



# Manarco Pipes Manufacturing Company

## UPVC



# INTRODUCTION

Al-Manar Pipes Factory is an ISO Certified company, established in 2003 that develops, manufactures and distribute a wide range of plastic piping systems such as UPVC, CPVC, PE, and PP.R pipes and fittings. With a vision of being a global leader of producing high quality pipes and fittings, it made us one of the most preferred manufacturers and exporters in the region.

Al-Manar Pipes come with various ranges of classes, shapes and sizes to meet all infrastructural needs as our target market consist of diverse lines of businesses. Companies involved in water and sewerage system, energy and power distribution, construction, industrial applications even telecommunications, Al-Manar caters them all.

At Al-Manar, our mission is to improve the quality of life by providing cost-effective solutions for the protection and flow of water and energy, definitely assuring that our products are manufactured in accordance to international quality standards and specifications such as BS, DIN and ASTM standards. In addition, Al-Manar just received the Water Regulations Advisory Scheme (WRAS) certification for our products, which without doubt elevated the company to greater heights, locally and internationally.

# المقدمة

أنشئ مصنع أنابيب المنار للصناعات البلاستيكية في عام ٢٠٠٣م لتصنيع المنتجات البلاستيكية على مختلف أنواعها ، ومن أهم منتجاته الأنابيب البلاستيكية UPVC ,CPVC ,HDPE , PPR والتي تحمل العلامة التجارية المنار وكذلك القطع البلاستيكية والتي تحمل العلامة التجارية مناركو والتي أصبحت البديل الأمثل لفعاليتها وسهولة نقلها وتركيبها وعدم تعرضها للصدأ ومقاومتها للعناصر الكيماوية بفضل هذه المميزات فإنها الرد المثالي على تحديات العصر الحديث والحل الأفضل لمشكلاته الفنية المستعصية .

إن لأنابيب مصنع أنابيب المنار استخدامات في كل المجالات المهمة خصوصا في تمديدات خطوط المياه ذات الضغط العالي والمنخفض وتمديدات المجاري والصرف الصحي وتمديدات الهاتف والكهرباء والإتصالات .

ويقوم مصنع أنابيب المنار بإنتاج هذه الأنابيب طبقا لأحدث المواصفات العالمية المقررة ووفقا للمتطلبات الهندسية وتخضع الأنابيب بنوعيتها وأحجامها للمواصفات المقررة من قبل الهيئة العربية السعودية للمواصفات والمقاييس SASO ويتم مراقبة الإنتاج وفقا لنظام دقيق في مختبرات مراقبة الجودة بواسطة أحدث وسائل التكنولوجيا والمعدات الحديثة لضمان جودة ونوعية عالية من الإنتاج . لذا تمكن مصنع أنابيب المنار من الحصول على

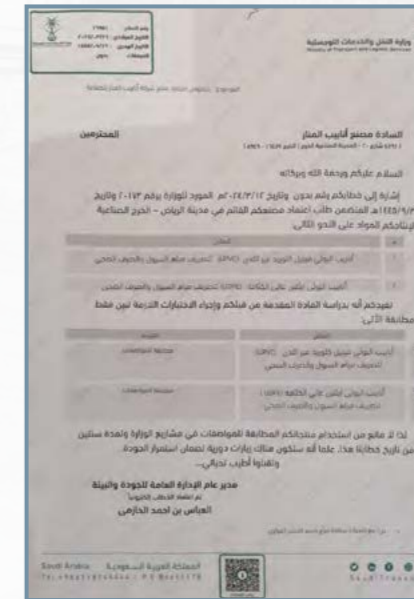
شهادتي :

ISO QMS 2008 :9001

Water Regulations Advisory Scheme ( WRAS )

كنتيجة طبيعية لأسلوبها الإداري المتميز وتبنيها مبدأ الجودة في منتجاتها . وتتوفر أنابيب مصنع أنابيب المنار بكل المقاسات والسماكات والتي تناسب كل الضغوط ، ويتم تسويق منتجات مصنع أنابيب المنار من الأنابيب على نطاق واسع في السوق المحلية في جميع أنحاء المملكة العربية السعودية

# CERTIFICATION











**MANARCO**  
PLASTIC PIPES AND  
FABRICATION



# MANARCO uPVC PIPES GENERAL ADVANTAGES

The principal reason for the great economy of Manarco pipes is not so much their cost per meter as delivered to site but rather the dramatic reduction in installation costs which can be achieved by intelligent exploitation of their light weight, availability in longer lengths, ease of joining and their immunity from corrosion. These characteristics are of even greater importance to engineers now that the need to carry out water supply and sewerage schemes, industrial plant installations, etc. at minimum cost and maximum reliability.

## NON-CORROSION



Manarco uPVC pipes resist corrosion caused by acid, alkalis, oils, salts, moisture and the media inside and outside the pipe. It is particularly reliable for resistance to the severe climatic and soil conditions in Saudi Arabia.

## LOW FLOW LOSS



Manarco uPVC pipes have a mirror-smooth surface which minimize resistance and impede the build-up of deposits and corrosive scales.

## SANITARY



Manarco uPVC pipes are entirely non-toxic. It will not affect the taste, smell or colour of water or liquid not react with any liquid to cause a precipitant.

## MECHANICAL STRENGTH



Manarco uPVC pipes are entirely non-toxic. It will not affect the taste, smell or colour of water or liquid not react with any liquid to cause a precipitant.

## LIGHT WEIGHT



Manarco uPVC pipes are incredibly light. Their specific weight is one fifth of steel pipe. This cuts down transportation costs and facilitates the installation of pipes and reduces its cost.

## FIRE RESISTANCE



Manarco uPVC pipes will not support combustion. In the event of fire, flames are unable to travel along the pipe. It is self extinguishing.

## EASE OF INSTALLATION



Manarco uPVC pipes are quick and easy to install, with a complete range of fittings, using solvent cement or rubber joints. Joints are leakproof. uPVC pipes can be cut easily for installation.

## EASE OF MAINTAINANCE



Manarco uPVC pipes can be quickly repaired with a minimum of complication or cost.

## INSULATOR



Manarco uPVC pipe are ideal for electric conduits. Because uPVC in itself is an integral insulator, it eliminates the possibility of electrolytic corrosion which so often destroys underground piping.





## APPLICATIONS OF MANARCO UPVC PIPES



### Water supplies

Non-toxic uPVC pipes will not affect the taste, color, or smell of drinking water. They will never corrode and are therefore extremely sanitary. Deposits and scales will not build up inside as in the case for conventional steel pipes. Their strength is greater than asbestos pipes.



### Irrigation Systems

Manarco uPVC pipes are ideal for agricultural irrigation and sprinkler systems. Non-corrosive Manarco uPVC pipes are perfect for carrying water which contains chemical fertilizers and insects inhibitors. In thick wall and large diameter Manarco uPVC pipes liquids can be transported under high pressure which is convenient for the management of large farms.



### Industry

Resistant to most chemicals, Manarco uPVC pipes have an important role to play in industrial plants. Light, non-corrosive and easy to assemble they allow more complex piping work than with steel or cast-iron pipes.



### Solid, Waste & Drainage System

Waste line for corrosive gases, ventilation for office buildings and factories; drainage systems for private homes and elevated highways - these are a few of the many possibilities for Manarco uPVC pipes. A full line of uPVC fittings is available to assure easy installation.



### Mining

Manarco uPVC pipes particularly are well-suited for draining corrosive liquids found in mines. They make an ideal vent line for pits because they are easily installed in hard to reach places.



### Electrical & Telecommunications Cables

Manarco uPVC pipes form an integral insulator, hence there is an ever-increasing demand for them as electrical conduit. To facilitate work, a full line of fittings is available and fabricated from the same material as the pipes.



### Manarco uPVC pipes for Casing and Screen

Engineering difficulties and the probability of adverse chemical reactions make it impractical to overcome corrosion and encrustation through the use of protective coating, chemical treatment or cathodic protection. Thus Al-Manar noncorrosion PVC for water well casing and screens rapidly received approval by the appropriate ministry consultants and engineers.



## MANUFACTURING STANDARDS

The principal reason for the great economy of Manarco pipes is not so much their cost per meter as delivered to site but rather the dramatic reduction in installation costs which can be achieved by intelligent exploitation of their light weight, availability in longer lengths, ease of joining and their immunity from corrosion. These characteristics are of even greater importance to engineers now that the need to carry out water supply and sewerage schemes, industrial plant installations, etc. at minimum cost and maximum reliability.

**SASO**

Saudi Arabian  
Standards

**DIN**

German  
Standard

**ASTM**

American  
Society for  
Testing & Material

**BS**

British  
Standard

**EN**

European  
Standard

**NEMA**

National Electrical  
Manufacturing  
Association

### Range of Production

Pipes from Manarco are manufactured according to SASO and or DIN Standards from 20mm, up to 800mm outside diameter in various pressure classes.

uPVC pipes are available with solvent weld Socket joints for diameters less than 63mm. Sizes of outside diameter 63mm and larger are available with both mechanical rubber ring joints or solvent weld Socket joints.

Pipes manufactured in accordance with ASTM are ranging from 2/1 inch up to 8 inches in various pressure (SCH 40, SCH 80) with white and gray colour.

ASTM Pipes are available with plain spigot and Solvent Cement joints only.

Manarco pipes are produced in 6 meters standard length (other lengths are available on request), standard colours are grey, white and black (other colours are available on request).



# TECHNICAL DATA OF MANARCO PIPE

## General Properties

**Material:** Unplasticised Polyvinylchloride.

**Standard Length:** Available in the length of 6 Meters or at any other lengths as per customer's request. Pipes are with or without socket. Socket are either solvent cement welding type or rubber ring joining type.

**Color:**  or any other colours on request.

**Specific Gravity:** 1.42 ± 0.02

**Flammability:** Will not support combustion.

## Material Technical Data

| Properties  | Unit                          | uPVC                 | Test Method               |
|---|-------------------------------|----------------------|---------------------------|
| <b>Physical Properties</b>                            |                               |                      |                           |
| (Specific Gravity (Compound                           | g/cm <sup>3</sup>             | 1.42 - 1.4           | 792 ASTM D                |
| (H <sub>2</sub> O Boiling Water 24 ] Water Absorption | mg/cm <sup>2</sup>            | 4 >                  | 2508 ISO                  |
| ( C 23 H At 24 ] Water Absorption                     | weight gain %                 | 0.05                 | 570 ASTM D                |
| Flammability  | N/A                           | Self extinguishing   | -                         |
| Resistance To Burning                                 | Sec                           | 5 >                  | 635 ASTM D                |
| (Kgf 5 Vicat Softening Temperature (VST               | C °                           | 80 <                 | 306 ISO                   |
| Thermal Conductivity                                  | W/m · K                       | 0.15                 | 1-52612 DIN               |
| Co-Efficient Of Thermal Linear Expansion              | mm / m · C                    | 0.8x10 <sup>-4</sup> | 696 ASTM D                |
| Specific Heat   | Cal / g · C                   | 0.25                 | -                         |
| <b>Mechanical Properties</b>                          |                               |                      |                           |
| C 23 @ Tensile Strength                               | Mpa                           | 50                   | 638 ASTM D                |
| C 23 @ Tensile Modulus Of Elasticity                  | Mpa                           | 3000                 | ASTM D638                 |
| C 23 @ Compressive Strength                           | Mpa                           | 65                   | 695 ASTM D                |
| C 23 @ Flexural Strength                              | Mpa                           | 89                   | 790 ASTM D                |
| C 23 @ Poisson's Ratio                                | -                             | 0.38                 | -                         |
| C 23 @ Izod Impact Strength (Notched                  | J/M<br>Ft-Lbs/in              | 53<br>1.0            | 256 ASTM D                |
| C 23 @ Hardness Strength                              | "Durometer "D<br>"Rockwell "R | 80<br>110            | 2240 ASTM D<br>785 ASTM D |
| <b>Electrical Properties</b>                          |                               |                      |                           |
| C 23 @ Volume Resistivity                             | Ohm/cm                        | 3x10 <sup>15</sup>   | 257 ASTM D                |
| Surface Resistivity                                   | Ohm                           | 10 <sup>12</sup> <   | DIN IEC60093              |
| HZ 60 @ Power Factor                                  | %                             | 1.255                | 150 ASTM D                |
| Dielectric Strength                                   | Volts / mil                   | 1400                 | 147 ASTM D                |
| F 30 @ 60Hz Dielectric Constant                       | -                             | 3.70                 | 150 ASTM D                |

Above mentioned values may varied according to compounds and products\*

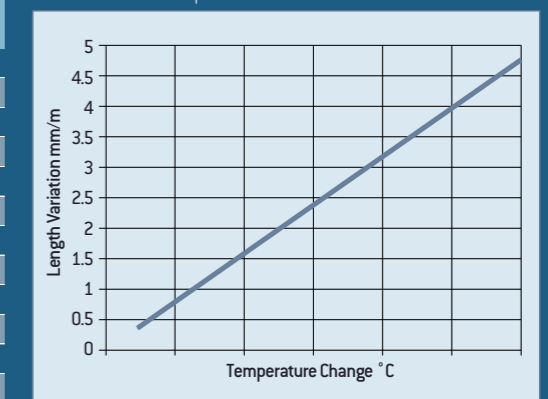
## Thermal de-rating factors for UPVC pressure pipes and fittings

| Maximum service temperature (°C) | Multiply working pressure at (20 °C) by these factors |
|----------------------------------|---|
| 20                               | 1   |
| 25                               | 0.9   |
| 30                               | 0.8   |
| 35                               | 0.7   |
| 40                               | 0.6   |

## UPVC pipe length variation due to temperature change (°C)

| Temperature Change (°C) | Length Variation mm/meter |
|-------------------------|---------------------------|
| 5                       | 0.4                       |
| 10                      | 0.8                       |
| 15                      | 1.2                       |
| 20                      | 1.6                       |
| 25                      | 2.0                       |
| 30                      | 2.4                       |
| 35                      | 2.8                       |
| 40                      | 3.2                       |
| 45                      | 3.6                       |
| 50                      | 4.0                       |
| 55                      | 4.4                       |
| 60                      | 4.8                       |

Coefficient of thermal expansion = 0.08mm/m/°C



## Allowable working pressure for pipes made of UPVC conveying water

Safety factor C = 2.5

| Temperature °C | Years of Service | Pipe Series S                  |      |      |      |
|----------------|------------------|--------------------------------|------|------|------|
|                |                  | 25                             | 16.7 | 10   | 6.3  |
|                |                  | Standard dimension ratio SDR   |      |      |      |
|                |                  | 51                             | 34.4 | 21   | 13.6 |
|                |                  | Allowable working pressure bar |      |      |      |
| 10             | 5                | 5.2                            | 7.8  | 13   | 20.9 |
|                | 10               | 5.1                            | 7.6  | 12.7 | 20.4 |
|                | 25               | 4.9                            | 7.4  | 12.3 | 19.7 |
|                | 50               | 4.8                            | 7.2  | 12.0 | 19.3 |
| 20             | 100              | 4.7                            | 7.1  | 11.8 | 18.8 |
|                | 5                | 4.4                            | 6.6  | 11.0 | 17.5 |
|                | 10               | 4.3                            | 6.4  | 10.7 | 17.1 |
|                | 25               | 4.1                            | 6.2  | 10.3 | 16.4 |
| 30             | 50               | 4.0                            | 6.0  | 10.0 | 16.0 |
|                | 100              | 3.9                            | 5.8  | 9.7  | 15.6 |
|                | 5                | 3.5                            | 5.3  | 8.8  | 14.1 |
|                | 10               | 3.4                            | 5.1  | 8.6  | 13.7 |
| 40             | 25               | 3.3                            | 4.9  | 8.2  | 13.2 |
|                | 50               | 3.2                            | 4.8  | 8.0  | 12.7 |
|                | 5                | 2.7                            | 4.1  | 6.8  | 10.8 |
|                | 10               | 2.6                            | 3.9  | 6.5  | 10.4 |
| 50             | 25               | 2.5                            | 3.7  | 6.2  | 9.9  |
|                | 50               | 2.4                            | 3.6  | 6.0  | 9.6  |
|                | 5                | 1.9                            | 2.9  | 4.8  | 7.6  |
|                | 10               | 1.8                            | 2.7  | 4.6  | 7.3  |
| 60             | 25               | 1.7                            | 2.6  | 4.3  | 6.9  |
|                | 5                | 1.2                            | 1.8  | 3.0  | 4.8  |
|                | 10               | 1.1                            | 1.7  | 2.8  | 4.4  |
|                | 25               | 1.1                            | 1.6  | 2.6  | 4.2  |



## UPVC Pipes According to BS 3505 / 3506

Applications: Water supply, irrigation systems, industrial use.

| Nominal Size Inch. | O.D. (mm) |       | Wall Thickness (mm) |     |         |     |         |      |         |      |         |     |         |     |         |     |
|--------------------|-----------|-------|---------------------|-----|---------|-----|---------|------|---------|------|---------|-----|---------|-----|---------|-----|
|                    | min       | max   | Class B             |     | Class C |     | Class D |      | Class E |      | Class 0 |     | Class 6 |     | Class 7 |     |
|                    |           |       | min                 | max | min     | max | min     | max  | min     | max  | min     | max | min     | max | min     | max |
| 3/8                | 17.0      | 17.3  |                     |     |         |     |         | 1.5  | 1.9     |      |         |     | 2.3     | 2.8 | 3.2     | 3.8 |
| 1/2                | 21.2      | 21.5  |                     |     |         |     |         | 1.7  | 2.1     |      |         |     | 2.8     | 3.3 | 3.7     | 4.3 |
| 3/4                | 26.6      | 26.9  |                     |     |         |     |         | 1.9  | 2.5     |      |         |     | 2.9     | 3.4 | 3.9     | 4.5 |
| 1                  | 33.4      | 33.7  |                     |     |         |     |         | 2.2  | 2.7     |      |         |     | 3.4     | 4.0 | 4.5     | 5.2 |
| 1 1/4              | 42.1      | 42.4  |                     |     |         |     | 2.2     | 2.7  | 2.7     | 3.2  |         |     | 3.6     | 4.2 | 4.8     | 5.5 |
| 1 1/2              | 48.1      | 48.4  |                     |     |         |     | 2.5     | 3.0  | 3.1     | 3.7  | 1.8     | 2.2 | 3.7     | 4.3 | 5.1     | 5.9 |
| 2                  | 60.2      | 60.5  |                     | 2.5 | 3.0     | 3.1 | 3.7     | 3.9  | 4.5     | 1.8  | 2.2     |     |         | 5.5 | 6.3     |     |
| 2 1/2              | 75.0      | 75.3  |                     | 3.0 | 3.5     | 3.9 | 4.5     | 4.8  | 5.5     | 1.8  | 2.2     |     |         |     |         |     |
| 3                  | 88.7      | 89.1  | 2.9                 | 3.4 | 3.5     | 4.1 | 4.6     | 5.3  | 5.7     | 6.6  | 1.8     | 2.2 |         |     |         |     |
| 4                  | 114.1     | 114.5 | 3.4                 | 4.0 | 4.5     | 5.2 | 6.0     | 6.9  | 7.3     | 8.4  | 2.3     | 2.8 |         |     |         |     |
| 5                  | 140.0     | 140.4 | 3.8                 | 4.4 | 5.5     | 6.4 | 7.3     | 8.4  | 9.0     | 10.4 | 2.6     | 3.1 |         |     |         |     |
| 6                  | 168.0     | 168.5 | 4.5                 | 5.2 | 6.6     | 7.6 | 8.8     | 10.2 | 10.8    | 12.5 | 3.1     | 3.7 |         |     |         |     |
| 8                  | 218.8     | 219.4 | 5.3                 | 6.1 | 7.8     | 9.0 | 10.3    | 11.9 | 12.6    | 14.5 | 3.1     | 3.7 |         |     |         |     |

Note: Classes B,C,D and E are to BS 3505/3506. Classes 0,6 and 7 are to BS 3506 / 1969. Classes 6 and 7 equivalent to ASTM D-17 85, SCH 40 and SCH 80 respectively.

Length: 5.8 and 6 meters | Colour: Dark Grey except class 0 which is grey.

Socket Type: Plain, solvent cement (SC/J) \*Non standard lengths and colours are available on request.

Pressure ratings for working pressure at 20 °C

| Class | Pressure Rating (bar) |
|-------|-----------------------|
| B     | 6.0 bar               |
| C     | 9.0 bar               |
| D     | 12.0 bar              |
| E     | 15.0 bar              |

For higher working temperatures, the pressure rating should be reduced.

## UPVC Pressure Pipes according to EN 1452

| Nominal Outside diameter  | Nominal (minimum) Wall Thickness |                     |               |                 |               |              |                  |              |
|---|----------------------------------|---------------------|---------------|-----------------|---------------|--------------|------------------|--------------|
|   | Pipe Series 8                    |                     |               |                 |               |              |                  |              |
|   | S 20 (SDR 41)                    | (S 16,7) (SDR 34,4) | S 16 (SDR 33) | S 12,5 (SDR 26) | S 10 (SDR 21) | S 8 (SDR 17) | S 6,3 (SDR 13,6) | S 5 (SDR 11) |
|   | PN 6                             | PN 6                | PN 8          | PN 10           | PN 12,5       | PN 16        | PN 20            |              |
| 12  | -                                | -                   | -             | -               | -             | -            | -                | 1,5          |
| 16  | -                                | -                   | -             | -               | -             | -            | -                | 1,5          |
| 20  | -                                | -                   | -             | -               | -             | -            | 1,5              | 1,9          |
| 25  | -                                | -                   | -             | -               | -             | 1,5          | 1,9              | 2,3          |
| 32  | -                                | -                   | 1,5           | 1,6             | 1,9           | 2,4          | 2,9              |              |
| 40  | -                                | 1,5                 | 1,6           | 1,9             | 2,4           | 3,0          | 3,7              |              |
| 50  | 1,5                              | 1,6                 | 2,0           | 2,4             | 3,0           | 3,7          | 4,6              |              |
| 63  | 1,9                              | 2,0                 | 2,5           | 3,0             | 3,8           | 4,7          | 5,8              |              |
| 75  | 2,2                              | 2,3                 | 2,9           | 3,6             | 4,5           | 5,6          | 6,8              |              |
| 90  | 2,7                              | 2,8                 | 3,5           | 4,3             | 5,4           | 6,7          | 8,2              |              |
| Nominal pressure PN based on service (design) coefficient C=2,0 |                                  |                     |               |                 |               |              |                  |              |
|   | PN 6                             | PN 7,5              | PN 8          | PN 10           | PN 12,5       | PN 16        | PN 20            | PN 25        |
| 110   | 2,7                              | 3,2                 | 3,4           | 4,2             | 5,3           | 6,6          | 8,1              | 10,0         |
| 125   | 3,1                              | 3,7                 | 3,9           | 4,8             | 6,0           | 7,4          | 9,2              | 11,4         |
| 140   | 3,5                              | 4,1                 | 4,3           | 5,4             | 6,7           | 8,3          | 10,3             | 12,7         |
| 160   | 4,0                              | 4,7                 | 4,9           | 6,2             | 7,7           | 9,5          | 11,8             | 14,6         |
| 180   | 4,4                              | 5,3                 | 5,5           | 6,9             | 8,6           | 10,7         | 13,3             | 16,4         |
| 200   | 4,9                              | 5,9                 | 6,2           | 7,7             | 9,6           | 11,9         | 14,7             | 18,2         |
| 225   | 5,5                              | 6,6                 | 6,9           | 8,6             | 10,8          | 13,4         | 16,6             | -            |
| 250   | 6,2                              | 7,3                 | 7,7           | 9,6             | 11,9          | 14,8         | 18,4             | -            |
| 280   | 6,9                              | 8,2                 | 8,6           | 10,7            | 13,4          | 16,6         | 20,6             | -            |
| 315   | 7,7                              | 9,2                 | 9,7           | 12,1            | 15,0          | 18,7         | 23,2             | -            |
| 355   | 8,7                              | 10,4                | 10,9          | 13,6            | 16,9          | 21,1         | 26,1             | -            |
| 400   | 9,8                              | 11,7                | 12,3          | 15,3            | 19,1          | 23,7         | 29,4             | -            |
| 450   | 11,0                             | 13,2                | 13,8          | 17,2            | 21,5          | 26,7         | 33,1             | -            |
| 500   | 12,3                             | 14,6                | 15,3          | 19,1            | 23,9          | 29,7         | 36,8             | -            |
| 560   | 13,7                             | 16,4                | 17,2          | 21,4            | 26,7          | -            | -                | -            |
| 630   | 15,4                             | 18,4                | 19,3          | 24,1            | 30,0          | -            | -                | -            |
| 710   | 17,4                             | 20,7                | 21,8          | 27,2            | -             | -            | -                | -            |
| 800   | 19,6                             | 23,3                | 24,5          | 30,6            | -             | -            | -                | -            |
| 900   | 22,0                             | 26,3                | 27,6          | -               | -             | -            | -                | -            |
| 1000  | 24,5                             | 29,2                | 30,6          | -               | -             | -            | -                | -            |

Length: 5.8 and 6 meters | Colour:  Grey

Socket Type: Rubber joint (R/J) type supplied from sizes 63mm up to 710mm.

Solvent Cement (SC/J) type supplied from sizes 12mm up to 315mm.

\*Non standard lengths and colours are available on request.

## UPVC Pipes According to ASTM D - 1785, Schedule 40 & Schedule 80

| Nominal Size Inch. | O.D. (mm) |        | Schedule 40         |       |                       |     | Schedule 80         |       |                |     |
|--------------------|-----------|--------|---------------------|-------|-----------------------|-----|---------------------|-------|----------------|-----|
|                    | min       | max    | Wall Thickness (mm) |       | Nominal Weight (kg/M) | PSI | Wall Thickness (mm) |       | Nominal Weight | PSI |
|                    |           |        | min                 | max   |                       |     | min                 | max   |                |     |
| 1/2                | 21.24     | 21.44  | 2.77                | 3.28  | 0.24                  | 600 | 3.73                | 4.24  | 0.3            | 850 |
| 3/4                | 26.57     | 26.77  | 2.87                | 3.38  | 0.33                  | 480 | 3.91                | 4.42  | 0.43           | 690 |
| 1                  | 33.27     | 33.53  | 3.38                | 3.89  | 0.48                  | 450 | 4.55                | 5.08  | 0.61           | 630 |
| 1 1/4              | 42.03     | 42.29  | 3.56                | 4.07  | 0.65                  | 370 | 4.85                | 5.44  | 0.87           | 520 |
| 1 1/2              | 48.11     | 48.41  | 3.68                | 4.19  | 0.77                  | 330 | 5.08                | 5.69  | 1.03           | 470 |
| 2                  | 60.17     | 60.47  | 3.91                | 4.42  | 1.04                  | 280 | 5.54                | 6.2   | 1.43           | 400 |
| 2 1/2              | 72.84     | 73.2   | 5.16                | 5.77  | 1.57                  | 300 | 7.01                | 7.85  | 2.2            | 420 |
| 3                  | 88.7      | 89.1   | 5.49                | 6.15  | 2.14                  | 260 | 7.62                | 8.53  | 2.91           | 370 |
| 4                  | 114.1     | 114.5  | 6.02                | 6.73  | 3.05                  | 220 | 8.56                | 9.58  | 4.26           | 320 |
| 5                  | 141.05    | 141.55 | 6.22                | 7.347 | 4.18                  | 190 | 9.52                | 10.67 | 6.42           | 290 |
| 6                  | 168       | 168.56 | 7.11                | 7.98  | 5.37                  | 180 | 10.97               | 12.29 | 8.13           | 280 |
| 8                  | 218.7     | 219.46 | 8.18                | 9.17  | 8.11                  | 160 | 12.7                | 14.22 | 10.1           | 250 |

Length: 4,5,8, 6.0 meters

Colour: Schedule 40 -  White Schedule 80 -  Grey

Socket Type: Plain, solvent cement (SC/J), Non standard lengths and colours are available on request.

## UPVC Pressure-rated Pipes According to ASTM D 2241

| Nominal Size Inch. | O.D. (mm) |        | Wall Thickness (mm)           |      |                      |      |                   |      |                     |       |                     |       |               |       |      |
|--------------------|-----------|--------|-------------------------------|------|----------------------|------|-------------------|------|---------------------|-------|---------------------|-------|---------------|-------|------|
|                    | min       | max    | Standard Diameter Ratio (SDR) |      |                      |      |                   |      |                     |       |                     |       | 13.5          |       |      |
|                    |           |        | 41<br>W.P: 6.9 Bar            |      | 32.5<br>W.P: 8.6 Bar |      | 26<br>W.P: 11 Bar |      | 21<br>W.P: 13.8 Bar |       | 17<br>W.P: 17.2 Bar |       | W.P: 21.7 Bar |       |      |
| min                | max       | min    | max                           | min  | max                  | min  | max               | min  | max                 | min   | max                 | min   | max           | min   | max  |
| 1/2                | 21.24     | 21.44  |                               |      |                      |      |                   |      |                     |       |                     |       |               | 1.57  | 2.08 |
| 3/4                | 26.57     | 26.77  |                               |      |                      |      |                   |      |                     |       |                     |       |               | 1.52  | 2.03 |
| 1                  | 33.27     | 33.53  |                               |      |                      |      |                   |      |                     |       |                     |       |               | 1.52  | 2.03 |
| 1 1/4              | 42.03     | 42.29  |                               |      |                      |      |                   |      |                     |       |                     |       |               | 1.52  | 2.03 |
| 1 1/2              | 48.11     | 48.41  |                               |      |                      |      |                   |      |                     |       |                     |       |               | 1.52  | 2.03 |
| 2                  | 60.17     | 60.47  |                               |      |                      |      |                   |      |                     |       |                     |       |               | 1.85  | 2.36 |
| 3                  | 88.70     | 89.10  | 2.16                          | 2.67 | 2.74                 | 3.25 | 3.43              | 3.94 | 4.24                | 4.75  | 5.23                | 5.87  | 6.58          | 7.37  |      |
| 4                  | 114.07    | 114.53 | 2.80                          | 3.30 | 3.51                 | 4.01 | 4.39              | 4.90 | 5.44                | 6.10  | 6.73                | 7.54  | 8.46          | 9.47  |      |
| 6                  | 168.00    | 168.56 | 4.11                          | 4.62 | 5.18                 | 5.79 | 6.48              | 7.26 | 8.03                | 9.00  | 9.91                | 11.10 | 12.47         | 13.97 |      |
| 8                  | 218.70    | 219.46 | 5.33                          | 5.97 | 6.73                 | 7.54 | 8.43              | 9.45 | 10.41               | 11.66 | 12.90               | 14.45 |               |       |      |

Note: The maximum pressure rating given above is based on water at 73 °F/23 °C and for unthreaded pipes.

Length: 6, 5, 8 meters | Colour:  White

Socket Type: Plain, solvent cement (SC/J), Non standard lengths and colours are available on request.

## MANARCO UPVC pipes according to DIN 8062, DIN 19532

| Pipe Series S |                  |                   |      |                   |      |                   |      |                   |      |                   |                                |                   |       |                   |       |                   |                 |                   |                |                   |       |
|---------------|------------------|-------------------|------|-------------------|------|-------------------|------|-------------------|------|-------------------|--------------------------------|-------------------|-------|-------------------|-------|-------------------|-----------------|-------------------|----------------|-------------------|-------|
| d             | 63               | 25                | 20   | 16.7              | 12.5 | 10                | 8    | 6.3               | 5    | 4                 | Standard Dimension Ratio (SDR) |                   |       |                   |       |                   |                 |                   |                |                   |       |
| mm            | 127 <sup>a</sup> |                   | 51   |                   | 41   |                   | 34.4 |                   | 26   |                   | 21                             |                   | 17    |                   | 13.6  |                   | 11 <sup>c</sup> |                   | 9 <sup>c</sup> |                   |       |
|               | e                | Mass <sup>b</sup> | e    | Mass <sup>b</sup> | e    | Mass <sup>b</sup> | e    | Mass <sup>b</sup> | e    | Mass <sup>b</sup> | e                              | Mass <sup>b</sup> | e     | Mass <sup>b</sup> | e     | Mass <sup>b</sup> | e               | Mass <sup>b</sup> | e              | Mass <sup>b</sup> |       |
| mm            | kg/m             | mm                | kg/m | mm                | kg/m | mm                | kg/m | mm                | kg/m | mm                | kg/m                           | mm                | kg/m  | mm                | kg/m  | mm                | kg/m            | mm                | kg/m           | mm                | kg/m  |
| 20            |                  |                   |      |                   |      |                   |      |                   |      |                   |                                |                   |       |                   |       | 1.5               | 0.139           | 1.9               | 0.168          | 2.3               | 0.199 |
| 25            |                  |                   |      |                   |      |                   |      |                   |      |                   |                                |                   |       |                   |       | 1.5               | 0.177           | 1.9               | 0.215          | 2.3               | 0.255 |
| 32            |                  |                   |      |                   |      |                   |      |                   |      | 1.6               | 0.243                          | 1.9               | 0.280 | 2.4               | 0.347 | 2.9               | 0.405           | 3.6               | 0.489          |                   |       |
| 40            |                  |                   |      |                   |      |                   |      |                   |      | 1.6               | 0.307                          | 1.9               | 0.355 | 2.4               | 0.442 | 3.0               | 0.533           | 3.7               | 0.642          | 4.5               | 0.761 |
| 50            |                  |                   |      |                   |      |                   |      |                   |      | 1.5               | 0.366                          | 2.0               | 0.469 | 2.4               | 0.560 | 3.0               | 0.678           | 3.7               | 0.821          | 4.6               | 0.995 |
| 63            |                  |                   |      |                   |      |                   |      |                   |      | 1.6               | 0.491                          | 1.9               | 0.571 | 2.5               | 0.739 | 3.0               | 0.866           | 3.8               | 1.08           | 4.7               | 1.3   |
| 75            |                  |                   |      |                   |      |                   |      |                   |      | 1.5               | 0.556                          | 1.9               | 0.683 | 2.2               | 0.793 | 2.9               | 1.01            | 3.6               | 1.24           | 4.5               | 1.52  |
| 90            |                  |                   |      |                   |      |                   |      |                   |      | 1.8               | 0.785                          | 2.2               | 0.957 | 2.7               | 1.15  | 3.5               | 1.46            | 4.3               | 1.77           | 5.4               | 2.18  |
| 110           | 1.8              | 0.964             | 2.2  | 1.18              | 2.7  | 1.41              | 3.2  | 1.66              | 4.2  | 2.14              | 5.3                            | 2.65              | 6.6   | 3.24              | 8.1   | 3.91              | 10.0            | 4.700             | 12.3           | 5.64              |       |
| 125           | 1.8              | 1.10              | 2.5  | 1.50              | 3.1  | 1.84              | 3.7  | 2.16              | 4.8  | 2.75              | 6.0                            | 3.39              | 7.4   | 4.13              | 9.2   | 5.04              | 11.4            | 6.094             | 14.0           | 7.28              |       |
| 140           | 1.8              | 1.23              | 2.8  | 1.86              | 3.5  | 2.31              | 4.1  | 2.69              | 5.4  | 3.47              | 6.7                            | 4.24              | 8.3   | 5.18              | 10.3  | 6.30              | 12.7            | 7.593             | 15.7           | 9.14              |       |
| 60            | 1.8              | 1.41              | 3.2  | 2.44              | 4.0  | 2.99              | 4.7  | 3.49              | 6.2  | 4.55              | 7.7                            | 5.55              | 9.5   | 6.75              | 11.8  | 8.23              | 14.6            | 9.963             | 17.9           | 11.9              |       |
| 180           | 1.8              | 1.59              | 3.6  | 3.06              | 4.4  | 3.71              | 5.3  | 4.43              | 6.9  | 5.66              | 8.6                            | 6.97              | 10.7  | 8.54              | 13.3  | 10.4              | 16.4            | 12.589            | 20.1           | 15.0              |       |
| 200           | 1.8              | 1.77              | 3.9  | 3.67              | 4.9  | 4.56              | 5.9  | 5.44              | 7    | 7.02              | 9.6                            | 8.64              | 11.9  | 10.5              | 14.7  | 12.8              | 18.2            | 15.522            | 22.4           | 18.6              |       |
| 225           | 1.8              | 1.99              | 4.4  | 4.67              | 5.5  | 5.77              | 6.6  | 6.85              | 8.6  | 8.81              | 10.8                           | 10.9              | 13.4  | 13.4              | 16.6  | 16.2              | 20.5            | 19.640            | 25.2           | 23.5              |       |
| 250           | 2.0              | 2.43              | 4.9  | 5.73              | 6.2  | 7.22              | 7.3  | 8.43              | 9.6  | 10.912            | 11.9                           | 13.3              | 14.8  | 16.4              | 18.4  | 20.0              | 22.7            | 24.152            | 27.9           | 28.9              |       |
| 280           | 2.2              | 3.03              | 5.5  | 7.21              | 6.0  | 7.81              | 8.2  | 10.6              | 12.0 | 15.1              | 13.4                           | 16.8              | 16.8  | 20.8              | 20.6  | 25.1              | 25.4            | 30.3              | 31.3           | 36.4              |       |
| 315           | 2.5              | 3.83              | 6.2  | 9.15              | 7.7  | 11.2              | 9.2  | 13.3              | 13.5 | 19.2              | 15.0                           | 21.2              | 18.7  | 26.0              | 23.2  | 31.8              | 28.6            | 38.3              |                |                   |       |
| 355           | 2.8              | 4.79              | 7.0  | 11.6              | 8.7  | 14.3              | 10.4 | 17.0              | 15.2 | 24.3              | 16.9                           | 26.8              | 21.1  | 33.1              | 26.1  | 40.2              |                 |                   |                |                   |       |
| 400           | 3.2              | 6.19              | 7.39 | 14.7              | 9.8  | 18.1              | 11.7 | 21.4              | 17.1 | 30.8              | 19.1                           | 34.2              | 23.7  | 41.8              | 29.4  | 51.0              |                 |                   |                |                   |       |
| 450           | 3.6              | 7.76              | 8.8  | 18.4              | 11.0 | 22.8              | 13.2 | 27.2              | 19.2 | 38.9              | 21.5                           | 43.3              | 26.7  |                   |       |                   |                 |                   |                |                   |       |
| 500           | 4.0              | 9.51              | 9.8  | 22.7              | 12.3 | 28.3              | 14.6 | 33.4              | 21.4 | 48.1              | 23.9                           | 53.4              | 29.7  |                   |       |                   |                 |                   |                |                   |       |
| 560           | 4.4              | 11.8              | 11.0 | 28.5              | 13.7 | 35.3              | 16.4 | 42.0              | 23.9 | 60.1              | 26.7                           | 66.8              |       |                   |       |                   |                 |                   |                |                   |       |
| 630           | 5.0              | 14.9              | 12.3 | 35.9              | 15.4 | 44.6              | 18.4 | 53.0              | 26.9 | 76.1              | 30.0                           | 84.4              |       |                   |       |                   |                 |                   |                |                   |       |
| 710           | 5.6              | 18.8              | 13.9 | 45.6              | 17.4 | 56.8              | 20.7 | 67.1              | 30.3 | 96.6              |                                |                   |       |                   |       |                   |                 |                   |                |                   |       |
| 800           | 6.3              | 23.9              | 15.7 | 58.0              | 19.6 | 72.0              | 23.3 | 85.1              |      |                   |                                |                   |       |                   |       |                   |                 |                   |                |                   |       |



## UPVC Electrical Conduits & Tubing according to NEMA TC-2

Applications: EPT Electrical plastic tubing for encasement in concrete, EPC 40 Electrical plastic conduit for direct burial underground, EPC 80 Electrical plastic conduit for heavy duty.

| Nominal Size<br>inch | Outside diameter<br>(mm) |        | Wall Thickness (mm) |      |        |       |        |       | Weight kg/m |       |        |
|----------------------|--------------------------|--------|---------------------|------|--------|-------|--------|-------|-------------|-------|--------|
|                      |                          |        | EPT                 |      | 40 EPC |       | 80 EPC |       | EPT         | 40EPC | 80 EPC |
|                      | min                      | max    | min                 | max  | min    | max   | min    | max   |             |       |        |
| 2/1                  | 21.24                    | 21.44  | 1.52                | 2.03 | 2.77   | 3.28  | 3.73   | 4.24  | 0.155       | 0.24  | 0.3    |
| 4/3                  | 26.57                    | 26.77  | 1.52                | 2.03 | 2.87   | 3.38  | 3.91   | 4.24  | 0.197       | 0.33  | 0.43   |
| 1                    | 33.27                    | 33.53  | 1.52                | 2.03 | 3.38   | 3.89  | 4.55   | 5.08  | 0.25        | 0.48  | 0.61   |
| 4/11                 | 42.03                    | 42.29  | 1.78                | 2.29 | 3.56   | 4.07  | 4.85   | 5.44  | 0.365       | 0.65  | 0.87   |
| 2/11                 | 48.11                    | 48.41  | 2.03                | 2.54 | 3.68   | 4.19  | 5.08   | 5.69  | 0.47        | 0.77  | 1.03   |
| 2                    | 60.17                    | 60.47  | 2.54                | 3.05 | 3.91   | 4.42  | 5.54   | 6.2   | 0.717       | 1.04  | 1.43   |
| 2/12                 | 72.84                    | 73.2   | 2.79                | 3.30 | 5.16   | 5.77  | 7.01   | 7.85  | 0.952       | 1.57  | 2.2    |
| 3                    | 88.70                    | 89.1   | 3.18                | 3.68 | 5.49   | 6.15  | 7.62   | 8.53  | 1.31        | 2.14  | 2.91   |
| 4                    | 114.1                    | 114.5  | 3.81                | 4.32 | 6.02   | 6.73  | 8.56   | 9.58  | 2.0         | 3.05  | 4.26   |
| 5                    | 141.05                   | 141.55 | -                   | -    | 6.22   | 7.347 | 9.52   | 10.67 | -           | 4.18  | 6.42   |
| 6                    | 168.0                    | 168.56 | -                   | -    | 7.11   | 7.98  | 10.97  | 12.29 | -           | 5.37  | 8.13   |

## UPVC Utilities Duct according to NEMA TC-6 & ASTM F 512

Applications: Type EB for encased burial in concrete, Type DB for direct burial without concrete.

| Nominal Size (mm) | Outside Diameter (mm) | PVC type EB 20      |             | PVC type DB 60      |             |
|-------------------|-----------------------|---------------------|-------------|---------------------|-------------|
|                   |                       | Wall Thickness (mm) | Weight kg/m | Wall Thickness (mm) | Weight kg/m |
| 2                 | 60.17                 | 1.52                | 0.465       | 1.52                | 0.465       |
| 3                 | 88.7                  | 1.55                | 0.703       | 2.34                | 1.000       |
| 4                 | 114.1                 | 2.08                | 1.170       | 3.07                | 1.650       |
| 5                 | 141.05                | 2.62                | 1.170       | 3.86                | 2.50        |
| 6                 | 168.0                 | 3.18                | 2.530       | 4.62                | 3.570       |

## UPVC Utilities Duct according to NEMA TC-8 & ASTM F 512

Applications: Type EB for encased burial in concrete, Type DB for direct burial without concrete.

| Nominal Size (mm) | Outside Diameter (mm) | PVC type EB 135     |             | PVC type DB 120     |             |
|-------------------|-----------------------|---------------------|-------------|---------------------|-------------|
|                   |                       | Wall Thickness (mm) | Weight kg/m | Wall Thickness (mm) | Weight kg/m |
| 1                 | 33.27                 | -                   | -           | 1.52                | 0.251       |
| 1 1/2             | 48.11                 | -                   | -           | 1.52                | 0.369       |
| 2                 | 60.17                 | 1.52                | 0.465       | 1.96                | 0.576       |
| 3                 | 88.7                  | 1.93                | 0.847       | 3.00                | 1.250       |
| 4                 | 114.1                 | 2.54                | 1.390       | 3.91                | 2.050       |
| 5                 | 141.05                | 3.2                 | 2.09        | 4.85                | 3.12        |
| 6                 | 168.0                 | 3.86                | 3.020       | 5.77                | 4.420       |

Length: 5.8 & 6 meters | Colour: Grey.  
Socket Type: Solvent cement (SC/J) type \*Non standard lengths and colours are available on request.

## UPVC Electrical & Telephone Duct

Applications: Electrical and telephone duct.

| Duct No. | Outside Diameter (mm) | Wall Thickness (mm) |      |
|----------|-----------------------|---------------------|------|
|          |                       | min                 | max  |
| 54D      | 96.5 +/-0.2           | 3.25                | 3.65 |
| 56       | 53.9 +/-0.1           | 1.55                | 1.70 |
| 57       | 114.3 +/-0.2          | 3.4                 | 3.8  |

Length: 6 meters | Colour: Black.  
Socket Type: Solvent cement (SC/J) type  
\*Non standard lengths and colours are available on request.

## UPVC Telephone Duct (U-Gard)

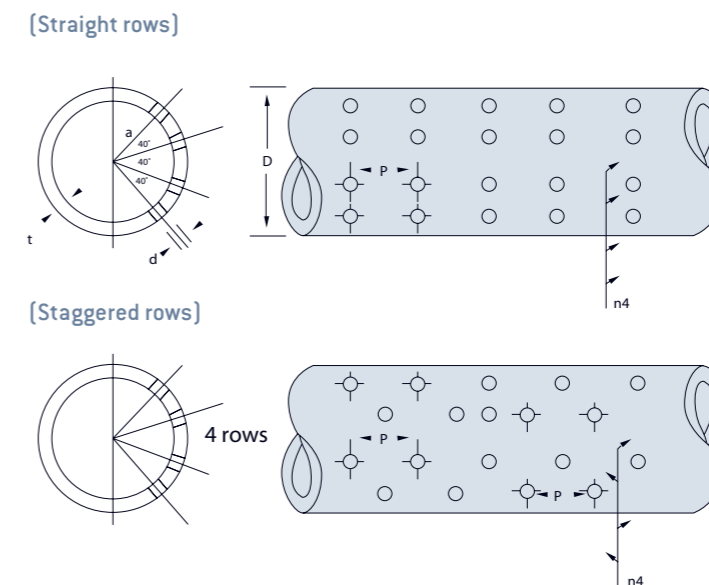
Applications: Electrical and telephone duct.

| Item Description | Wall Thickness (mm) | No. of Holes/pc | Length (cm/pc) | Weight (kg/pc) |
|------------------|---------------------|-----------------|----------------|----------------|
| 36 U-Gard        | 2.8                 | 10              | 150            | 0.60           |

Colour: Yellow.  
Note: UV Resistance

## Perforated UPVC Pipes

Manarco Perforated uPVC pipes are manufactured upon request depending on the size and class of the pipes, below figures given a general configuration which may vary for each clients requirements.



Range of sizes : 75mm to 500mm  
Longitude Pitch of wholes (LP) : 30mm to 200mm  
Hole Diameter : 05mm to 13mm  
Number of rows : 1 to 6  
Angular Pitch of holes : 40 degree for 3 to 4 rows.  
40, 80 or 120 degree for 2 rows.

## Pipes Handling Storage

### Handling

1. The pipe should be handled with reasonable care to avoid breakage or damage.
2. The pipe should never be pushed or thrown from a delivery truck.
3. The pipe should be protected from direct sunlight at all Time's.
4. The pipe should be kept away from sharp objects (rocks, irons...etc.) to prevent damage.
5. Lifting of pipes requires extra care as the extended pipe weight can cause cracking or breakage.



### Storage - Uv Protection

1. The pipe should be protected from the sun. This will prevent the effects of ultraviolet-rays and heat build ups.
2. Pipes and fittings should always be protected from dirt and foreign matter.
3. UPVC pipes should be provided with adequate support at all times.
4. Pipes should not be stacked in large piles, especially in warm temperature conditions.
5. For long term storage, pipe racks should provide continuous support.
6. Closer supports will be required for sizes below 160 mm. In such pipe racks, pipes may be stored not more than seven layers
7. For temporary storage in the field, where racks are not provided, the ground should be level and free from loose stones.
8. UPVC pipes should always be stored in the shade to avoid ultra-violet rays.
9. Special care must be taken in transit, handling and storage to avoid damage to the ends.
10. PVC pipes should not be exposed to solar radiation for any length of time and ultraviolet rays which may cause discoloration. It is recommended to stock pipes in cool ventilated and shaded places

## Rules of Handling & Storage

|   |   |   |  |
|---|---|---|--|
|    | Never drag or roll individual pipes or bundles  |    | Always store pipes/fittings on flat, firm ground, able to withstand the weight of the material and lifting apparatus                   |
|    | Never throw or drop pipe and fittings from vehicle  |    | Always use non-metal slings when handling pipes/fittings (e.g. nylon or polypropylene)   |
|    | Never use metal hooks, slings or chains when handling pipes/fittings  |    | Always exercise special care when handling pipes in wet or frosty conditions, since they may become slippery                           |
|    | Never stack pipe bundles more than 3 meters or 3 bundles high   |    | Always keep protective packaging (battens, shrink-wrap, pallets, strapping, etc.) intact until pipes/tittings are required to be used. |
|    | Never place pipes/fittings in contact with lubricating or hydraulic oil, gasoline, solvent, or other aggressive materials |    | Always store pipes/fittings away from intense heat   |
|  | Never stack coils more than 2 meters high   |  | Always allow some bending deflection when pipes are loaded and unloaded  |
|  | Never store pipes and fittings near sharp objects   |  | Always protect pipes/fittings with opaque sheeting or tarpaulin  |

## Installation

### Joining of Push-Fit System

1. Cut the pipe square with a fine-toothed saw.
2. Chamfer the pipe end with a coarse file or chamfering tool.
3. Clean the spigot & socket from dust, grit, grease and make sure pipe is as dry as possible.
4. Insert pipe into the socket without seal ring in place and mark pipe when it's fully inserted.
5. Place seal ring in groove of socket ensuring that seal is oriented correctly.
6. Apply lubricant to the pipe, Fitting and seal ring.
7. Push-fit the pipe to the full socket depth.
8. Withdraw pipe 5 mm on waste system and 10 mm on soil system to allow for expansion.

### Join ng of Solvent Cement Piping

1. Cut the pipe square with a fine-toothed saw.
2. Clean the spigot and socket from dust, grit & grease. Make sure pipe is as dry as possible.
3. Apply solvent cement evenly over ma ng surfaces of both spigot and socket.
4. Insert pipe into socket with slight twisting ac on to full socket depth.
5. Remove surplus cement with a cloth & hold the joint firmly in position for 30 secs. to dry.



### General Installation Instruction

UPVC pipes do not fracture under load but can be liable to deformation. The extent of this deformation depends largely upon the compaction of the immediate surrounding fill. This fill should extend to the trench width in normal situations.

The external backfill and surcharge loads imposed on a pipe of rigid material, (such as vitrified clay, concrete, asbestos cement or cast iron) are supported mainly by the resistance of the pipe to circumferential bending. On the other hand, UPVC pipes being relatively flexible, offer less resistance to circumferential deformation and rely partly on external support to resist deformation. Therefore, it is of primary importance for UPVC pipes that fill material, particularly the bedding and side fill, should be properly compacted in order to prevent excessive deformation.

It is desirable that vertical deformation should be limited to 5% on completion of the backfilling, which can only be achieved by proper composition and compaction of the backfill. It is essential to avoid high stress concentrations and sharp objects such as large stones or flints which should not be allowed to come into contact with the surface of the pipe.

The flexible nature of UPVC pipes helps them to accommodate deformation's resulting from ground movement or from other differential settlement under normal circumstances.

When a vertical load is imposed on the UPVC pipes the resulting horizontal force is transmitted to the undisturbed trench wall by the side fill. Any deflection of the pipe will cease when the horizontal reaction of the side fill corresponds to the transmitted vertical load and a state of equilibrium is reached.

Except in special circumstances, e.g., at very shallow cover depths or where it is necessary to safeguard the foundations of existing structures, the use of concrete for bedding or surrounding the pipes is unnecessary.

### Pipe Laying

Normally, drainage pipe work is laid in straight lines. However, in special circumstances, it may sometimes be acceptable to the jointed pipes to a slight curve to avoid an obstacle, or to follow the curvature of a street. If this is done and joints are of the push-fit type, care has to be taken not to spring the pipe work too sharp. Otherwise, a curve or the joints may be overstrained and cause a subsequent failure. Straining of the joints can be minimized by firmly backfilling a short length of pipe.

The pipe should be anchored in this position by further backfilling before the next joint is made and the process repeated as necessary. The trench may need to be widened on the curve to accommodate the pipe in its straight position. It is essential that the joining is always carried out in the straight position.

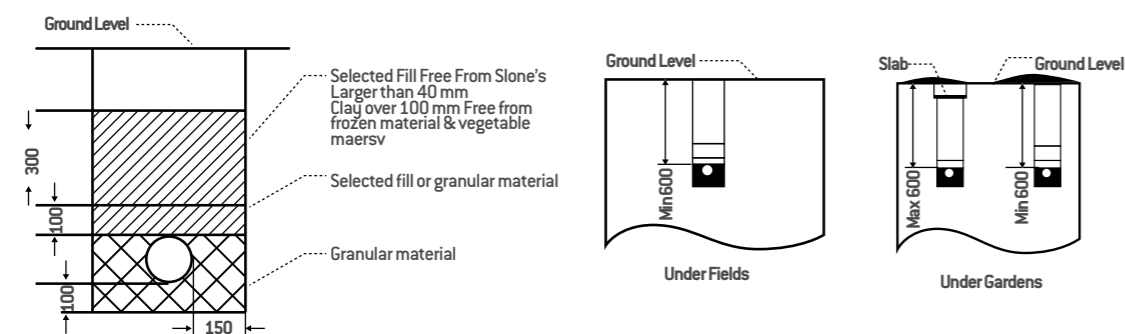
### Excavation

The trench should not be opened too long in advance of pipe laying and should be backfilled as soon as possible. It is essential to ensure that the sides of the trenches are adequately supported.

The width of the trench within any timbering should be as narrow as is practicable, but not less than the outside diameter of the pipe plus sufficient extra width (usually about 150 mm) on each side of the pipe to provide access for making the joints, as well as placing and compacting side fill.

### Pipe Bedding

The maximum and minimum recommended depths are illustrated in the below construction details:



### Protection Of Upvc Pipes

If the UPVC pipe has less than 300 mm depth of cover under an area other than a vehicular area, it should have concrete paving slabs laid as bridging on granular or other flexible filling at least 75 mm above the top of the pipe. If the UPVC pipe has less than 600 mm bridging in a similar manner.

If the material is suitable for use as bedding, the bottom of the trench may be trimmed to form the pipe bed. Otherwise, the trench should be excavated to an adequate depth below the level of the pipe to necessary thickness of bedding material.

The thickness of bedding under the pipes should be at least 100 mm, but in very wet or so conditions or where the trench bottom is very irregular, it may be necessary to increase this thickness.

Bedding should be properly compacted and finished so as to provide uniform support for the pipe. It is essential that bricks or other hard materials are not placed under the pipes for temporary or permanent support.

### Bedding Material

Material to be used for bedding and surrounding the pipes should be selected granular material.

Suitable Materials for UPVC Pipe Bedding

| Pipe ND (mm)  | Bedding Material   |
|---------------|--|
| 110           | 10mm single-sized granules   |
| 160           | 10mm or 14mm single-sized or 14 to 5 graded granules                     |
| 200 and above | 10mm, 14 mm or 20 mm single-sized, or 14 to 5 or 20 to 5 graded granules |

Bedding material should not contain pieces with sharp edges. The maximum particle size should generally not exceed 20 mm. The presence of an occasional particle between 20mm and 40 mm is acceptable provided the total quantity of such particles is only a very small fraction.

### Testing

Tests should be carried out after the system has been installed before and after backfilling. The following steps should be taken.

1. The system should be flushed out with water to clean any undesired matter before the test.
2. Air test: Air to be pumped into the system until a pressure of 100 mm head is achieved. Maximum loss of head on a manometer should not exceed 25 mm during a period of 5 minutes.
3. Water test - The system to be filled with water, a test pressure of 1.5 m head above the crown of the pipe is to be applied at the higher end of the sewer ensuring that the resultant head at the lower end is not exceeding 4.0 m. The sewer should then be filled with water for at least 1 hour. The level of the water in the stand pipe should be maintained by adding known quantities of water every 10 minutes for a period of 30 minutes. The loss of water should not exceed one liter per hour, per linear meter, per meter of nominal diameter.
4. Pressure hydrostatic testing specification will be at the discretion of the responsible Engineer but should not exceed 1 1/2 times designed working pressure of the lowest rated component in the system and a duration of 24 hours. A permissible water loss of 3 liters per kilometer of pipe per 25mm nominal bore, per 3 bar of test pressure, per 24 hours, may be considered reasonable. Air testing is not recommended. If, however, for practical reasons, pneumatic testing is necessary, this should be limited to a maximum pressure of 1.5 bar.

## CPVC PIPE SYSTEM

Manarco' PVC and CPVC pipe have a number of outstanding features, such as high chemical resistance, easy installation, and reasonable price, which can lead to the reduction of total construction cost. Manarco' PVC and CPVC can or should replace other materials of construction in size ranges available for all sorts of piping systems.

CPVC (Chlorinated Polyvinyl Chloride) is another rigid pipe which has three highly desirable characteristics, good mechanical strength at high temperatures and higher chemical resistance and relatively compared to metal. CPVC polymer is more chlorinated into PVC polymer. This extra chlorine is responsible for the material's high temperature strength and other properties which are valuable for industrial piping. For pressure piping applications, it is recommended for temperatures as high as 200°F compared with 140°F of PVC.

## ADVANTAGES

### Chemical Resistance

PVC and CPVC pipe are inert to attack by strong acids, alkalis, salt solutions, alcohols, and many other chemicals. They are dependable on corrosive applications and impart no tastes or odors to materials carried in them. They do not react with materials carried, nor act as a catalyst. All possibility of contamination, or chemical process changes, and all danger of clouding, slugging, or discoloration are eliminated.

Manarco' Sch80 PVC & CPVC Pipe ranging in sizes from 1/2" through 24", and PVC fittings and PVC valves are available for light, medium, and heavy duty use.

PVC and CPVC are environmentally friendly polymer in terms of low carbonic acid gas emission in manufacturing process

### Chemical Resistance

PVC and CPVC pipe are highly resilient, tough and durable products that have high tensile and high impact strength. They will withstand surprisingly high pressure for long periods. Fire Resistance PVC and CPVC pipe products are self extinguishing and will not support combustion. They have an ASTM E-84 flame spread rate of 25 or less.

### External Corrosion Resistance

Industrial fumes, humidity, saltwater, weather, atmospheric, or underground conditions, regardless of type of soil or moisture encountered, cannot harm rigid PVC and CPVC plastic pipe. Scratches or surface abrasions do not provide points which corrosive elements can attack. Immunity to Galvanic or Electrolytic Attack PVC and CPVC pipe are inherently immune to galvanic or electrolytic action. They can be used underground, underwater, in the presence of metals, and can also be connected to metals.

### Freedom from Toxicity, Odors, Tastes

PVC and CPVC piping are nontoxic, odorless, and tasteless. They have been listed by the National Sanitation Foundation for use with potable water.

### Corrosion Free

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 and CPVC, there are no corrosive byproducts, therefore, no contamination of the piped fluid.

### Low Friction Loss

The smooth interior surfaces of PVC and CPVC pipe, compared to metal and other piping materials, assure low friction loss and high flow rates. Additionally, since PVC and CPVC pipe will not rust, pit, scale, or corrode, the high flow rates will be maintained for the life of the piping system.

### Low Thermal Conductivity

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

## Easy Installation and Low Installation Cost

PVC and CPVC pipe are lightweight, convenient to handle, relatively flexible, and easy to install. For example, it is approximately 1/5 to 1/6 for the weight of metal.

They have smooth, seamless interior walls. No special tools are required for cutting. They can be installed using solvent cementing, threading, flanging techniques.

These features lead to lower installed costs than conventional metal piping.

## Maintenance Free

Once a PVC or CPVC piping system is properly selected, designed, and installed, it is virtually maintenance free. It will not rust, scale, pit, corrode, or promote build-up on the interior. Therefore, years of trouble-free service can be expected when using MANARCO PVC and CPVC pipe.

## Standard Approved

MANARCO' PVC and CPVC pipe complies with the industry standards and requirements as set forth by the American Society for Testing and Materials (ASTM) and the National Sanitation Foundation (NSF International).

## MANARCO' CPVC Pipe is Manufactured to The Following Standard Specifications

| Type             | Material (Cell Classification) | Dimensions | Commercial Classification   |
|------------------|--------------------------------|------------|-----------------------------|
| CPVC Schedule 80 | ASTM D-1784 (23447)            | ASTM F-441 | Type IV, Grade 1, CPVC 4120 |

## CPVC Pipe Dimensions, Weights and Maximum Operating Pressure

| Nominal Pipe Size |     | Outdoor Pipe Size |       | Wall Thickness |       | Approx. Inside Diameter | Nominal Weight<br>CPVC | Max. operating Pressure |
|-------------------|-----|-------------------|-------|----------------|-------|-------------------------|------------------------|-------------------------|
| inch              | mm  | mm                |       | mm             |       | mm                      | kg/m                   | MPa                     |
| 1/2"              | 15  | 21.34             | ±0.10 | 3.73           | +0.51 | 13.4                    | 0.337                  | 5.86                    |
| 3/4"              | 20  | 26.67             | ±0.10 | 3.91           | +0.51 | 18.3                    | 0.457                  | 4.76                    |
| 1"                | 25  | 33.40             | ±0.13 | 4.55           | +0.53 | 23.8                    | 0.670                  | 4.34                    |
| 1-1/4"            | 32  | 42.16             | ±0.13 | 4.85           | +0.58 | 31.9                    | 0.927                  | 3.59                    |
| 1-1/2"            | 40  | 48.26             | ±0.15 | 5.08           | +0.61 | 37.5                    | 1.124                  | 3.24                    |
| 2"                | 50  | 60.32             | ±0.15 | 5.54           | +0.66 | 48.6                    | 1.556                  | 2.76                    |
| 2-1/2"            | 65  | 73.02             | ±0.18 | 7.01           | +0.84 | 58.2                    | 2.373                  | 2.90                    |
| 3"                | 80  | 88.90             | ±0.20 | 7.62           | +0.91 | 72.8                    | 3.178                  | 2.55                    |
| 4"                | 100 | 114.30            | ±0.23 | 8.56           | +1.02 | 96.2                    | 4.468                  | 2.21                    |
| 5"                | 125 | 141.30            | ±0.25 | 9.53           | +1.14 | 121.1                   | 6.450                  | 2.00                    |
| 6"                | 150 | 168.28            | ±0.28 | 10.97          | +1.32 | 145.0                   | 8.873                  | 1.93                    |



## Properties of CPVC PIPES

| ITEM  | Test Method | SI unit                |                          |
|---|-------------|------------------------|--------------------------|
|   |             | unit                   | CPVC                     |
| <b>GENERAL</b>  |             |                        |                          |
| Cell Classification                                       | ASTM D1784  | —                      | 23447                    |
| Maximum Usable Temp.                                      | —           | °C                     | 93                       |
| Specific Gravity @ 73°F(23°C)                             | ASTM D792   | g/cc                   | 1.55±0.02                |
| Water Absorption % increase 24 hrs@ 73°F(23°C)            | ASTM D570   | %                      | 0.04                     |
| Hardness, Rockwell  | ASTM D785   | —                      | 115-125                  |
| Poisson's Ratio @ 73°F(23°C)                              | ASTM D638   | —                      | 0.36                     |
| <b>MECHANICAL</b>   |             |                        |                          |
| Tensile Strength @ 73°F(23°C)                             | ASTM D638   | MPa                    | 53.1                     |
| Tensile Strength @ 194 °F(90°C)                           | "           | MPa                    | 22.1                     |
| Tensile Modulus of Elasticity @ 73°F(23°C)                | "           | GPa                    | 2.62                     |
| Tensile Modulus of Elasticity @ 194°F(90°C)               | "           | GPa                    | 1.52                     |
| Flexural Strength @ 73°F(23°C)                            | ASTM D790   | MPa                    | 89.6                     |
| Flexural Modulus of Elasticity @ 73°F(23°C)               | "           | GPa                    | 2.69                     |
| Compressive Strength @ 73°F(23°C) ε =10                   | ASTM D695   | MPa                    | 96.5                     |
| Compressive Modulus of Elasticity @ 73°F(23°C)            | "           | GPa                    | 1.00                     |
| Izod Impact, notched @ 73°F(23°C)                         | ASTM D256   | J/m                    | 160                      |
| <b>THERMAL</b>  |             |                        |                          |
| Coefficient of Linear Expansion                           | ASTM D696   | m/m/°C                 | 7.0-8.0x10 <sup>-5</sup> |
| Coefficient of Thermal Conductivity                       | ASTM C177   | Watt/m <sup>2</sup> /K | 0.13                     |
| Heat Deflection Temperature Under Load (264psi, annealed) | ASTM D648   | °C                     | 110                      |
| Specific Heat   | ASTM D2766  | J <sup>o</sup> /K/g    | 1.1                      |
| <b>ELECTRICAL</b>   |             |                        |                          |
| Volume Resistivity  | ASTM D257   | ohm/cm                 | >1.0 x 10 <sup>15</sup>  |
| Dielectric Strength                                       | ASTM D149   | volt/mm                | >1000                    |
| Dielectric Constant                                       | ASTM D150   | —                      | 3                        |
| Power Factor  | "           | —                      | 0.01-0.02                |
| Electrical Conductivity                                   | —           | —                      | Non Conductor            |
| <b>FIRE PERFORMANCE</b>                                   |             |                        |                          |
| Flammability Rating                                       | UL-94       | —                      | UL-94                    |
| Flame Spread Index  | "           | —                      | <10                      |
| Average Time of Burning                                   | ASTM D635   | sec                    | <5                       |
| Average Extent of Burning                                 | "           | mm                     | <10                      |
| Burning Rate  | "           | mm/min                 | Self Extinguishing       |
| Limiting Oxygen Index (LOI)                               | ASTM D2863  | LOI                    | 60                       |







**MANARCO**  
UPVC FITTINGS  
ORANGE



## Advantages of Mechanical Piping Systems Using Lip Seal Rubber Ring

Manarco lip seal fittings offer mechanical fixing joints which has substantial advantages. Moreover, the revolution by the polymer industry has played a vital role in the reduction of water and sewage network costs. These advantages could be summarized as follows:

### Corrosion Resistance

uPVC Fittings being a non-conductor and non-metallic. It resist all types of galvanic and electromechanical influences, all types of corrosion caused by water, industrial liquids and chemicals. Thus increasing the life time of installed uPVC piping system.

### Resistance to Biological Attack and Growth

uPVC Fittings is resistant to any microscopic life that it might be exposed to. It does not offer a nourishing source to any bacterial life form and is completely guaranteed to withstand any such growth.

### Resistance to Abrasion

uPVC pipes are highly resistant to abrasion due to stress from abrasion fluids of excessive pressure. Tests have shown that uPVC Piping System are up to 2.5 times more resistant to abrasion when compared to steel.

### Reaction with Building Materials

uPVC does not react with any of the normal building materials like cements and paints. However, information about chemical resistance of uPVC Fittings to a wide range of chemicals can be found in the tables of chemical resistance list. Please consult with manufacturer supplies.

### Flammability

uPVC Fittings is self – extinguishing material as per BS2782 and does not support fire and toxic fumes.

## Advantages of Mechanical Piping Systems Using

Long exposure to direct sunlight causes the color of uPVC Fittings to fade, in addition to the reduction of impact strength. The effect of sunlight does not seriously affect the performance of the system, however it is always advisable to protect the system from the direct exposure to sunlight.

### Effect of Frost

The uPVC Fittings is not affected by frost, however sub-zero temperature reduce the impact strength of the uPVC System. Therefore, extra care is to be given while handling and installing uPVC during sub-zero temperatures.

## Handling

- Take all reasonable care when handling uPVC Fittings, in very cold conditions as impact strength of the material is reduced.
- Do not throw or drop pipes.

## Storage

### Fittings

Fittings should be stored in their original packaging and staked in cartons or bags on shelves. When storage in the open is required, then screening from the sun is necessary with an air gap between the stored fittings. In case fittings are removed from their boxes do not mix with other materials. Avoid storage of UPVC fittings near an open flame or extreme heat. Store fittings under cover.

### Storage in hot climates

- Ultra-violet light can affect fittings: fittings colour may change and rubber seals may be degraded.
- Accordingly;
  - A. Store all materials in well-ventilated, shady conditions
  - B. Do NOT expose to direct sunlight
  - C. Keep fittings in original packaging until required for use

## Installation Guide

### Trench Construction

It is essential to avoid high stress concentrations and sharp objects such as large stones or flints which should not come into contact with the surface of the pipe. The flexible nature of uPVC pipes helps them to accommodate deformations resulting from ground movement or from other differential settlement under normal circumstances.

1. Trench Contour  
The trench bottom should be continuous, relatively smooth and free of rocks. It is advisable to pad the trench bottom using sand or compacted fine-grained soil.
2. Trench Width  
The recommended trench width should be at least equal to the Pipe & Fittings outside diameter plus 300 mm.
3. Trench Depth  
The trench depth is the distance between the ground level and the upper level of the Pipe & Fittings. Trench depth  $1.5D$ , where  $D$  is the diameter of the Pipe & Fittings.

### Installation to Normal Vehicle Traffic

#### Trench depth

The minimum total cover should be not less than (ASTM F 690)

#### Requirements

- Size 32 to 63 mm in diameter - 450 mm
- Size 75 to 110 mm in diameter - 600 mm
- Size 140 to 400 mm in diameter - 750 mm
- Size above 400 mm in diameter - 900 mm

#### Ground Features and laying Tips

The lateral reaction of the ground caused by the deformation of the Pipe & Fittings, depends on the soil and laying methods and on the level of tamping needed for back filling material.

#### External Loads on a Buried Pipe & Fittings.

External Loads on a Buried Pipe

Where EL : Earth load

TL : Traffic load

HL : Hydrostatic load

#### Calculations for loads on a buried Pipe & Fittings

1) Earth load  $EL = F \cdot H \text{ kg/m}^2$

Where F = portor density of sand

H = depth of the trench

2) Traffic load  $TL = \frac{3}{2} \times \frac{P}{h+d/2} \text{ kg/m}^2$

Where W = dramic factor for vehicle = 1 +0.3 H

P = concentrated load of the passing vehicle

Normally, P = 3000 kg for yard motor vehicle

P = 6000 kg for light motor vehicle

P = 9000 kg for heavy motor vehicle

3) Hydrostatic load

(The load due to the presence of the aquifer)HL

$HL = a \cdot (H - HI + D/2) \text{ kg/m}^2$

a = specific weight of the water (kg/m<sup>3</sup>)

H = the distance between the plane of site and the level of the aquifer.

### Vertical Installation

In horizontal installation, pipe clamps should be placed at intervals which are approximately ten times bigger than the pipe diameter. This will ensure that the installation is fixed and will not bend.

### REGISTER COUPLING R/J – F/F



| SIZE (mm) | Dimension |      | Wall Thickness (mm) |
|-----------|-----------|------|---------------------|
|           | K mm      | L mm |                     |
| 50        | 108       | 3    | 3.2                 |
| 75        | 131       | 3    | 3.2                 |
| 110       | 158       | 3    | 3.2                 |
| 160       | 200       | 4    | 4.7                 |
| 200       | 230       | 9    | 5.9                 |
| 250       | 250       | -    | 6.1                 |
| 315       | 293       | -    | 7.7                 |

### REPAIR COUPLING S C/J – F



| SIZE (mm) | Dimension |      | Wall Thickness (mm) |
|-----------|-----------|------|---------------------|
|           | K mm      | L mm |                     |
| 50        | 108       | 3    | 3.2                 |
| 75        | 131       | 3    | 3.2                 |
| 110       | 158       | 3    | 3.2                 |
| 160       | 200       | 4    | 4.7                 |
| 200       | 230       | 9    | 5.9                 |
| 250       | 250       | -    | 6.1                 |
| 315       | 293       | -    | 7.7                 |

### CLEAN OUT



| SIZE (mm) | Dimension | Wall Thickness (mm) |
|-----------|-----------|---------------------|
|           | L (mm)    |                     |
| 50        | 39        | 3.2                 |
| 75        | 54        | 3.2                 |
| 110       | 64.5      | 3.2                 |
| 160       | 78        | 4.7                 |





**ELBOW 45°**

| SIZE (mm) | Dimension |      | Wall Thickness (mm) |
|-----------|-----------|------|---------------------|
|           | K mm      | L mm |                     |
| 50        | 12        | 16   | 3.2                 |
| 75        | 23        | 29   | 3.2                 |
| 110       | 25        | 29   | 3.2                 |
| 160       | 38        | 42   | 4.7                 |
| 200       | 86        | 74   | 5.9                 |
| 250       | 83        | 63   | 6.1                 |
| 315       | 153       | 167  | 7.7                 |




**ELBOW 90°**

| SIZE (mm) | Dimension |      | Wall Thickness (mm) |
|-----------|-----------|------|---------------------|
|           | K1 mm     | L mm |                     |
| 50        | 36        | 40   | 3.2                 |
| 75        | 62        | 67   | 3.2                 |
| 110       | 78        | 86   | 3.2                 |
| 160       | 132       | 110  | 4.7                 |
| 200       | 141       | 129  | 5.9                 |
| 250       | 139       | 145  | 6.1                 |
| 315       | 181       | 163  | 7.7                 |



**FLOOR GULLEY S C/J – F/F/F**

| SIZE (mm)     |
|---------------|
| 110 x 75 x 50 |



**LONG GULLY**

| SIZE (mm)          |
|--------------------|
| 110 x 50 x 50 x 50 |



**LEVEL INVERT REDUCER R/J – M/F**

| SIZE (mm) | Dimension | Wall Thickness (mm) |
|-----------|-----------|---------------------|
|           | K1 mm     |                     |
| 50 x 40   | 21        | 2.0                 |
| 75 x 50   | 45        | 3.2                 |
| 110 x 50  | 50        | 3.2                 |
| 110 x 75  | 35        | 3.2                 |
| 160 x 110 | 34        | 3.6                 |
| 200 x 160 | 29        | 4.5                 |



**NON RETURN VALVE R/J – M/F**

| SIZE (mm) | Dimension |         |         |         |
|-----------|-----------|---------|---------|---------|
|           | L (mm)    | z1 (mm) | z2 (mm) | z3 (mm) |
| 160       | 375       | 160     | 280     | 250     |



**CAP**

| SIZE (mm) | Dimension | Wall Thickness (mm) |
|-----------|-----------|---------------------|
|           | L (mm)    |                     |
| 50        | 45        | 3.2                 |
| 75        | 59        | 3.2                 |
| 110       | 56        | 3.2                 |
| 160       | 65        | 4.7                 |
| 200       | 114       | 5.9                 |

**TEE**



| SIZE<br>(mm) | Dimension |       |       | Wall<br>Thickness<br>(mm) |
|--------------|-----------|-------|-------|---------------------------|
|              | K1 mm     | K2 mm | K3 mm |                           |
| 50x50        | 46        | 50    | 31    | 3.2                       |
| 75x75        | 62        | 67    | 44    | 3.2                       |
| 110x110      | 83        | 87    | 62    | 3.2                       |
| 110x75       | 52        | 80    | 45    | 3.2                       |
| 110x50       | 28        | 60    | 32    | 3.2                       |
| 160x160      | 80        | 93    | 93    | 4.7                       |
| 160x110      | 60        | 87    | 65    | 3.6                       |
| 200x200      | 105       | 111   | 111   | 4.5                       |
| 250 x 250    | 91        | 138   | 90    | 6.1                       |
| 315 x 315    | -         | -     | -     | -                         |

**Y-TEE**



| SIZE<br>(mm) | Dimension |       |       | Wall<br>Thickness<br>(mm) |
|--------------|-----------|-------|-------|---------------------------|
|              | K1 mm     | K2 mm | K3 mm |                           |
| 50x50        | 14        | 62    | 62    | 3.2                       |
| 75x75        | 23        | 95    | 95    | 3.2                       |
| 110x110      | 25        | 136   | 136   | 3.2                       |
| 110x75       | 0         | 107   | 95    | 3.2                       |
| 110x50       | 4         | 120   | 112   | 3.2                       |
| 160x160      | 38        | 198   | 198   | 4.7                       |
| 160x110      | 7         | 172   | 163   | 4.7                       |
| 200x200      | 46        | 241   | 241   | 5.9                       |
| 250 x 250    | 64        | 78    | 417   | 6.1                       |
| 315 x 315    | 8         | 475   | 475   | 7.7                       |







**MANARCO**  
UPVC DWV FITTINGS



## MANARCO UPVC DWV FITTINGS

| ELBOW 90° |            |       |
|-----------|------------|-------|
| Size In.  | Dimensions |       |
|           | C          | C1    |
|           | mm         | mm    |
| 1/2"      | 31.76      | 13.49 |
| 3/4"      | 34.14      | 15.08 |
| 1"        | 42.07      | 18.65 |
| 1 1/2"    | 56.37      | 26.99 |
| 2"        | 64.29      | 33.34 |
| 3"        | 85         | 51    |
| 4"        | 110        | 59    |
| 6"        | 175        | 89    |
| 110       | 119.00     | 50.00 |
| 160       | 176.00     | 76.70 |

| TEE      |            |       |
|----------|------------|-------|
| Size In. | Dimensions |       |
|          | C          | C1    |
|          | mm         | mm    |
| 1/2"     | 31.49      | 13.49 |
| 3/4"     | 34.14      | 15.08 |
| 1"       | 42.07      | 18.65 |
| 1 1/2"   | 56.37      | 26.99 |
| 2"       | 64.29      | 33.34 |
| 3"       | 99.5       | 51    |
| 4"       | 110        | 59    |
| 6"       | 177.5      | 89.5  |
| 110      | 119.70     | 50.00 |
| 160      | 176.00     | 89.30 |

| WYE      |            |       |        |
|----------|------------|-------|--------|
| Size In. | Dimensions |       |        |
|          | C          | C1    | C2     |
|          | mm         | mm    | mm     |
| 1 1/2"   | 98.43      | 26.99 | 71.44  |
| 2"       | 127        | 34.92 | 92.07  |
| 3"       | 168.28     | 41.9  | 127    |
| 4"       | 119.80     | 50.00 | 161.93 |
| 6"       | 175        | 89    | 214.31 |
| 110 mm   | 123.73     | 51.40 |        |
| 160 mm   | 176        | 89.3  |        |

| ELBOW 45° |            |       |
|-----------|------------|-------|
| Size In.  | Dimensions |       |
|           | C          | C1    |
|           | mm         | mm    |
| 1/2"      | 24.94      | 6.67  |
| 3/4"      | 27.39      | 8.93  |
| 1"        | 31.75      | 8.93  |
| 1 1/2"    | 41.05      | 11.67 |
| 2"        | 47.62      | 16.64 |
| 3"        | 72         | 21    |
| 4"        | 76.5       | 25.6  |
| 6"        | 80         | 29    |
| 110       | 119.50     | 50.00 |
| 160       | 176.00     | 70.50 |

| FLOOR GULLY |            |       |       |
|-------------|------------|-------|-------|
| Size In.    | Dimensions |       |       |
|             | A          | B     | C     |
|             | mm         | mm    | mm    |
| 4"          | 155.57     | 98.42 | 98.42 |




**P-TRAP SHORT**

| Size In. | Dimensions |       |        |
|----------|------------|-------|--------|
|          | C          | C1    | D      |
|          | mm         | mm    | mm     |
| 4"       | 51.80      | 45.80 | 127.05 |
| 110 mm   | 51.8       | 45.80 | 119.5  |



**TEE WITH ACCESS CAP**

| Size In. | Dimensions |       |        |
|----------|------------|-------|--------|
|          | C          | C1    | D      |
|          | mm         | mm    | mm     |
| 4"       | 221.60     | 51.05 | 127.65 |
| 110 mm   | 120.00     | 50.00 | 119.00 |




**COUPLING**

| Size In. | Dimensions |       |
|----------|------------|-------|
|          | C          | C1    |
|          | mm         | mm    |
| 1/2"     | 39.1       | 3.18  |
| 3/4"     | 41.29      | 3.18  |
| 1"       | 50.1       | 3.18  |
| 1 1/2"   | 61.94      | 3.18  |
| 2"       | 65.08      | 3.18  |
| 3"       | 107        | 5     |
| 4"       | 107        | 5     |
| 6"       | 184.5      | 5     |
| 110      | 120.00     | 49.70 |
| 160      | 178.00     | 68.30 |



**ELBOW WITH ACCESS CAP**

| Size In. | Dimensions |       |        |
|----------|------------|-------|--------|
|          | C          | C1    | D      |
|          | mm         | mm    | mm     |
| 4"       | 27.00      | 51.70 | 126.85 |
| 110 mm   | 27.00      | 50.00 | 119.00 |



**ACCESS CAP AND PLUG**

| Size In. | Dimensions |        |        |
|----------|------------|--------|--------|
|          | C          | C1     | D      |
|          | mm         | mm     | mm     |
| 4"       | 71.65      | 125.85 | 112.00 |
| 110 mm   | 47.00      | 125.00 | 119.50 |
| 160 mm   | 138        |        |        |



**SANITARY SWEPT TEE**

| Size In. | Dimensions |       |       |
|----------|------------|-------|-------|
|          | A          | B     | C     |
|          | mm         | mm    | mm    |
| 4"       | 155.57     | 98.42 | 98.42 |





**UPVC CONDUIT**  
PIPES AND FITTINGS



## RIGID CONDUIT

According to SASO GSO IES 21-61386

| Outside Diameter | Wall Thickness | Standard Pack |
|------------------|----------------|---------------|
| 20 MM            | 1.55 MM        | 75 M          |
| 25 MM            | 1.8 MM         | 75 M          |
| 32 MM            | 2.1 MM         | 60 M          |
| 38 MM            | 2.5 MM         | 30 M          |
| 50 MM            | 3.2 MM         | 30 M          |

### LIGHT DUTY

| Outside Diameter | Wall Thickness | Standard Pack |
|------------------|----------------|---------------|
| 20 MM            | 1.4 MM         | 75 M          |
| 25 MM            | 1.5 MM         | 75 M          |
| 32 MM            | 1.7 MM         | 60 M          |
| 38 MM            | 1.8 MM         | 30 M          |
| 50 MM            | 1.7 MM         | 30 M          |



## CIRCULAR BOXES

### ONE WAY



| Size / MM | PACKED |
|-----------|--------|
| 20 MM     | 60 NOS |
| 25 MM     | 60 NOS |

### TWO WAY ANGLE



| Size / MM | PACKED |
|-----------|--------|
| 20 MM     | 60 NOS |
| 25 MM     | 60 NOS |

### TWO WAY STRAIGHT



| Size / MM | PACKED |
|-----------|--------|
| 20 MM     | 60 NOS |
| 25 MM     | 60 NOS |

### THREE WAY



| Size / MM | PACKED |
|-----------|--------|
| 20 MM     | 60 NOS |
| 25 MM     | 60 NOS |

### FOUR WAY



| Size / MM | PACKED |
|-----------|--------|
| 20 MM     | 60 NOS |
| 25 MM     | 60 NOS |

## RIGID CONDUIT

### COUPLING



| Size / MM | PACKED  |
|-----------|---------|
| 20 MM     | 800 NOS |
| 25 MM     | 450 NOS |
| 32 MM     | 200 NOS |
| 38 MM     | 140 NOS |
| 50 MM     | 80 NOS  |

### ADAPTOR



| Size / MM | PACKED  |
|-----------|---------|
| 20 MM     | 900 NOS |
| 25 MM     | 500 NOS |
| 32 MM     | 270 NOS |
| 38 MM     | 190 NOS |
| 50 MM     | 90 NOS  |

## CONDUIT BEND

### ADAPTOR



| Size / MM | PACKED  |
|-----------|---------|
| 20 MM     | 170 NOS |
| 25 MM     | 110 NOS |
| 32 MM     | 35 NOS  |
| 50 MM     | 16 NOS  |
| 63 MM     | 10 NOS  |
| 75 MM     | 5 NOS   |
| 90 MM     | 5 NOS   |
| 110 MM    | 5 NOS   |









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