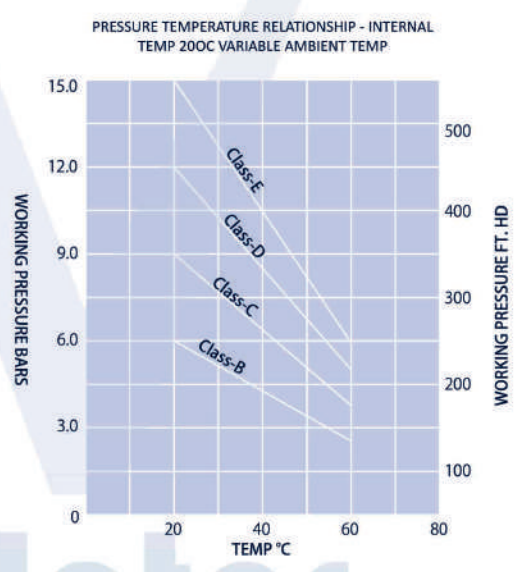
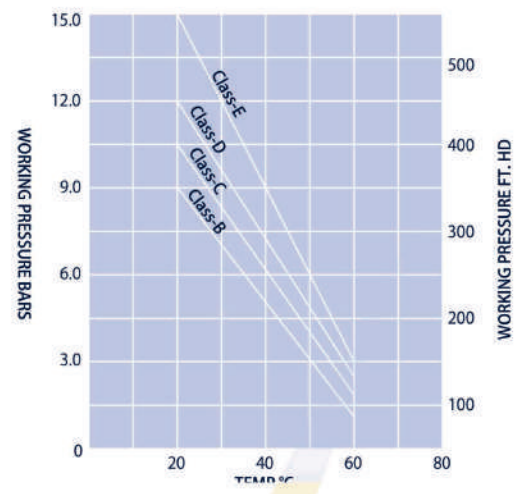
T is

valve closing time in seconds.



PRESSURE / TEMPERATURE RELATIONSHIP:

The pressure / temperature relationship of PVC plays an important part in the behaviour of the pipe at elevated temperatures. In case where PVC Pipes are operating above ground, the ambient temperature will vary and although the temperature of the liquid being conveyed may not exceed 20 C, some reduction in strength, and therefore, of the maximum working pressure at which the pipe may be used will take place. In such cases, the working pressure of the pipe should be re-rated in accordance with graph-1 & Graph 2. If both the ambient temperature and the temperature of the liquid exceed 20 C, the reduction in working pressure is cumulative and the advice of the relevant person should be sought.



COMBINED EXTERNAL LOAD:

Combined external loads acting upon a buried pipe are expressed by:

Where

- P = Combined external load, kg/cm²
- PE = Static earth load, kg/cm²
- Pt = Wheel load, kg/cm²

| DEPTH | | Earth Load | Wheel Load | Combined |
|-------|----|--------------------|--------------------|--------------------|
| CM | FT | kg/cm ² | kg/cm ² | kg/cm ² |
| 30 | 1 | 0.0493 | 1.226 | 1.2753 |
| 60 | 2 | 0.00905 | 0.546 | 0.6365 |
| 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 | 0.21135 | 0.083 | 0.2965 |
| 240 | 8 | 0.2272 | 0.066 | 0.2932 |

Bright Water



EARTH LOAD

The load of backfill acting upon a buried pipe is calculated from the empirical formula of Master and Anderson.

$$PE = Cd, VB$$

$$CD = \frac{1 - e^{-2k \tan \theta H/B}}{2k \tan \theta}$$

$$K = \frac{1 - \sin \theta}{1 + \sin \theta}$$

Where, PE = static earth load, kg/cm²
 V = specific weight of backfill. In kg/cm³
 (Normal Soil = 0.0018 kg/cm³)
 H = depth of cover, in cm
 θ = angle of repose of soil, in deg.
 B = width of trench, in cm.

WHEEL LOAD

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

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

where

- Pt = Wheel load, in kg/cm²
- 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.



CHEMICAL RESISTANCE OF BRIGHT WATER UPVC & PVC PIPES:

PVC Pipes are highly resistant to salt water acids and alkalies. It is not recommended for use with organic ester, ketones, chlorinated solvents aromatic hydrocarbon and low molecular weight alcohols.

Resistance of uPVC & PVC Pipes to common chemicals under the conditions.

| | | |
|----------------------------------|--|---|
| Mineral Acids | Hydrochloric Acid 30% Sulphuric Acid 50% Sulphuric Acid 98% | + |
| Alkalies | Ammonium Hydroxide Calcium Hydroxide Sodium Hydroxide | + |
| Salts | Calcium Chloride Potassium Chloride Sodium Bicarbonate Sodium Chloride Sodium Phosphate Sodium Sulphate | + |
| Oxidizing Agents / Disinfectants | Sodium Hydrochloride (Bleach Solution) Chlorine Water Calcium Hypochlorite - Soln. 18% | + |
| Organic Acids | Acetic Acid - 10% Citric Acid 25 Hydroxy Acetic Acid | + |
| Oil & derived Products | Diesel Fuel Gasoline Lubricating & Thread Cutting Oils Motor Oil | + |
| Solvents | Acetone Methyl Ketone Toluene Trichloroethylene Turpentine Xylene Soaps & Detergents | + |
| Gases | Ammonia Carbon Dioxide Natural Gas Oxygen | + |



CONVERSION TABLE

| Quantity | SI Unit | Alternate SI Unit | Conversion Factor | | U.S. Unit | Conversion Factor | |
|------------------------|------------------------|----------------------|------------------------|-----------------------|------------------------------|------------------------|------------------------|
| | | | K | 1/K | | K | 1/K |
| Length | M | | 1.00 | 1.00 | In (inch) | 39.370 | 2.54x10 ⁻² |
| | | | | | ft (foot) | 3.281 | 0.305 |
| | | | | | mi (mile) | 6.214x10 ⁻⁴ | 1609.344 |
| area | m ² | Hectare | 104 | 104 | in ² | 1550 | 6.452x10 ⁻⁴ |
| | | | | | ft ² | 10.764 | 0.093 |
| | | | | | mi ² | 3.861x10 ⁻⁷ | 2.59x10 ⁶ |
| Volume | m ³ | dm ³ =1 | 1000.00 | 0.00 | ft ³ | 35.315 | 0.0283 |
| | | | | | gal (gallon) | 264.172 | 3.785x10 ⁻³ |
| | | | | | gal (gallon) UK | 219.969 | 4.546x10 ⁻³ |
| Mass | kg | ton | 1000 | 0.001 | lbm (pound) | 2.205 | 0.454 |
| | | | | | gr (grain) | 15432.4 | 6.479x10 ⁻⁵ |
| | | | | | oz (ounce) | 35.274 | 2.835x10 ⁻² |
| Force | N | kgf | 0.102 | 9.807 | lbf | 0.23 | 4.448 |
| | | | | | | | |
| Pressure | N/mm ² | Kgf/mm ² | 0.102 | 9.807 | psi (lbf/in ²) | 145 | 6.895x10 ⁻³ |
| | | bar | 10 | 0.1 | | | |
| | | dyn/cm ² | 107 | 10 ⁻⁷ | | | |
| Energy | J | kgf-erg | 0.102107 | 9.80710 ⁻⁷ | lbf-ft | 0.738 | 1.356 |
| | | | | | cal | 0.239 | 4.184 |
| | | | | | BTU | 9.478x10 ⁻⁴ | 1055.06 |
| Power | W | kcal/hr | 0.86 | 1.162 | oR (Rankine) | 3.415 | 0.293 |
| Temperature (absolute) | K, °C | | | | | 1.8 | 0.555 |
| | | | | | | 1.8 | 0.555 |
| Density | Pas=N s/m ² | kfg s/m ² | 0.102 | 9.807 | lbf s/ft ² | 0.0209 | 47.880 |
| | | cp | 1000 | 0.001 | | | |
| Density | m ² /S | | | | lb/ft ² | 0.0624 | 16.0180 |
| Thermal Conductivity | Kg/m ³ | g/cm ³ | 0.001 | 1000 | BTU in/ft ² hr oF | 6.933 | 0.144 |
| | W/mk | kcal/mh°C | 0.860 | 1.162 | | | |
| Specific Entropy | k/kg K | kcal/kg °C | 2.390x10 ⁻¹ | | BTU / lbm oR | 2.388x10 ⁻¹ | 4.187 |



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