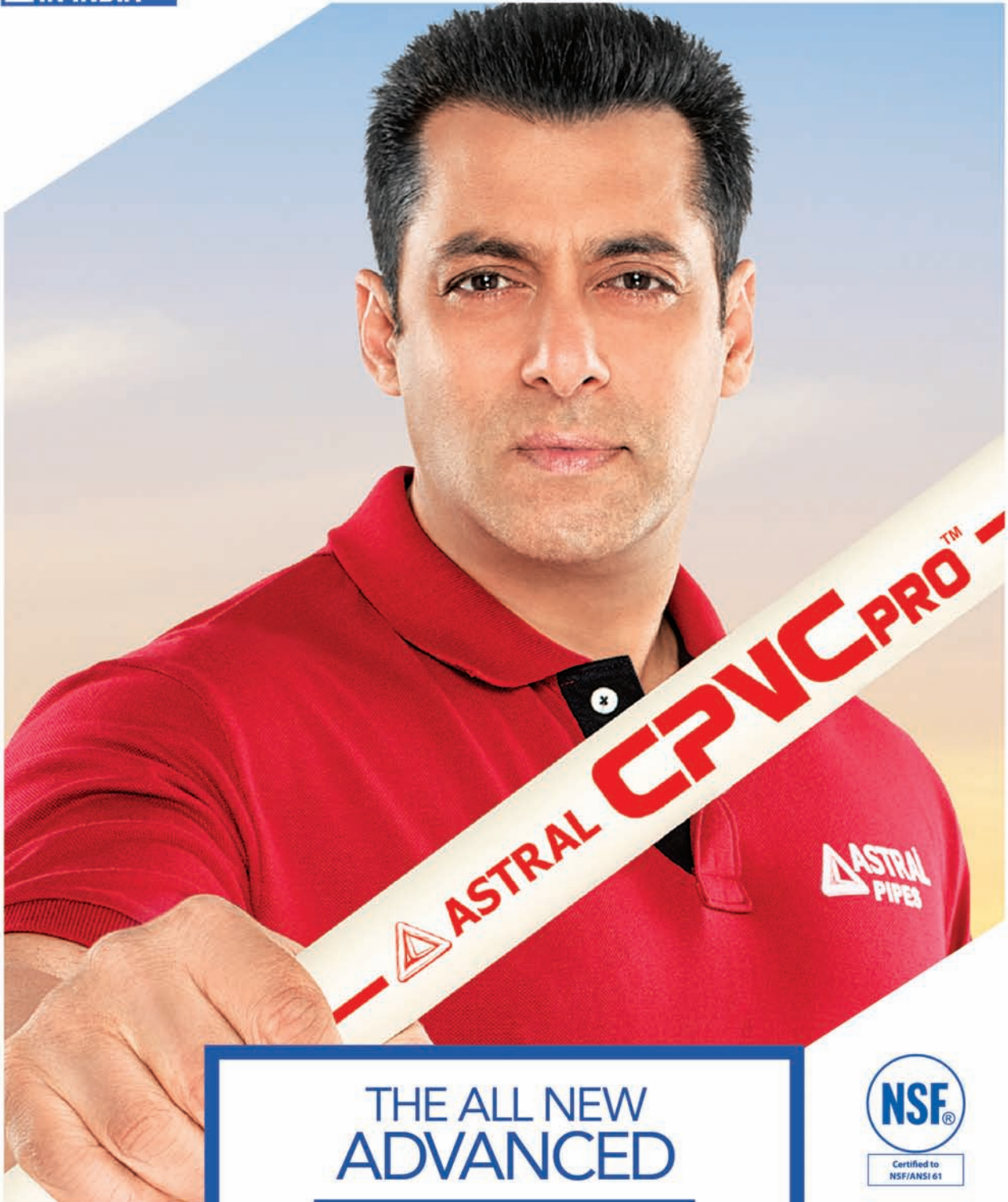


**1<sup>st</sup>**  
**TO**  
**INTRODUCE**  
**CPVC**  
**IN INDIA**

 **ASTRAL**  
**PIPES**



THE ALL NEW  
ADVANCED

ASTRAL  
**CPVC** PRO™

ADVANCED HOT AND COLD WATER PLUMBING SYSTEM



Certified to  
NSF/ANSI 61



**WE ARE  
PROUD TO  
INTRODUCE**

**ASTRAL  
CPVC PRO™**

ADVANCED HOT AND COLD WATER PLUMBING SYSTEM

A class apart in the category, ASTRAL CPVC PRO is more than just a hot and cold plumbing system. To us it is an initiative, to deliver a world-class plumbing solution to India.

**1<sup>st</sup>  
TO  
INTRODUCE  
CPVC  
IN INDIA**

**UPTO  
93°C**



# YET ANOTHER MILESTONE FIRST AND HAPPILY, THE MOST SIGNIFICANT SO FAR

Astral wins 'The Most Trusted Brand' award (Pipe Category)  
as per 'The brand Trust Report', India Study-2016

The Brand Trust Report - India Study 2016



Power of Trust

Thank you, for making us earn your trust.

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# ASTRAL INDIA'S PROGRESSIVE PIPE COMPANY

## ASTRAL INDIA'S PROGRESSIVE PIPE COMPANY

Astral Poly Technik Limited was established in 1996 with the aim to manufacture pro-India plumbing and drainage systems for the Indian market. While serving the plumbing needs of millions of houses, the company adds extra mileage to India's developing real estate fraternity. Our contribution to the plumbing industry in the form of being pro-innovative bears the hallmark of unbeaten quality. Astral Poly Technik Limited is equipped with production facilities at Santej & Dholka (Gujarat), and Hosur (Tamil Nadu) to manufacture Plumbing systems, Drainage systems, Agriculture and Electrical Conduit Pipes with all kinds of necessary fittings.

We are also known as pro-customers' company as we serve with an intention of taking excellence to new heights. Through our quality products and services we have also achieved the benchmark of being Pro-India Company in numerous ways.

### PRO-EXPERTISE

We are the pioneers of CPVC pipes in India. With over 17 years of expertise in this area, we have led the development of what is now the world's largest market for CPVC pipe and fittings.

### PRO-LEADERSHIP

We are one of the leading company in the plumbing industry with a turnover close to Rs. 1800 crores; with a network spanning 800 distributors and 25,000 dealers across India.

### PRO-TRUST

Our most important commitment is to our customer.

### PRO-FUTURE

Beyond manufacturing, we have invested in the industry by training more than 70,000 plumbers every year in India. We believe this training equips them in making their future sustainable.

### PRO-ACHIEVEMENT

We are the first Indian piping company having own NSF approved compound to be used in our certified CPVC piping system.



**ASTRAL PIPES**  
*STRONG NAHIN, ASTRAL STRONG!!*



#### **PRO-LEARNING**

We have full-fledged Research and Development division to constantly improve, innovate and to engineer new developments. This division has a fully integrated product development environment that encompasses the development process all the way from conceptual design of products to manufacturing.

#### **PRO-EXCELLENCE**

We constantly strive to upgrade processes and materials and to incorporate international developments in the plumbing industry to benefit their customers. We test our products beyond the requirements of IS and ASTM Standards.

#### **PRO-PROGRESS**

Initiating the process of compounding of raw material in India, is our contribution towards the Make in India initiative.

#### **PRO-EMPOWERMENT**

The best quality piping materials may cause problems if the installations are not carried out correctly. Therefore, we empower our users with updated product catalogues, technical manuals, installation literatures, audio-visual presentations and plumbing guides.

#### **PRO-INNOVATIONS**

We always think of our customer when working on innovative products and we make conscious effort to supply them with the best. We seek to deliver innovative product designs and improvements, new technologies and a fully integrated manufacturing system that assure quality.

#### **PRO-EXPANSION**

With Salman Khan as the voice of our products we hope to expand the already flourishing company that has more than 800 distributors and thousands of dealers in India penetrating the plumbing market from metro cities to smaller towns. Our products are now also available in more than 22 countries.

#### **PRO-EXPLORERS**

We have acquired UK based Bond IT and India based Resinova Chemie Ltd. in efforts to expand our business visions into other categories. With a plan to establish a strong presence in this category, we have deployed cutting edge technology and a talented work force.

Therefore, at Astral we are proud to support the pro-India spirit. So, be a part of this initiative by putting your trust in us.



## INNOVATIONS & RECOGNITIONS

- First to introduce CPVC piping system in India (1999)
- First to launch lead free uPVC piping system in India (2004)
- Corp Excel- National SME Excellence Award (2006)
- First to get NSF Certification for CPVC piping system in India (2007)
- First to launch lead free uPVC column pipes in India (2012)
- Enterprising Entrepreneur of the year 2012-13
- Business Standard Star SME of the year (2013)
- Inc. India Innovative 100 for Smart Innovation under category of "Technology" (2013)
- India's Most Promising Brand Award (2014)
- Value Creator Award during the first ever Fortune India Next 500 (2015)
- India's Most Trusted Brand Award (2015)
- India's Most Trusted Pipe Brand Award (2016)
- ET Inspiring Business Leaders of India Award (2016)
- India's Most Attractive Pipe Brand Award (2016)



## MARKETING NETWORK

ASTRAL has marketing network of more than 800 distributors and 25,000 dealers spread all over India with branch offices at Mumbai, Pune, Delhi, Bengaluru, Chennai, Hyderabad, Jaipur, Lucknow and Kochi apart from that ASTRAL has its own warehouses at Bengaluru, Coimbatore, Hyderabad, Vijaywada, Kolkata, Ghaziabad and Kolhapur to deliver the material as quick as possible. More than 300 techno marketing professionals and administrative personnel are on the board to coordinate with architects, plumbing contractors and plumbers to utilize the best plumbing techniques and to get the best from the product.



ONLY THOSE PRODUCTS BEARING THE ABOVE MARKS ARE CERTIFIED

## BUSINESS PARTNERS

SEKISUI INC. was established in 1947 in order to run general plastic business in Japan. In 1948 changed the company name to SEKISUI CHEMICAL CO. LTD. SEKISUI began producing CPVC some 40 years ago in 1974. Its CPVC is high-quality, stable product achieved as a result of the sophisticated technologies and quality controls that SEKISUI has accumulated over that long history.



SPEARS® broad product line offers a complete selection of 1/8" through 12" injection molded fittings and fabricated fittings through 48", many specialty products, and a full complement of manual and mechanically actuated thermoplastic valves in a variety of types, sizes, and configurations.



IPS Corporation was the first company to produce a reliable cement for use with PVC and CPVC pipe and fittings. IPS products are recognized for their labor saving efficiency and convenience.



## SUBSIDIARIES

Resinova manufactures a diversified range of adhesives, sealants, putties and construction aids. Our products are mostly pioneering efforts where advantages has been taken of our knowledge of different chemistries such as epoxy, silicones, acrylics, cyanoacrylates, UV care, PVA etc. Our products stand for quality and reliability and are marketed through a network of about more than 2000 distributors and 4,50,000 dealers across the country.



For almost two decades, Bond It has been a manufacturer of high performance, high quality building chemicals such as sealants, adhesives, grouts, cleaners, expanding foams, fillers, decorating sundries, landscaping products and other similar products.



Seal IT Services Limited, a UK based subsidiary of the Astral Poly Technik Ltd. has entered into U.S. market by acquiring silicone tape business of Rowe Industries Inc., USA.



# ABOUT

## ASTRAL CPVC PRO™

### ABOUT THE PRODUCT

Astral Poly Technik Limited is proud to introduce the all new advanced ASTRAL CPVC PRO. A class apart in the category, ASTRAL CPVC PRO is more than just a hot and cold plumbing system. To us it is an initiative, to deliver a world class plumbing solution.

ASTRAL CPVC PRO pipe and fittings, manufactured by Astral Poly Technik Limited, are made from the specialty plastic, chemically known as Chlorinated Poly Vinyl Chloride [CPVC]. The CPVC compound shall meet cell class DP 110-2-3-2 as per IS 15778 and a maximum service temperature up to 93°C. The compound is carefully designed in our R & D and backed by our own expertise of manufacturing CPVC piping system from last 17 years, which will give excellent results in all applications for CPVC piping system. It is unique combination of highest Impact resistance without any loss in pressure bearing capacity / Tensile strength or Vicat softening temperature. This will ensure best trouble free service and also stood notch above the initial installation issues of cracking / damages due to handling, storage and installation.

The pipes are produced in copper tube size (CTS) from 15 mm (½") to 50 mm (2") with two different standard dimensional ratios - SDR-11 and SDR-13.5 (Class 1 & Class 2 respectively as per IS 15778) . The fittings are produced as per SDR 11. The pipes and fittings in SDR 11 class is also complies to ASTM standard. All Astral CPVC SDR 11 and SDR 13.5 pipes are made from identical CPVC compound material having same physical properties. The CPVC fittings are manufactured from compound material which meets all the requirement as per ASTM standard.

Apart from having the same physical properties, SDR 11 and SDR 13.5 which are having different wall thickness and therefore, at any given temperature, they have different pressure ratings. For e.g.

### PIPE TEMPERATURE (°C) PRESSURE RATING

GRADE	UNIT	23°C	82°C
SDR 11	PSI	400	100
	Kg/cm2	28.1	7.0
SDR 13.5	PSI	320	80
	Kg/cm2	22.5	5.6

Astral also produces CPVC PRO pipes in iron pipe size (IPS), available sizes are 65 mm (2½") to 300 mm (12") in SCH 40 and SCH 80 which meets the requirements of ASTM F 441. The pressure ratings varies with schedule pipe size and temperature. CPVC pipes of Copper Tube Size (CTS) dimensions can also be connected to CPVC (IPS) dimensions by using IPS x CTS fittings.

## PRODUCT RANGE

Class 1 (SDR 11) & Class 2 (SDR 13.5): 15 mm (½") to 50 mm (2") CTS -Confirming to IS 15778:2007  
As per ASTM D2846  
SCH 40 : 65 mm (2½") to 100 mm (4") IPS As per ASTM F441 & ASTM F438  
SCH 80 : 65 mm (2½") to 300 mm (12") IPS As per ASTM F441 & ASTM F439

## MARKING & UNIFORMITY

Pipes and fittings made from CPVC compound are clearly marked with the manufacturers trademark, material designation, applicable ASTM standard.

**SDR 11 Pipe:** Tan coloured with red stripe

**SDR 13.5 Pipe:** Tan coloured with brown stripe

**SDR 11 fittings:** Tan colour

**SCH 40 Pipe:** Tan colour with brown stripe

**SCH 40 fittings:** Tan colour

**SCH 80 Pipe:** Tan colour with red stripe

**SCH 80 fittings:** Tan colour / Grey colour

## FEILDS OF APPLICATIONS

Hot and Cold water applications in homes, apartments, hotels, resorts, hospitals, high and low rise buildings, corporate and commercial houses, academic institutes etc. for pure and hygienic water supply.

## STANDARDS & SPECIFICATIONS

### ASTM D1784

Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

### ASTM D2846

Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot & Cold water distribution systems.

### ASTM F493

Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe & Fittings.

### ASTM F441

Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, SCH 40 & 80.

### ASTM F438

Socket-Type Chlorinated Polyvinyl Chloride Plastic Pipe Fittings. SCH 40.

### ASTM F439

Socket-Type Chlorinated Polyvinyl Chloride Plastic Pipe Fittings. SCH 80.

### ASTM D2774

Underground installation of Thermoplastic pipes.

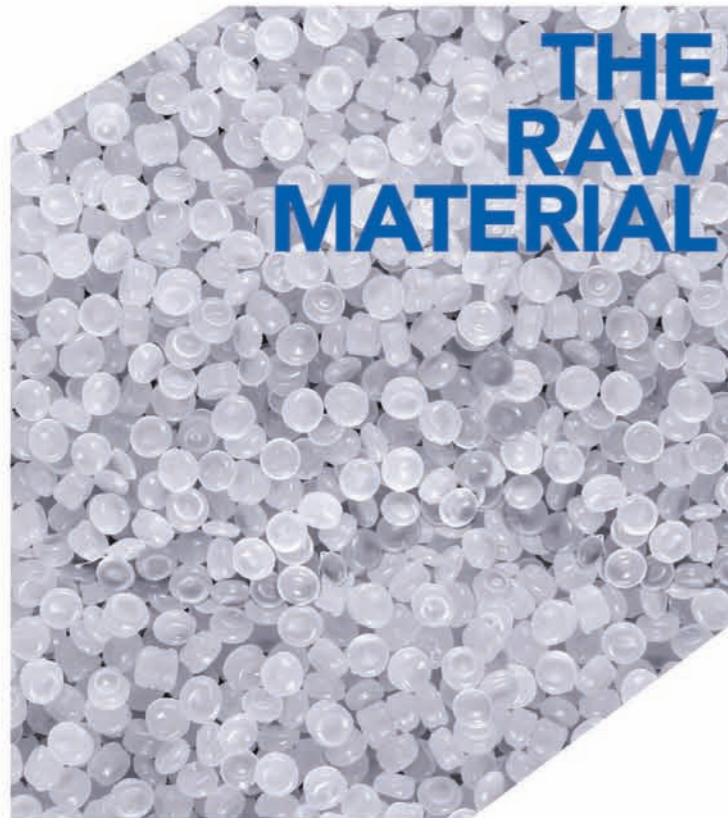
### IS 15778

Chlorinated poly vinyl chloride (CPVC) pipe for potable hot & cold water distribution supplies.





## ASTRAL CPVC-PRO PIPE AND FITTINGS ARE THE BEST CHOICE FOR HOT AND COLD POTABLE WATER DISTRIBUTION



ASTRAL CPVC PRO pipes and fittings are manufactured with specially designed CPVC Compound formulated by Astral itself. The compound is mixture of CPVC Resin from SEKISUI CHEMICAL CO. LTD., Japan (the world renowned CPVC resin manufacturer) and other ingredients like Impact Modifiers, Lubricants, UV stabilizers etc.

The compound for pipes and fittings are carefully designed in our R & D facility and checked for different properties like Dynamic Thermal Stability, Fusion, Torque and all other rheological properties. Thus designed CPVC compound can give highest processibility as well as best Physical and Mechanical properties.

The compound meets or exceed all requirement for cell classification for IS 15778 and ASTM D2846.

The material is also approved by NSF for its safe use with potable water and thus completely safe for drinking water.

### About NSF Approval

ASTRAL Poly Technik Ltd. is proud to announce that ASTRAL CPVC PRO is approved by NSF International, a leading global independent public health and safety organization. To receive certification, Astral Poly Technik Ltd. submitted product samples to NSF that underwent rigorous testing to recognized standards and agreed to unannounced manufacturing facility audits and periodic retesting to verify continued conformance to the standards. Find us in the NSF water listings by visiting <http://www.nsf.org/certified-products-systems>.

#### About NSF International

NSF International is a global independent organization that writes standards and protocols and tests and certifies products for the food, water and consumer goods industries to minimize adverse health effects and protect the environment. NSF operates in over 165 countries. Founded in 1944, NSF is a Pan American Health Organization/World Health Organization Collaborating Center on Food Safety, Water Quality and Indoor Environment.

## WHY ASTRAL CPVC-PRO

### INTRODUCED CPVC FOR THE FIRST TIME IN INDIA

There was a time when CPVC pipes were not accepted by the industry. This was mainly because GI pipes were 30% cheaper than CPVC pipes. So strength of steel and cost were major factors why GI pipes were norms. But ASTRAL introduced CPVC pipes in India for the first time embarking upon anti-corrosion and hot water compatibility. Since then, ASTRAL CPVC has been a flagship CPVC product leading the way in the market.

### HIGHEST NUMBER OF CERTIFICATIONS

NSF, UIPC-I and ISI Certifications : ASTRAL the only pipe manufacturing company in India now having most prestigious quality approval from National Sanitation Foundation (NSF), and certifications from UIPC-I and Bureau of Indian Standards (BIS).



Certified to NSF/ANSI 61

ONLY THOSE PRODUCTS BEARING THE ABOVE MARKS ARE CERTIFIED

### STATE OF THE ART MANUFACTURING

ASTRAL is equipped with state of art manufacturing facilities at Santej and Hosur plants. High speed and accurate extruders and injection molding machines including innovative manufacturing techniques being used to manufacture the ultra modern, errorless ASTRAL CPVC PRO pipes and fittings.

### WIDEST PRODUCT RANGE

ASTRAL is the only company that provides the pipes with sizes ranging from 1/2" to 12" diameter. Hence you can meet any requirement with this widest range of CPVC pipes.

### SKILL DEVELOPMENT INITIATIVES FOR PLUMBERS

ASTRAL also takes care of its customers by training plumbers and plumbing contractors throughout the year by updating them about modern plumbing techniques and to do plumbing work more effectively and professionally.

ASTRAL CPVC PRO  
3" SCH 40 AS PER ASTM F441

## FEATURES & BENEFITS

### CORROSION RESISTANCE



ASTRAL® CPVC Pipe gives excellent resistance even under the harshest of water conditions so there are none of the purity worries from corrosion of metal pipe or soldered joints. ASTRAL® CPVC Pipe keeps pure water pure.

1

### EASY PLUMBING PROCESS



CPVC uses a simple, solvent cement jointing method. Tools required are very simple and inexpensive (chamfering tool and pipe cutter only) and avoid the need for an electrical source.

6

### LOWER BACTERIAL GROWTH



Bacteria build up with CPVC is far lower than with alternative piping materials - Copper, Steel and other thermoplastics.

2

### HOT WATER COMPATIBLE



ASTRAL® CPVC pipe is compatible with both hot and cold water. It withstand very high temperature compared to any other thermoplastic plumbing systems. Many solar and electric water heaters have CPVC piping system for heat efficiency and lower installation cost.

7

### NO SCALE, PIT OR LEACH FORMATION



Even after years of use in the most aggressive conditions, This pipe won't corrode, standing up to low pH water, coastal salt air exposures and corrosive soils. It stays as solid and reliable as the day it was installed, maintaining full water carrying Capacity.

3

### TOUGH, RIGID MATERIAL



ASTRAL® CPVC pipe has a much higher strength than other thermoplastics used in plumbing. Hence, it needs less hangers and supports and there is no unsightly looping of the pipe. It has a higher pressure bearing capability, leading to the same flow rate with a smaller size.

8

### UNAFFECTED BY CHLORINE IN WATER



Some materials may be adversely affected by chlorine contained in the water supply, which can cause breakdown of the polymer chains and potential leaks. In this respect, ASTRAL® CPVC pipe is unaffected by the chlorine present in potable water supply.

4

### FIRE SAFETY



CPVC has a limiting Oxygen Index (LOI) of 60. Thus in air, ASTRAL® CPVC pipe does not support combustion. No flaming drips, does not increase the fire load, low flame spread, low smoke generation.

9

### LOW THERMAL EXPANSION



ASTRAL® CPVC pipe has a lower coefficient of thermal expansion than alternative plastics, reducing the amount that the pipe expands when hot water is running, again reducing unsightly 'looping' of the pipe.

5

### APPROVED WORLD WIDE



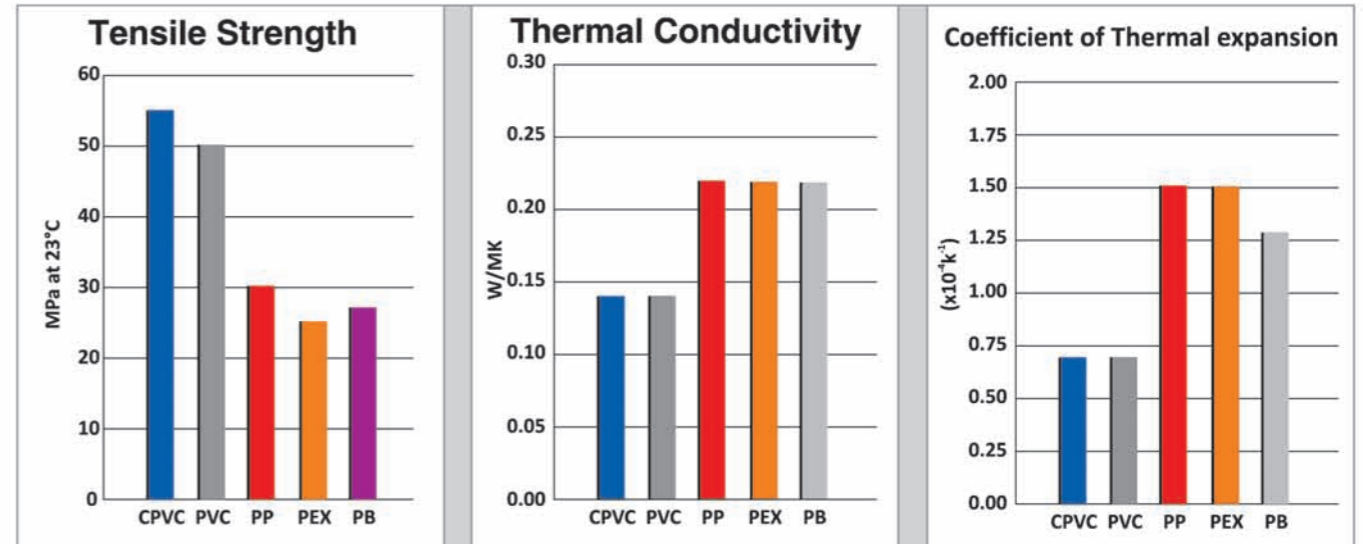
CPVC plumbing system is approved for contact with potable water in wide range of countries including USA, UK, Canada, Germany, France, The Netherlands, Middle East etc.

10

## BASIC PHYSICAL PROPERTIES

PROPERTY	TEST METHOD	ENGLISH UNIT	SI UNIT
<b>GENERAL PROPERTIES</b>			
Specific Gravity @ 23°C	ASTM D792	1.50 g/cm <sup>3</sup>	1.50 g/cm <sup>3</sup>
Specific volume @ 23°C		0.666 cm <sup>3</sup> /g	0.666 cm <sup>3</sup> /g
Water Absorption @ 23°C	ASTM D570	0.02%	0.02%
Water Absorption @ 100°C	ASTM D570	0.50%	0.50%
Cell Class	ASTM D1784	23447-B	D.P.110-2-3-2
<b>MECHANICAL PROPERTIES</b>			
Izod Impact (Notched) @ 23°C	ASTM D256	4.5ft.lbs/in	267 J/m
Tensile Strength@ 23°C	ASTM D638	8000 psi	55 N/mm <sup>2</sup>
Tensile Modulus@ 23°C	ASTM D638	3,94,000psi	2710 N/mm <sup>2</sup>
Flexural Strength@ 23°C	ASTM D790	15,100psi	104N/mm <sup>2</sup>
Flexural Modulus@ 23°C	ASTM D790	4,15,100psi	2860N/mm <sup>2</sup>
Compressive Strength@ 23°C	ASTM D695	10,200 psi	71 N/mm <sup>2</sup>
Compressive Modulus@ 23°C	ASTM D695	1,97,500 psi	1360 N/mm <sup>2</sup>
<b>THERMAL PROPERTIES</b>			
Coefficient of Thermal Expansion	ASTM D696	3.4X10 <sup>-5</sup> in/in/°f	6.3 X10 <sup>-5</sup> m/m/°K
Thermal Conductivity	ASTM C177	0.95 BTU in/hr/ft <sup>2</sup> /°F	0.14 Wm/°K/m <sup>2</sup>
Heat Distortion Temperature	ASTM D638	221°F	105°C
<b>FLAMMABILITY</b>			
Flammability Rating (0.062 inch/ 0.157cm)	UL94	V0, 5VA & 5VB	-

Note : Above values are typical values. It should be used as a general recommendation. Do not consider as a specification



## CPVC PRO PIPE & FITTINGS

COPPER - TUBE SIZE - AS PER ASTM D2846

### TRANSITION BUSHING (IPSEXCTS)



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15 x 15	½ IPS x ½ CTS	M512112101	1500
20 x 20	¾ IPS x ¾ CTS	M512112102	1000
25 x 25	1 IPS x 1 CTS	M512112103	200
32 x 32	1¼ IPS x 1¼ CTS	M512112104	150
40 x 40	1½ IPS x 1½ CTS	M512112105	80
50 x 50	2 IPS x 2 CTS	M512112106	50

### TRANSITION COUPLING



Size (mm)	Size (in.)	Part Number	Quantity (Case)
20 x 20	¾ IPS x ¾ CTS	M512112202	100
25 x 25	1 IPS x 1 CTS	M512112203	600

### REDUCER COUPLING



Size (mm)	Size (in.)	Part Number	Quantity (Case)
20 x 15	¾ x ½	M512111114	800
25 x 15	1 x ½	M512111115	500
25 x 20	1 x ¾	M512111116	400
32 x 15	1¼ x ½	M512111117	300
32 x 20	1¼ x ¾	M512111118	300
32 x 25	1¼ x 1	M512111119	200
40 x 15	1½ x ½	M512111120	200
40 x 20	1½ x ¾	M512111121	75
40 x 25	1½ x 1	M512111122	75
40 x 32	1½ x 1¼	M512111123	50
50 x 15	2 x ½	M512111124	40
50 x 20	2 x ¾	M512111125	90
50 x 25	2 x 1	M512111126	30
50 x 32	2 x 1¼	M512111127	30
50 x 40	2 x 1½	M512111128	70

### COUPLING



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512111001	1200
20	¾	M512111002	600
25	1	M512111003	600
32	1¼	M512111004	300
40	1½	M512111005	200
50	2	M512111006	50

## CPVC PRO PIPE & FITTINGS

COPPER - TUBE SIZE - AS PER ASTM D2846

### REDUCER BUSHING



Size (mm)	Size (in.)	Part Number	Quantity (Case)
20 x 15	¾ x ½	M512111914	1000
25 x 15	1 x ½	M512111915	600
25 x 20	1 x ¾	M512111916	600
32 x 15	1¼ x ½	M512111917	300
32 x 20	1¼ x ¾	M512111918	300
32 x 25	1¼ x 1	M512111919	300
40 x 15	1½ x ½	M512111920	200
40 x 20	1½ x ¾	M512111921	200
40 x 25	1½ x 1	M512111922	200
40 x 32	1½ x 1¼	M512111923	200
50 x 15	2 x ½	M512111924	100
50 x 20	2 x ¾	M512111925	150
50 x 25	2 x 1	M512111926	100
50 x 32	2 x 1¼	M512111927	100
50 x 40	2 x 1½	M512111928	100

### TEE



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512110101	600
20	¾	M512110102	500
25	1	M512110103	300
32	1¼	M512110104	150
40	1½	M512110105	80
50	2	M512110106	40

### ELBOW 45°



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512112301	500
20	¾	M512112302	200
25	1	M512112303	250
32	1¼	M512112304	60
40	1½	M512112305	40
50	2	M512112306	15

### REDUCER ELBOW 90°



Size (mm)	Size (in.)	Part Number	Quantity (Case)
20 x 15	¾ x ½	M512110614	500
25 x 15	1 x ½	M512110615	350
25 x 20	1 x ¾	M512110616	300
32 x 15	* 1¼ x ½	M512110617	As req.
32 x 25	* 1¼ x 1	M512110619	As req.
50 x 25	* 2 x 1	M512110626	As req.

\* Reducer fittings are professionally assembled using ASTRAL fittings and bushings. Quantity as per order.

**NOTE :** Fabricated reducer fittings are not eligible for return to the manufacturer.

## CPVC PRO PIPE & FITTINGS

COPPER - TUBE SIZE - AS PER ASTM D2846

### ELBOW 90°



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512110501	1000
20	¾	M512110502	800
25	1	M512110503	400
32	1¼	M512110504	200
40	1½	M512110505	120
50	2	M512110506	50

### REDUCER TEE



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15 x 15 x 20	* ½ x ½ x ¾	M512110291	250
20 x 15 x 20	* ¾ x ½ x ¾	M512110292	As req.
20 x 15 x 15	* ¾ x ½ x ½	M512110293	As req.
20 x 15	¾ x ½	M512110214	300
25 x 15	1 x ½	M512110215	300
25 x 20	1 x ¾	M512110216	75
32 x 15	1¼ x ½	M512110217	100
32 x 20	1¼ x ¾	M512110218	120
32 x 25	1¼ x 1	M512110219	80
40 x 15	1½ x ½	M512110220	70
40 x 20	1½ x ¾	M512110221	60
40 x 25	1½ x 1	M512110222	30
40 x 32	1½ x 1¼	M512110223	60
50 x 15	2 x ½	M512110224	30
50 x 20	2 x ¾	M512110225	35
50 x 25	2 x 1	M512110226	15
50 x 32	2 x 1¼	M512110227	30
50 x 40	2 x 1½	M512110228	25

### MALE ADAPTER (CPVC THREADS)



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512111301	600
20	¾	M512111302	600
25	1	M512111303	300
32	1¼	M512111304	150
40	1½	M512111305	100
50	2	M512111306	50
20 x 15	¾ Soc x ½ MIP	M512111314	500
25 x 20	1 Soc x ¾ MIP	M512111316	450

\* Reducer fittings are professionally assembled using ASTRAL fittings and bushings. Quantity as per order.

**NOTE :** Fabricated reducer fittings are not eligible for return to the manufacturer.

## CPVC PRO PIPE & FITTINGS

COPPER - TUBE SIZE - AS PER ASTM D2846

### CROSS



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512112401	200
20	¾	M512112402	100
25	1	M512112403	100

### UNION



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512112601	200
20	¾	M512112602	150
25	1	M512112603	100
32	1¼	M512112604	80
40	1½	M512112605	50
50	2	M512112606	30

### FEMALE ADAPTER (CPVC THREADS)



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512111601	800
20	¾	M512111602	400
25	1	M512111603	200
32	1¼	M512111604	150
40	1½	M512111605	100
50	2	M512111606	50
# 20 x 15	¾ x ½	-	-

### TANK ADAPTER



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512112501	80
20	¾	M512112502	60
25	1	M512112503	40
32	1¼	M512112504	30
40	1½	M512112505	20
50	2	M512112506	15

### CAP



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512114101	1000
20	¾	M512114102	500
25	1	M512114103	200
32	1¼	M512114104	100
40	1½	M512114105	80
50	2	M512114106	40

# Shortly Introducing

**NOTE :** Fabricated reducer fittings are not eligible for return to the manufacturer.

## CPVC PRO PIPE & FITTINGS

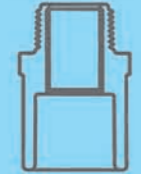
COPPER - TUBE SIZE - AS PER ASTM D-2846

### FEMALE ADAPTER (BRASS THREADS)



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512111701	200
20	¾	M512111702	150
25	1	M512111703	50
32	1¼	M512111704	25
40	1½	M512111705	25
50	2	M512111706	15
<b>SCH - 80</b>			
65	2½	-	-
80	3	-	-

### MALE ADAPTER (BRASS THREADS)



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512111401	200
20	¾	M512111402	100
25	1	M512111403	50
32	1¼	M512111404	25
40	1½	M512111405	25
50	2	M512111406	15
20 x 15	¾ x ½	M512111514	150
25 x 15	1 x ½	M512111515	100
25 x 20	1 x ¾	M512111416	125
<b>SCH - 80</b>			
# 65	2½	M512801307	9
# 80	3	M512801308	-

### BRASS FEMALE (UNION TYPE)



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512119901	-
# 20	¾	M512119902	-
# 25	1	M512119903	-
# 32	1¼	M512119904	-
# 40	1½	M512119905	-
# 50	2	M512119906	-

### BRASS MALE (UNION TYPE)



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512119801	-
# 20	¾	M512119802	-
# 25	1	M512119803	-
# 32	1¼	M512119804	-
# 40	1½	M512119805	-
# 50	2	M512119806	-

# Shortly Introducing

## CPVC PRO PIPE & FITTINGS

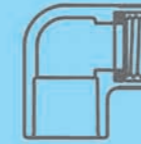
COPPER - TUBE SIZE - AS PER ASTM D-2846

### BRASS COUPLING



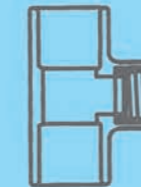
Size (mm)	Size (in.)	Part Number	Quantity (Case)
20 x 15	¾ x ½	M512111214	200
25 x 15	1 x ½	M512111215	100
25 x 20	1 x ¾	M512111216	125

### BRASS FPT 90° ELBOW



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15 x 15	½ x ½	M512110701	200
20 x 15	¾ x ½	M512110714	150
20 x 20	¾ x ¾	M512110702	100
25 x 15	1 x ½	M512110715	100
25 x 20	1 x ¾	M512110716	100
25 x 25	1 x 1	M512110703	50
32 x 32	1¼ x 1¼	M512110704	30
# 32 x 15	1¼ x ½	M512110717	75
# 32 x 20	1¼ x ¾	M512110718	60

### BRASS FPT TEE



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15 x 15 x 15	½ x ½ x ½	M512110301	200
20 x 20 x 15	¾ x ¾ x ½	M512110314	100
20 x 20 x 20	¾ x ¾ x ¾	M512110302	100
25 x 25 x 15	1 x 1 x ½	M512110315	75
25 x 25 x 20	1 x 1 x ¾	M512110316	75
32 x 32 x 32	1¼ x 1¼ x 1¼	M512110304	30
32 x 32 x 15	1¼ x 1¼ x ½	M512110317	40

### CONCEALED VALVE (WHEEL TYPE)



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512118601	01
20	¾	M512118602	01

# Shortly Introducing

## CPVC PRO PIPE & FITTINGS

COPPER - TUBE SIZE - AS PER ASTM D2846

### CONCEALED VALVE (CHROME PLATED)



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512118501	01
20	¾	M512118502	01
25	1	M512118503	01

Quarter turn introduced

### BALL VALVES (CTS SOCKETS)



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512112701	80
20	¾	M512112702	120
25	1	M512112703	50
32	1¼	M512112704	40
40	1½	M512112705	30
50	2	M512112706	15

### LONG RADIUS BEND



Size (mm)	Size (in.)	Part Number	Quantity (Case)
20	¾	M512110902	140
25	1	M512110903	80
32	1¼	M512110904	50
40	1½	M512110905	30
50	2	F512110906	14

### STEP OVER BEND



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512112801	150
20	¾	M512112802	200
25	1	M512112803	150
32	1¼	F512112804	30
40	1½	F512112805	20
50	2	F512112806	10

### SSR ELBOW



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15 x 15	½ x ½	M512117501	200
20 x 15	¾ x ½	M512117514	150

## CPVC PRO PIPE & FITTINGS

SCH - 40 FITTINGS AS PER ASTM F438

### TEE - SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	2½	M512400107	12
80	3	M512400108	08
100	4	M512400109	04

### CAP - SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	2½	M512404107	10
80	3	M512404108	10
100	4	M512404109	10

### REDUCER BUSHING (FLUSH STYLE)



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65 x 25	2½ x 1	A512401931	As req.
65 x 32	2½ x 1¼	M512401932	25
65 x 40	2½ x 1½	M512401933	25
65 x 50	2½ x 2	M512401934	25
80 x 25	3 x 1	A512401937	As req.
80 x 40	3 x 1½	M512401939	20
80 x 50	3 x 2	M512401940	20
80 x 65	3 x 2½	M512401941	20
100 x 50	4 x 2	M512401947	10
100 x 65	4 x 2½	M512401948	10
100 x 80	4 x 3	M512401949	10

### TRANSITION BUSHING (IPS x CTS)



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65 x 40	2½ IPS x 2 CTS	A512112133	As req.
65 x 50	2½ IPS x 2 CTS	M512112134	25
80 x 50	3 IPS x 2 CTS	M512112140	20
100 x 50	4 IPS x 2 CTS	M512112147	10

### 90° ELBOW - SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	2½	M512400507	15
80	3	M512400508	10
100	4	M512400509	6

## CPVC PRO PIPE & FITTINGS

### SCH - 40 FITTINGS AS PER ASTM F438

#### COUPLING - SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	2½	M512401007	20
80	3	M512401008	15
100	4	M512401009	8

## 3 IN 1 WALL MIXER ADAPTOR

#### ALL TOP ADAPTER



Size (mm)	Size (in.)	Part Number	Quantity (Case)
20 x 15	¾ x ½	M512510614	06
25 x 15	1 x ½	M512510615	06

#### TOP BOTTOM ADAPTER



Size (mm)	Size (in.)	Part Number	Quantity (Case)
20 x 15	¾ x ½	M512510714	06
25 x 15	1 x ½	M512510715	06

#### TOP SIDE ADAPTER



Size (mm)	Size (in.)	Part Number	Quantity (Case)
20 x 15	¾ x ½	M512510814	06
25 x 15	1 x ½	M512510815	06

#### HOT UP - COLD DOWN ADAPTER



Size (mm)	Size (in.)	Part Number	Quantity (Case)
20 x 15	¾ x ½	M512510914	06
25 x 15	1 x ½	M512510915	06

#### HOT SIDE - COLD DOWN ADAPTER



Size (mm)	Size (in.)	Part Number	Quantity (Case)
20 x 15	¾ x ½	M512511014	06
25 x 15	1 x ½	M512511015	06

## CPVC PRO PIPE & FITTINGS

### SCH - 80 FITTINGS AS PER ASTM F439

#### REDUCING TEE - SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65 x 25	2½ x 1	M512800231	15
65 x 32	2½ x 1¼	M512800232	15
65 x 40	2½ x 1½	M512800233	15
65 x 50	2½ x 2		12
80 x 25	3 x 1		10
80 x 32	3 x 1¼	A512800238	10
80 x 40	3 x 1½	M512800239	10
80 x 50	3 x 2	M512800240	9
80 x 65	3 x 2½	M512800241	9
100 x 25	4 x 1	M512800244	5
100 x 32	4 x 1¼	M512800245	5
100 x 40	4 x 1½	M512800246	5
100 x 50	4 x 2	M512800247	5
100 x 65	4 x 2½	M512800248	5
100 x 80	4 x 3	M512800249	5
150 x 100	6 x 4	M512800258	As req.
200 x 150	* 8 x 6	801-585C	As req.
250 x 200	* 10 x 8	801-628C	As req.
300 x 250	*12 x 10	801-670C	As req.

#### MALE ADAPTER SOC X MBSP



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	2½	M512801307	30
80	3	M512801308	20
100	4	M512801309	15

#### UNION SOC WITH EPDM O-RING SEAL



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	* 2½	897-025C	05
80	* 3	897-030C	05
100	* 4	897-040C	05
150	* 6	897-060C	03

#### TEE - SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	2½	M512800107	12
80	3	M512800108	07
100	4	M512800109	04
150	6	M512800110	02
200	8	M032800111	01
250	* 10	801-100C	01
300	* 12	801-120C	01

\* Trading Item available in Grey colour only # Shortly Introducing  
\* Sizes above 6" will be in Grey colour

## CPVC PRO PIPE & FITTINGS

### SCH - 80 FITTINGS AS PER ASTM F439

#### REDUCER BUSHING (FLUSH STYLE)



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65 x 32	2½ x 1¼	M512801932	50
65 x 40	2½ x 1½	M512801933	50
65 x 50	2½ x 2	M512801934	50
80 x 40	3 x 1½	M512801939	35
80 x 50	3 x 2	M512801940	35
80 x 65	3 x 2½	M512801941	35
100 x 50	4 x 2	M512801947	20
100 x 65	4 x 2½	M512801948	10
100 x 80	4 x 3	M512801949	20
150 x 100	6 x 4	M512801958	06
200 x 150	8 x 6	M512801959	03
250 x 200	* 10 x 8	837-628C	01
300 x 250	* 12 x 10	837-670C	01

#### FEMALE ADAPTER SOC X FBSP



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	2½	M512801607	30
80	3	M512801608	20
100	4	M512801609	12

#### CAP SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	2½	M512804107	10
80	3	M512804108	10
100	4	M512804109	06
150	* 6	847-060C	03
200	* 8	847-080C	01
250	* 10	847-100CF	01
300	* 12	847-120CF	01

#### REDUCER COUPLING - SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65 x 40	2½ x 1½	M512801133	40
65 x 50	2½ x 2	M512801134	40
80 x 50	3 x 2	M512801140	25
80 x 65	3 x 2½	M512801141	25
100 x 65	4 x 2½	M512801148	15
100 x 80	4 x 3	M512801149	15
150 x 100	* 6 x 4	829-532C	As req.
200 x 150	* 8 x 6	829-585C	As req.
250 x 200	* 10 x 8	829-628CF	As req.
300 x 250	* 12 x 10	829-670CF	As req.

\* Trading Item available in Grey colour only # Shortly Introducing  
\* Sizes above 6" will be in Grey colour

## CPVC PRO PIPE & FITTINGS

### SCH - 80 FITTINGS AS PER ASTM F439

#### 45° ELBOW SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	2½	M512802307	20
80	3	M512802308	12
100	4	M512802309	06
150	* 6	817-060C	02
200	* 8	817-080C	01
250	* 10	817-100C	01
300	* 12	817-120C	01

#### COUPLING - SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	2½	M512801007	20
80	3	M512801008	15
100	4	M512801009	12
150	6	M512801010	02
200	8	M032801011	01
250	10	M032801012	01
300	12	M032801013	01

#### 90° ELBOW SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	2½	M512800507	15
80	3	M512800508	10
100	4	M512800509	05
150	6	M512800510	02
200	8	M032800511	01
250	* 10	806-100C	01
300	* 12	806-120C	01

#### BLIND FLANGE



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	* 2½	853-025C	05
80	3	M512803108	20
100	4	M512803109	12
150	* 6	853-060C	03
200	* 8	853-080C	01
250	* 10	853-100C	01
300	* 12	853-120C	01

\* Trading Item available in Grey colour only # Shortly Introducing  
\* Sizes above 6" will be in Grey colour



## CPVC PRO PIPE & FITTINGS

### SCH - 80 FITTINGS AS PER ASTM F439

#### VANSTONE FLANGE - SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	2½	M512803407	15
80	3	M512803408	12
100	4	M512803409	08
150	6	M512803410	03
200	8	M032803411	01
250	* 10	854-100C	As req.
300	* 12	854-120C	As req.

#### VANSTONE FLANGE SPIG



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	* 2½	856-025C	05
80	3	M512803308	10
100	4	M512803309	06
150	* 6	856-060C	03
200	* 8	856-080C	01
250	* 10	856-100C	01
300	* 12	856-120C	01

#### FLANGE - SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	* 2½	851-025C	05
80	3	M512803208	12
100	4	M512803209	08
150	* 6	851-060C	03
200	* 8	851-080C	01
250	* 10	851-100C	01
300	* 12	851-120C	01

#### FLANGE HUB SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	2½	M512803407	As req.
80	3	M512803408	As req.
100	4	M512803409	As req.
150	6	M512803410	As req.
200	8	M032803411	As req.

\* Trading Item available in Grey colour only # Shortly Introducing  
\* Sizes above 6" will be in Grey colour

## CPVC PRO PIPE & FITTINGS

### SCH - 80 FITTINGS AS PER ASTM F439

#### FLANGE RING - SOC



Size (mm)	Size (in.)	Part Number	Quantity (Case)
65	2½	M512804207	As req.
80	3	M512804208	As req.
100	4	M512804209	As req.
150	6	M512804210	As req.
200	8	M512804211	As req.

#### FLANGE HUB SPIG



Size (mm)	Size (in.)	Part Number	Quantity (Case)
80	3	M512803708	05
100	4	M512803709	05



\* Trading Item available in Grey colour only # Shortly Introducing  
\* Sizes above 6" will be in Grey colour

## CPVC PRO PIPE & FITTINGS COPPER - TUBE SIZE

### CLASS 1 - PIPE SDR-11



Size (mm)	Size (Inch)	3 Mtr. Length		5 Mtr. Length	
		Part No.	Std. Pkg.	Part No.	Std. Pkg.
15	½	M511110301	100	M511110501	60
20	¾	M511110302	50	M511110502	40
25	1	M511110303	30	M511110503	25
32	1¼	M511110304	20	M511110504	15
40	1½	M511110305	15	M511110505	10
50	2	M511110306	08	M511110506	06

### CLASS 2 - PIPE SDR -13.5



Size (mm)	Size (Inch)	3 Mtr. Length		5 Mtr. Length	
		Part No.	Std. Pkg.	Part No.	Std. Pkg.
15	½	M511130301	100	M511130501	60
20	¾	M511130302	50	M511130502	40
25	1	M511130303	30	M511130503	25
32	1¼	M511130304	20	M511130504	15
40	1½	M511130305	15	M511130505	10
50	2	M511130306	08	M511130506	06

## CPVC PRO PIPE & FITTINGS IPS - IRON PIPE SIZE AS PER ASTM F441

### PIPE SCHEDULE 40



Size (mm)	Size (Inch)	3 Mtr. Length		5 Mtr. Length	
		Part No.	Std. Pkg.	Part No.	Std. Pkg.
65	2½	M511400307	05	M511400507	05
80	3	M511400308	03	M511400508	03
100	4	M511400309	02	M511400509	02

### PIPE SCHEDULE 80



Size (mm)	Size (Inch)	3 Mtr. Length		5 Mtr. Length	
		Part No.	Std. Pkg.	Part No.	Std. Pkg.
65	2½	M511800307	05	M511800507	05
80	3	M511800308	03	M511800508	03
100	4	M511800309	02	M511800509	02
150	6	M511800310	01	M511800510	01
200	8	M511800311	01	M511800511	01
250	10	M531800312	01	M531800512	01
300	12	M531800313	01	M531800513	01

## SOLVENT CEMENTS & PRIMER

### CPVC 1-STEP ADHESIVE SOLUTION (YELLOW)



Size (mm)	Part Number	Quantity (Case)
22 ml	M513010101	48
44 ml	M513010202	24
50 ml	M513010303	48
118 ml	M513010404	24
237 ml	M513010505	24
473 ml	M513010606	12
946 ml	M513010707	12

Reduced VOC Emissions

N.B. For sizes 15 mm (½") to 50 mm (2")

### CPVC 724



Size (mm)	Part Number	Quantity (Case)
473 ml	M5133010101	12
946 ml	M5133010202	12

N.B. For sizes 65 mm (2½") and above

### PRIMER P70



Size (mm)	Part Number	Quantity (Case)
118 ml	AEZ - 223	24
237 ml	AEZ - 222	24
473 ml	M5133050101	12
946 ml	M5133050202	12

N.B. Must use primer for 65 mm (2½") & above

## CPVC PIPES & FITTINGS

### PLASTIC STRAP



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M514006001	2500
20	¾	M514006002	2000
25	1	M514006003	1200
32	1¼	M514006004	600
40	1½	M514006005	500
50	2	M514006006	300

### END PLUG



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M514002901	300
20	¾	M514002902	200

### ELBOW HOLDER



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15 x 15	½ x ½	M514006701	200
20 x 15	¾ x ½	M514006714	200

### PUNCHARE KIT



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	M512113001	As req.
20	¾	M512113002	As req.

### METAL STRAP



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15	½	A9120 M	100
20	¾	A9340 M	100
25	1	A9100 M	100
32	1¼	A9105 M	50
40	1½	A9106 M	50
50	2	A9200 M	50

## CPVC PIPES & FITTINGS

### TEE HOLDER



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15 x 15	½ x ½	M514006801	200
20 x 15	¾ x ½	M514006814	200

### TOOLKIT BOX



Size (mm)	Size (in.)	Part Number	Quantity (Case)
300	12	M144009100	10

### CHAMFERING TOOL



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15-32	½ - 1¼	M514005600	As req.

### RATCHET CUTTER



Size (mm)	Size (in.)	Part Number	Quantity (Case)
15-32	½ - 1¼	ASK00100024	As req.

# TECHNICAL DETAILS

Nominal Size		Outside Diameter, in. (mm)		Wall Thickness, in. (mm)		Pipe Pr. R. PSI (Kg/Cm <sup>2</sup> )			
(in.)	(mm)	Average	Tolerance	Minimum	Tolerance	73.4°F (23°C)	180°F (82°C)		

## Outside Diameters and Wall Thicknesses For CPVC 4120, SDR 11 Plastic Pipe As Per ASTM D-2846

½*	(15)	0.625 (15.9)	± 0.003 (0.08)	0.068 (1.73)	+ 0.020 (0.51)	400 (28.1)	100 (7.0)		
¾	(20)	0.875 (22.2)	± 0.003 (0.08)	0.080 (2.03)	+ 0.020 (0.51)	400 (28.1)	100 (7.0)		
1	(25)	1.125 (28.6)	± 0.003 (0.08)	0.102 (2.59)	+ 0.020 (0.51)	400 (28.1)	100 (7.0)		
1¼	(32)	1.375 (34.9)	± 0.003 (0.08)	0.125 (3.18)	+ 0.020 (0.51)	400 (28.1)	100 (7.0)		
1½	(40)	1.625 (41.3)	± 0.004 (0.10)	0.148 (3.76)	+ 0.020 (0.51)	400 (28.1)	100 (7.0)		
2	(50)	2.125 (54.0)	± 0.004 (0.10)	0.193 (4.90)	+ 0.023 (0.58)	400 (28.1)	100 (7.0)		

\* For ½" wall thickness minimum is not a function of SDR.

## Outside Diameters and Wall Thicknesses For CPVC 4120, SDR 13.5 Plastic Pipe

½*	(15)	0.625 (15.9)	± 0.003 (0.08)	0.055 (1.40)	+ 0.020 (0.51)	320 (22.5)	80 (5.6)		
¾	(20)	0.875 (22.2)	± 0.003 (0.08)	0.065 (1.65)	+ 0.020 (0.51)	320 (22.5)	80 (5.6)		
1	(25)	1.125 (28.6)	± 0.003 (0.08)	0.083 (2.12)	+ 0.020 (0.51)	320 (22.5)	80 (5.6)		
1¼	(32)	1.375 (34.9)	± 0.003 (0.08)	0.102 (2.59)	+ 0.020 (0.51)	320 (22.5)	80 (5.6)		
1½	(40)	1.625 (41.3)	± 0.004 (0.10)	0.120 (3.06)	+ 0.020 (0.51)	320 (22.5)	80 (5.6)		
2	(50)	2.125 (54.0)	± 0.004 (0.10)	0.157 (4.00)	+ 0.023 (0.58)	320 (22.5)	80 (5.6)		

\* For ½" wall thickness minimum is not a function of SDR.

Nominal Size		Outside Diameter, in. (mm)		I.D.	Wall Thickness, in. (mm)		Pipe Pr. R. PSI (Kg/Cm <sup>2</sup> )	
(in.)	(mm)	Average	Tolerance	Average	Minimum	Tolerance	180°F (82°C)	

## Outside Diameters, Wall Thickness & Pressure Rating For CPVC 4120, Schedule 40 Piping System As per ASTM F 441

2½	(65)	2.875 (73.0)	± 0.007 (0.18)	2.444 (62.07)	0.203 (5.16)	+ 0.024 (0.61)	300 (21.10)	
3	(80)	3.500 (88.9)	± 0.008 (0.20)	3.041 (77.26)	0.216 (5.49)	+ 0.026 (0.66)	280 (18.28)	
4	(100)	4.500 (114.3)	± 0.009 (0.23)	3.998 (101.55)	0.237 (6.02)	+ 0.028 (0.71)	220 (15.47)	

Pr. R. = Pressure Rating

## Outside Diameters, Wall Thickness & Pressure Rating For CPVC 4120, Schedul 80 Piping System As per ASTM F 441

2½	(65)	2.875 (73.0)	± 0.007 (0.18)	2.288 (58.14)	0.276 (7.01)	+ 0.033 (0.84)	420 (29.53)	
3	(80)	3.500 (88.9)	± 0.008 (0.20)	2.864 (72.75)	0.300 (7.62)	+ 0.036 (0.91)	370 (26.01)	
4	(100)	4.500 (114.3)	± 0.009 (0.23)	3.778 (95.97)	0.337 (8.56)	+ 0.040 (1.02)	320 (22.50)	
6	(150)	6.625 (168.3)	± 0.011 (0.28)	5.710 (145.04)	0.432 (10.97)	+ 0.052 (1.32)	280 (19.69)	
8	(200)	8.625 (219.1)	± 0.015 (0.38)	7.565 (192.15)	0.500 (12.70)	+ 0.060 (1.52)	250 (17.57)	
10	(250)	10.750 (273.1)	± 0.015 (0.38)	9.493 (241.12)	0.593 (15.06)	+ 0.071 (1.80)	230 (16.17)	
12	(300)	12.750 (323.90)	± 0.015 (0.38)	11.294 (286.87)	0.687 (17.45)	+ 0.082 (2.08)	230 (16.17)	

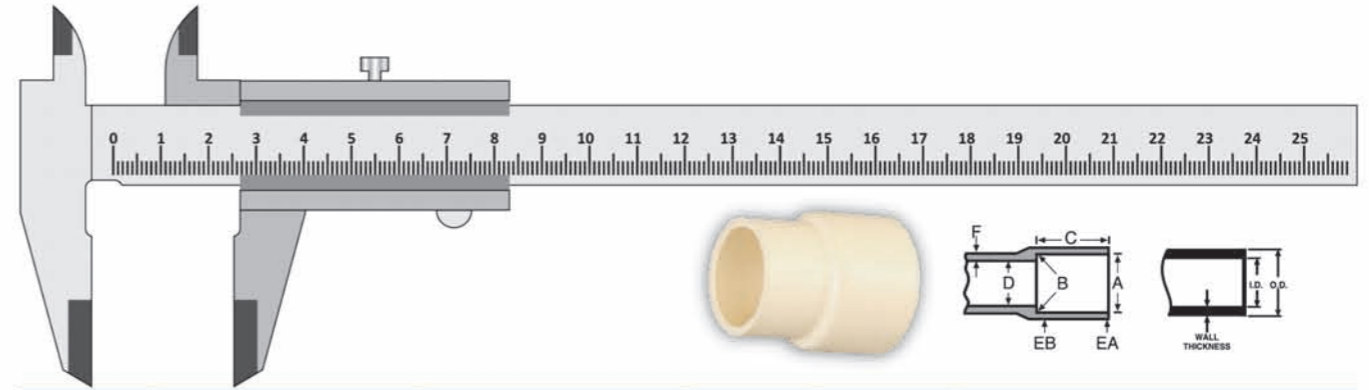
Pr. R. = Pressure Rating

## Temperature Derating Factors

Working Temperature (°F)	73-80	90	100	120	140	160	180	200
Working Temperature (°C)	23-25	32	38	49	60	71	82	93
Pipe Derating Factor	1.00	0.91	0.82	0.65	0.50	0.40	0.25	0.20
Valve Derating Factor	1.00	0.95	0.90	0.80	0.70	0.61	0.53	0.45

N.B. : For obtaining working pressure in system, multiply the maximum pressure with derating factor at the working temperature of system.

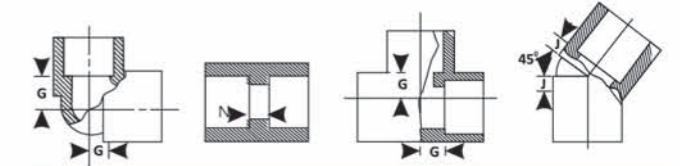
\* Valves, Unions & Speciality Products have different elevates temperature rating than pipe.



Nominal		Socket Entrance Diameter in. (mm)		Socket Bottom Diameter in. (mm)		Socket Length	Inside Diameter in. (mm)	Wall Thickness in. (mm)		
(in.)	(mm)	"A" Average	"A" Tolerance	"B" Average	"B" Tolerance	"C" min.	"D" min	Socket Entrance "EA" min.	Socket Bottom "EB" min.	"F"

## Tapered Socket Dimensions For CPVC 4120, SDR 11, Plastic Pipe Fittings AS PER ASTM D2846

½	(15)	0.633 (16.08) ± 0.003 (0.08)	0.619 (15.72) ± 0.003 (0.08)	0.500 (12.70)	0.489 (12.42)	0.068 (1.73)	0.102 (2.59)	0.128 (3.25)
¾	(20)	0.884 (22.45) ± 0.003 (0.08)	0.870 (22.10) ± 0.003 (0.08)	0.700 (17.78)	0.715 (18.16)	0.080 (2.03)	0.102 (2.59)	0.128 (3.25)
1	(25)	1.135 (28.83) ± 0.003 (0.08)	1.121 (28.47) ± 0.003 (0.08)	0.900 (22.86)	0.921 (23.39)	0.102 (2.59)	0.102 (2.59)	0.128 (3.25)
1¼	(32)	1.386 (35.20) ± 0.003 (0.08)	1.372 (34.85) ± 0.003 (0.08)	1.100 (27.94)	1.125 (28.58)	0.125 (3.18)	0.125 (3.18)	0.156 (3.96)
1½	(40)	1.640 (41.66) ± 0.004 (0.10)	1.622 (41.20) ± 0.004 (0.10)	1.300 (33.02)	1.329 (33.76)	0.148 (3.76)	0.148 (3.76)	0.185 (4.70)
2	(50)	2.141 (54.38) ± 0.004 (0.10)	2.123 (53.92) ± 0.004 (0.10)	1.700 (43.18)	1.739 (44.17)	0.193 (4.90)	0.193 (4.90)	0.241 (6.12)



Nominal Size		Threads (Per Inch)	Effective Thread Length (L)	Pitch of Thread (P)
(mm)	(in.)			

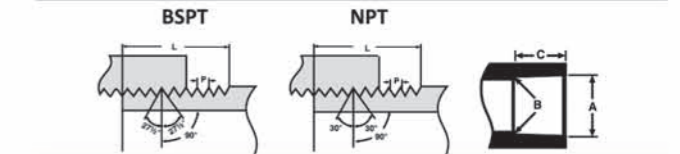
## American National Standard Taper Pipe Threads (NPT) Ansi Standard B1.20.1 ASTM Standard F 1498

15	½	14	0.5337	0.07143
20	¾	14	0.5457	0.07143
25	1	11½	0.6828	0.08696
32	1¼	11½	0.7068	0.08696
40	1½	11½	0.7235	0.08696
50	2	11½	0.7565	0.08696
65	2½	8	1.1375	0.12500
80	3	8	1.2000	0.12500
100	4	8	1.3000	0.12500

Nominal Size		(G) Min.	(J) Min.	(N) Min.
(mm)	(in.)			

## Minimum Dimensions from Center to End of Socket (Laying Length) for CPVC 4120, SDR 11 Plastic Tubing Fittings\* Per ASTM D 2846

15	½	0.382	0.183	0.102
20	¾	0.507	0.235	0.102
25	1	0.633	0.287	0.102
32	1¼	0.758	0.339	0.102
40	1½	0.884	0.391	0.102
50	2	1.134	0.495	0.102



Nominal Size		Threads (Per Inch)	Effective Thread Length (L)	Pitch of Thread (P)
(mm)	(in.)			

## BSP ISO 7/1 Parallel Threads

15	½	14	13.152	1.8143
20	¾	14	14.514	1.8143
25	1	11	16.714	2.3091
32	1¼	11	19.050	2.3091
40	1½	11	19.050	2.3091
50	2	11	23.378	2.3091
65	2½	11	26.698	2.3091
80	3	11	29.873	2.3091
100	4	11	35.791	2.3091

Nominal Size		Diameter (in.)		Socket Length Minimum C (in.)	
(mm)	(in.)	Socket Entrance A	Socket Bottom B	SCH 40	SCH 80

## Basic Socket Dimensions Schedule 40 CPVC Fittings As Per ASTM F 438 Schedule 80 CPVC Fittings As Per ASTM F 439

65	2½	2.889	2.868	± 0.007	1.750	1.750
80	3	3.516	3.492	± 0.008	1.875	1.875
100	4	4.518	4.491	± 0.009	2.000	2.250
150	6	6.647	6.614	± 0.011	3.000	3.000
200	8	8.655	8.610	± 0.015	4.000	4.000
250	10	10.780	10.735	± 0.015	5.000	5.000
300	12	12.780	12.735	± 0.015	6.000	6.000

# FLUID HANDLING CHARACTERISTIC OF ASTRAL CPVC PRO PIPES

## LINEAR FLUID FLOW VELOCITY

The linear velocity of a flowing fluid in a pipe is calculated from :

$$V = \frac{0.4085g}{d^2}$$

Where V = Linear fluid flow velocity in feet per second

g = Flow rate in gallons per minute

d = Inside diameter of pipe in inches

The values in the following tables are based on this formula. These values are accurate for all fluids.

Linear fluids flows velocity in a system should generally be limited to 5 ft/s, particularly for pipe size 6" and greater. Following this guideline will minimize risk of hydraulic shock damage due to water hammer surge pressures.

## FRICITION LOSS IN PIPES

A great advantage that ASTRAL CPVC PRO Pipe enjoys over its metallic competitors is a smooth inner surface which is resistant to scaling and fouling. This means that friction pressure losses in the fluid flow are minimized from the beginning and do not significantly increase as the system ages, as can be the case with metal pipes subject to scaling.

The Hazen-Willims formula is the generally accepted method of calculating friction head losses in piping systems. The values in the following fluid tables are based on this formula and a surface roughness constants for other piping materials are given beside :

$$f = 0.2083 \times \left(\frac{100}{C}\right)^{1.852} \frac{g^{1.852}}{d^{4.8655}}$$

Where f = Friction head in feet of water per 100 feet of pipe

d = Inside diameter of pipe in inches

g = Flow rate in gallons per minute

c = pipe surface roughness constant

## CONSTANT (C) TYPE OF PIPE

150	-	CPVC pipe, new-40 years old
130-140	-	steel / cast iron pipe, new
125	-	steel pipe, old
120	-	cast iron, 4 - 12 years old galvanized steel
	-	cast iron, 13 - 20 years old
60 - 80	-	cast iron, worn / pitted

## FRICITION LOSS IN FITTINGS

Friction losses through fittings are calculated from the equivalent length of straight pipe which would produce the same friction loss in the fluid. The equivalent lengths of pipe for common fittings are given here.

Nominal Size (mm)	90° Standard Elbow	45° Standard Elbow	Standard Tee Run Flow	Standard Tee Branch Flow
½	1.55	0.83	1.04	3.11
¾	2.06	1.10	1.37	4.12
1	2.62	1.40	1.75	5.25
1¼	3.45	1.84	2.30	6.90
1½	4.03	2.15	2.68	8.05
2	5.17	2.76	3.45	10.30
2½	6.10	3.30	4.10	12.20
3	7.60	4.10	5.10	15.20
4	10.00	5.30	6.70	20.00
6	15.10	8.00	10.10	30.20
8	19.90	10.60	13.20	39.70
10	24.90	13.30	16.60	49.90
12	29.70	15.90	19.80	59.40

## WATER HAMMER SURGE PRESSURE

Whenever the flow rate of fluid in a pipe is change, there is a surge in pressure known as water hammer, The longer the line and the faster the fluid is moving, the greater the hydraulic shock will be. Water hammer may be caused by opening or closing a valve, starting or stopping a pump, or the movement of entrapped air through the pipe. The maximum water hammer surge pressure may be calculated from :

$$P_{wh} = \frac{\rho \Delta V}{g_c} \left[ \frac{\rho}{K} \left( \frac{1+d}{bE} \right) \right]^{1/2}$$

Where Pwh = Maximum surge pressure, psi

ρ = Fluid density

ΔV = Change in fluid velocity

g<sub>c</sub> = Gravitational constant

K = Bulk modulus of elasticity of fluid

b = Pipe wall thickness

E = Pipe material bulk modulus of elasticity

d = Pipe inside diameter

The value in the following tables are based on this formula at 73°F and the assumption that water flowing at a given rate of gallons per minute is suddenly completely stopped. At 180°F, the surge pressure is approximately 15% less. The value for fluids other than water may be by multiplying by the square root of the fluid's specific gravity.

## THE WATER HAMMER SURGE PRESSURE PLUS THE SYSTEM OPERATING PRESSURE SHOULD NOT EXCEED THE RECOMMENDED WORKING PRESSURE RATING OF THE SYSTEM.

In order to minimize hydraulic shock due to water hammer, linear fluid flow velocity should generally be limited to 5ft/s. Velocity at system start-up should be limited to 1 ft/s during filling until it is certain that all air has been flushed from the system and pressure has been brought up to operating conditions. Pump should not be allowed to draw in air.

Where necessary, extra protective equipment may be used to prevent water hammer damage, such equipment might include pressure relief valves, shock absorbers, surge arrestors and vacuum air relief valves.

## FRICITION LOSS AND FLOW VELOCITY FOR SDR 11 CTC CPVC THERMOPLASTIC PIPE

(Friction head and Friction Loss are per 100 feet of pipe)

Gallons Per Minute	½ in.			¾ in.			1 in.			1 ½ in.			2 in.		
	Friction Pressure Loss (PSI Per 100 Ft.)	Friction Head Loss (Ft. of Water Per 100 Ft.)	Flow Velocity (Feet Per Second)	Friction Pressure Loss (PSI Per 100 Ft.)	Friction Head Loss (Ft. of Water Per 100 Ft.)	Flow Velocity (Feet Per Second)	Friction Pressure Loss (PSI Per 100 Ft.)	Friction Head Loss (Ft. of Water Per 100 Ft.)	Flow Velocity (Feet Per Second)	Friction Pressure Loss (PSI Per 100 Ft.)	Friction Head Loss (Ft. of Water Per 100 Ft.)	Flow Velocity (Feet Per Second)	Friction Pressure Loss (PSI Per 100 Ft.)	Friction Head Loss (Ft. of Water Per 100 Ft.)	Flow Velocity (Feet Per Second)
1	1.71	3.19	1.71	0.80	0.50	0.80	0.22	0.15	0.06	0.48	0.15	0.06	0.21	0.13	0.68
2	3.42	11.53	3.42	1.60	1.82	1.60	0.79	0.53	0.23	0.96	0.53	0.23	0.42	0.27	1.35
3	5.16	24.43	5.16	2.40	3.85	2.40	1.67	1.12	0.49	1.44	1.12	0.49	0.63	0.41	2.03
4	6.83	41.62	6.83	3.20	6.55	3.20	2.84	1.91	0.83	1.93	1.91	0.83	0.84	0.55	2.70
5	8.54	62.91	8.54	4.00	9.91	4.00	4.29	2.89	1.25	2.41	2.89	1.25	1.09	0.71	3.38
6	10.25	88.18	10.25	4.79	13.89	4.79	6.02	4.05	1.76	2.89	4.05	1.76	1.37	0.89	4.05
7	11.96	117.32	11.96	5.59	18.47	5.59	8.01	5.39	2.34	3.37	5.39	2.34	1.75	1.12	4.73
8	13.67	150.23	13.67	6.39	23.66	6.39	10.26	6.90	2.99	3.85	6.90	2.99	2.16	1.35	5.40
9	15.38	186.85	15.38	7.19	29.42	7.19	12.76	8.59	3.72	4.33	8.59	3.72	2.57	1.58	6.08
10	17.08	227.11	17.08	7.99	35.76	7.99	15.50	10.43	4.52	4.82	10.43	4.52	2.98	1.81	6.75
15				11.99	75.78	11.99	32.85	22.11	9.58	7.22	22.11	9.58	4.39	2.64	10.01
20				15.98	129.11	15.98	55.97	37.67	16.33	9.63	37.67	16.33	5.79	3.47	13.40
25										12.04	56.94	24.69	9.33	6.46	17.85
30										14.45	79.82	34.60	13.07	9.68	23.16
35										16.86	106.19	46.03	17.39	12.72	29.47
40													22.27	16.14	35.78
45													27.70	17.75	42.09
50													33.66	19.36	48.40
55													40.16	20.97	54.71
60													47.85	22.58	61.02
70													64.37	28.19	77.33
80													81.69	33.80	93.59
90													99.01	39.41	109.85
100													116.43	45.02	126.11
125													168.99	60.63	168.99

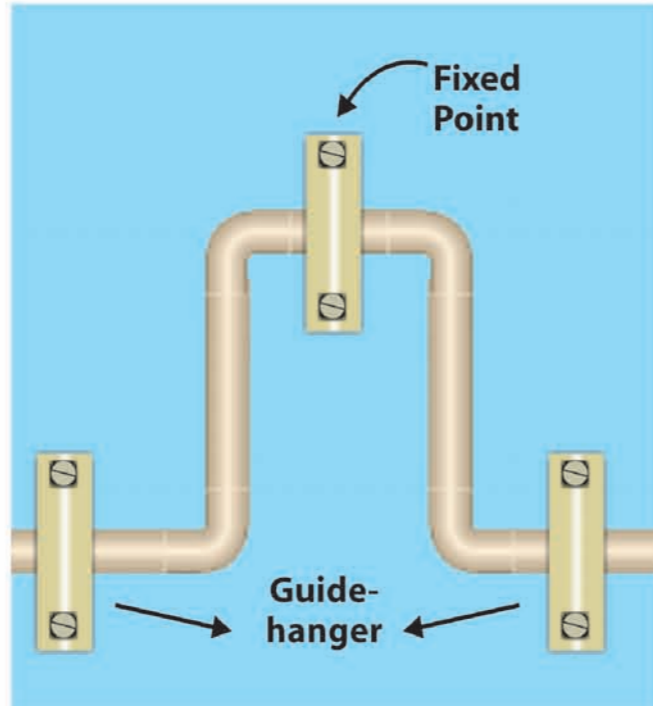
CAUTION : Flow velocity should not exceed 5 feet per second. Velocities in excess of 5 feet per second may result in system failure and property damage.

# THERMAL EXPANSION AND CONTRACTION

Like all piping material, ASTRAL CPVC PRO expand when heated and contract when cooled. CPVC piping (regardless of pipe diameter) will expand about 1 inch per 50 feet of length when subjected to a 50° F temperature increase, therefore, allowances must be made for this resulting movement. However, laboratory testing and installation experience have demonstrated that the practical issues are much smaller than the coefficient of thermal expansion would suggest. The stresses developed in CPVC pipe are generally much smaller than those developed in metal pipe for equal temperature changes because of the difference in elastic modulus. Required loops are smaller than those recommended by the Copper Development Association for copper systems.

Expansion is mainly a concern in hot water lines. Generally, thermal expansion can be accommodated with changes in direction.

However, a long straight run may require an offset or loop. Only one expansion loop, properly sized is required in any single straight run, regardless of its total length. If more convenient, two or more smaller expansion loops, properly sized, can be utilized in a single run of pipe to accommodate the thermal movement. Be sure to hang pipe with smooth straps that will not restrict movement. For convenience, loop (or offset) length have been calculated for different pipe sizes and different run length with a temperature increase (DT) of about 80°F. The results, shown in Tables A and B, are presented simply as a handy guide for quick and easy determinations of acceptable loop length for the approximate conditions. Loop length for other temperatures and run length can be calculated utilizing the following equations :



### EXPANSION LOOP FORMULA

$$L = \sqrt{\frac{3ED(\Delta L)}{2S}}$$

Where:

- L = Loop Length (in.)
- E = Modulus of elasticity at maximum temperature (psi)
- S = Working stress at maximum temperature (psi)
- D = Outside diameter of pipe (in.)
- $\Delta L$  = Change in length due to change in temperature (in.)

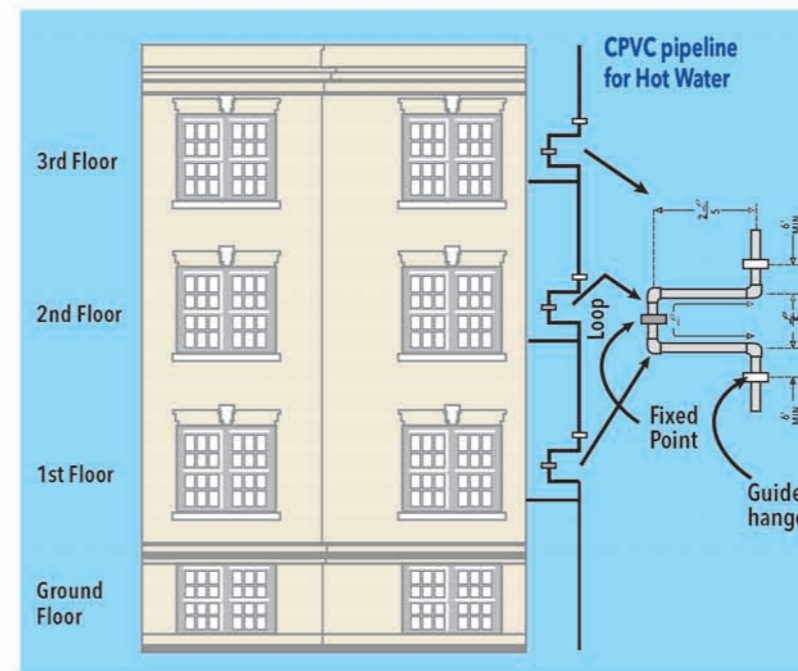
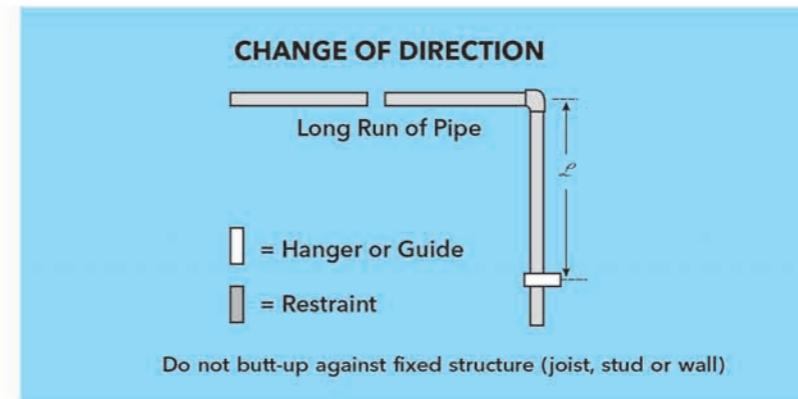
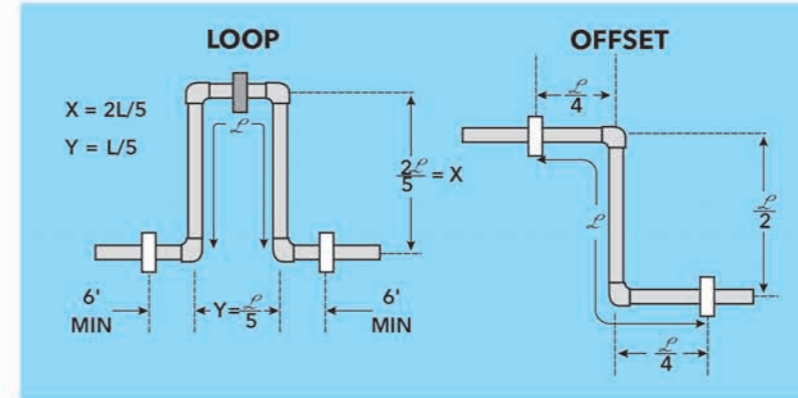
### THERMAL EXPANSION FORMULA

$$\Delta L = L_p C \Delta T$$

Where:

- $\Delta L$  = Change in length due to change temperature (in.)
- $L_p$  = Length of pipe (in.)
- C = Coefficient of thermal expansion (in. / in. /°F)  
=  $3.4 \times 10^{-5}$  in. / in. /°F for CPVC
- $\Delta T$  = Change in temperature (°F)

# THERMAL EXPANSION AND CONTRACTION



### Modulus of Elasticity and Working Stress For CPVC

Temperature °F	Temperature °C	Modulus, E(psi)	Stress, S(psi)
73	(27)	423,000	2000
90	(32)	403,000	1800
110	(43)	371,000	1500
120	(49)	355,000	1300
140	(60)	323,000	1000
160	(71)	291,000	750
180	(82)	269,000	500

**TABLE A**  
ASTRAL CPVC PRO pipe CTS PIPES (ASTM D 2846)  
Calculated Loop (Offset) Length with  $\Delta T$  of approx. 80°F in inches

Nominal Size	mm	in.	Length of Run Feet			
			40	60	80	100
15	½	22	27	31	34	
20	¾	26	32	36	41	
25	1	29	36	41	46	
32	1¼	32	40	46	51	
40	1½	35	43	50	56	
50	2	40	49	57	64	

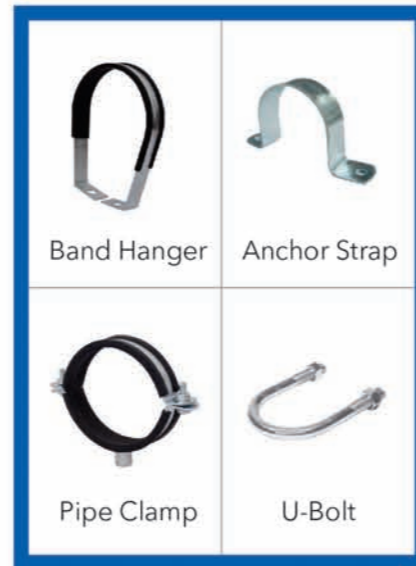
**TABLE B**  
ASTRAL CPVC PRO IPS PIPES (ASTM F 441)  
Calculated Loop (Offset) Length with  $\Delta T$  of approx. 80°F in inches

Nominal Size	mm	in.	Length of Run Feet			
			40	60	80	100
65	2½	47	57	66	74	
75	3	52	63	73	82	
100	4	58	72	83	92	
150	6	71	87	100	112	
200	8	81	99	114	128	
250	10	90	111	128	143	
300	12	98	121	139	156	

## HORIZONTAL & VERTICAL SUPPORTS

Horizontal & Vertical runs of ASTRAL CPVC PRO Pipe should be supported by pipe clamps or by hangers located on the horizontal connection close to the Riser, Hangers should not have rough or sharp edges, which come in contact with the pipe.

SPACING									
Nominal Pipe Size		21°C (70°F)		49°C (120°F)		71°C (160°F)		82°C (180°F)	
mm	in.	Ft.	(cm)	Ft.	(cm)	Ft.	(cm)	Ft.	(cm)
15	½	5.5	(167.70)	4.5	(137.16)	3.0	(91.44)	2.5	(76.20)
20	¾	5.5	(167.70)	5.0	(152.40)	3.0	(91.44)	2.5	(76.20)
25	1	6.0	(182.88)	5.5	(167.70)	3.5	(106.68)	3.5	(91.44)
32	1¼	6.5	(198.12)	6.0	(182.88)	3.5	(106.68)	3.5	(106.68)
40	1½	7.0	(213.36)	6.0	(182.88)	3.5	(106.68)	3.5	(106.68)
50	2	7.0	(213.36)	6.5	(198.12)	4.0	(121.92)	3.5	(106.68)
65	2½	8.0	(244.00)	7.5	(228.60)	4.5	(137.16)	4.0	(121.92)
75	3	8.0	(244.00)	7.5	(228.60)	4.5	(137.16)	4.0	(121.92)
100	4	9.0	(274.32)	8.5	(259.08)	5.0	(152.40)	4.5	(137.16)
150	6	10.0	(304.80)	9.0	(274.32)	5.5	(167.07)	5.0	(152.40)
200	8	11.0	(335.28)	10.0	(304.80)	6.0	(182.88)	5.5	(167.07)
250	10	11.5	(350.52)	10.5	(320.04)	6.5	(198.12)	6.0	(182.88)
300	12	12.5	(381.00)	11.0	(335.28)	7.5	(228.60)	6.5	(198.12)



## Astral Clamps & Hangers

Support Staff of Pipes & Fittings



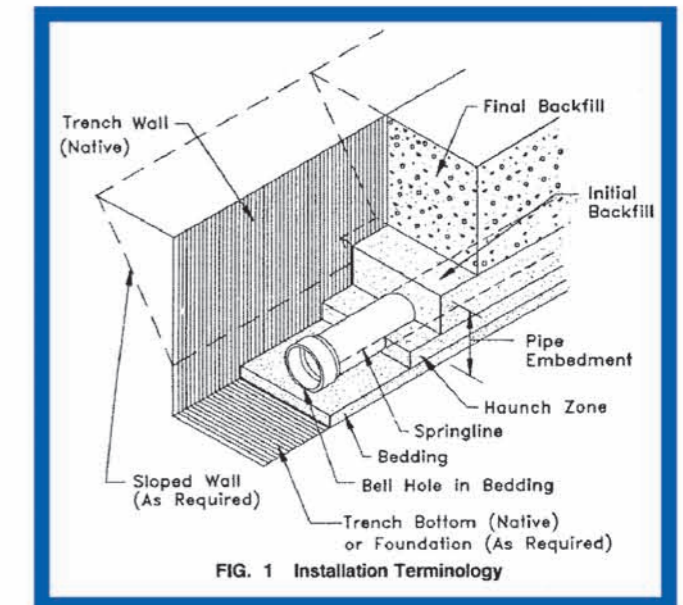
## UNDERGROUND INSTALLATION

### TRENCHING

The following trenching and burial procedures should be used to protect the piping system.

- The trench should be excavated to ensure the sides will be stable under all working conditions.
- The trench should be wide enough to provide adequate room for the following :
  - Joining the pipe in the trench.
  - Snaking the pipe from side or side to compensate for expansion and contraction.
  - Filling and compacting the side fills. The space between the pipe and trench wall must be wider than the compaction equipment used in the compaction of the back fill. Minimum width shall not be less than the greater of either the pipe outside diameter plus 16 inches or the pipe outside diameter times 1.25 plus 12 inches. Trench width may be different if approved by the design engineer.
- The trench bottom should be smooth, free of rocks and debris, continuous and provide uniform support. If ledge rock, hardpan or large boulders are encountered, the trench bottom should be padded with bedding of compacted granular material to a thickness of at least 4 inches. Foundation bedding should be installed as required by the engineer.
- Trench depth is determined by the pipe's service requirements. Plastic pipe should always be installed at least below the frost level. The minimum cover for lines subject to heavy overhead traffic is 24 inches.
- A smooth trench bottom is necessary to support the pipe over its entire length on firm stable material. Blocking should not be used to change pipe grade or to intermittently support pipe over low sections in the trench.

CPVC pipes and fittings can be installed underground. Since these piping systems are flexible systems, proper attention should be given to burial conditions. The stiffness of the piping system is affected by sidewall support, soil compaction, and the condition of the trench. Trench bottoms should be smooth and regular in either undisturbed soil or a layer of compacted backfill. Pipe must lie evenly on this surface throughout the entire length of its barrel. Excavation, bedding and backfill should be in accordance with the provision of the local Plumbing Code having jurisdiction.



### BEDDING AND BACKFILLING

- Even though sub-soil conditions vary widely from place to place, the pipe backfill should be stable and provide protection for the pipe.
- The pipe should be surrounded with a granular material which is easily worked around the sides of the pipe. Backfilling should be performed in layer of 6 inch with each layer being sufficiently compacted to 85% to 95% compaction.
- A mechanical tamper is recommended for compacting sand and gravel backfill which contain a significant proportion of fine grained material, such as silt and clay. If a tamper is not available, compacting should be done by hand.
- The trench should be completely filled. The backfill should be placed and spread in fairly uniform layers to prevent any unfilled spaces or voids.

# REQUIREMENT OF THERMALLY INSULATING CPVC PIPE

CPVC has much lower thermal conductivity than metals used in piping systems (0.14W / mk for CPVC versus > 400 W / mk for copper).

For this reason in most cases it is not necessary to thermally insulate CPVC piping. However the equation below can be used to calculate the approximate heat loss from CPVC pipes 1 meter length of pipe.

$$Q = \frac{\lambda}{e} \cdot \Pi \cdot \left[ \frac{d_i + d_o}{2} \right] \cdot \Delta T$$

Where  $Q$  = Heat loss per meter of pipe, W/m  
 $\lambda$  = Thermal conductivity. [W/mk] for CPVC,  
 $\lambda = 0.14$  w/mk  
 $e$  = Thickness of pipe, mm .068  
 $\Pi$  = 3, 1416  
 $d_i$  = Inside diameter, mm  
 $d_o$  = Outside diameter, mm  
 $\Delta T$  = Temperature differential between inner and outer surface of pipe.  
 This can be approximated to :  $T$  water.  
 $T$  ambient (K)

## EXAMPLE

What is the heat loss/meter from a 20mm outside diameter CPVC pipe. wall thickness 2,3mm, with water flowing inside at 80°C and an ambient air temperature of 25°C?

$$Q = \frac{0.14}{2.3} \cdot 3,1416 \cdot \left[ \frac{15.4 + 20}{2} \right] \cdot (80-25)$$

$$= 186 \text{ W/m}$$

Equation (1) can be simplified for standard pipe dimensions to :

$$Q = K \Delta T$$

Where K is a conductivity of CPVC and the pipe geometry in the previous example.  $d_o = 20$ mm, and  $e = 2.3$ mm

$$Q = \frac{0.14}{2.3} \cdot 3,1416 \cdot \left[ \frac{15.4 + 20}{2} \right] \cdot = 3.38 \text{ (W/mks)}$$

## HANDLING

The pipe should be handled with reasonable care because thermoplastic pipe is much lighter in weight than metal pipe, there is sometimes a tendency to throw it around. This should be avoided.

The pipe should never be dragged or pushed from a truck bed. Pallets for pipe should be removed with a fork lift. Loose pipe can be rolled down timbers as long as the pieces do not fall on each other or on any hard or uneven surface. In all cases, severe contact with any sharp objects (rocks, angle irons, forks on forklifts, etc.) should be avoided.

## STORAGE

If possible, pipe should be stored inside. When this is not possible, the pipe should be stored on level ground which is dry and free from sharp objects. If different schedules of pipes are stacked together, the pipes with the thickest walls should be at the bottom.

The pipes should be protected from the sun and be in an area with proper ventilation. This will lessen the effects of ultraviolet rays and help prevent heat built-up.

If the pipes are stored in racks, it should be continuously supported along its length. If this is not possible, the spacing of the supports should not exceed three feet (3').

When storage temperatures are below 0°C (32°F), extra care should be taken when handling the pipe. This will help prevent any problems which could be caused by the slightly lower impact strength of PVC pipes at temperature below freezing.



# JOINING ASTRAL CPVC PIPES & FITTINGS

## CUTTING

In order to make a proper and neat joint, measure the pipe length accurately and make a small mark. Ensure that the pipe and fittings are size compatible. You can easily cut with a wheel type plastic pipe cutter or hacksaw blade. Cutting tubing as squarely as possible provides optimal bonding area within a joint.



1

## DEBURRING/BEVELING



Burrs and filings can prevent proper contact between tube and fitting during assembly and should be removed from the outside and inside of the pipe. Debarking tool, pocket knife or file are suitable for this. A slight bevel on the end of the tubing will ease entry of the tubing into the fitting socket.

2

## FITTING PREPARATION

Using a clean, dry rag, wipe dirt and moisture from the fitting sockets and tubing end. The tubing should make contact with the socket wall 1/3 to 2/3 of the way into the fitting socket.



3

## SOLVENT CEMENT APPLICATION



Use only CPVC cement or an all - purpose cement conforming to ASTM F 493 or joint failure may result. When making a joint, apply a heavy, even coat of cement to the pipe end. Use the same applicator without additional cement to apply a thin coat inside the fitting socket. Too much cement can cause clogged water ways.

4

## ASSEMBLY

Immediately insert the tubing into the fitting socket, rotate the tube ¼ to ½ turn while inserting. This motion ensures an even distribution of cement within the joint. Properly align the fittings. Hold the assembly for approximately 10 seconds, allowing the joint to set-up.



5

## SET AND CURE



Solvent cement set and cure times are a function of pipe size, temperature and relative humidity. Curing time is shorter for drier environments, smaller sizes and higher temperatures. It requires 10 to 20 minutes for perfect joint.

6

Note : For sizes above 65 mm (2½") use IPS 70 primer before applying solvent cement. The purpose of a primer is to penetrate and soften the surfaces so they can stick together. The proper use of a primer ensures that the surfaces are prepared for fusion in a wide variety of weather conditions.



# HOW TO USE SOLVENT CEMENT PRIMER & CLEANER

## JOINT CURING

### Recommended initial set times.

Temperature Range	Pipe Size ½" to 1 ¼" 15 mm to 32 mm	Pipe Size 1½" to 3" 40 mm to 80 mm	Pipe Size 4" to 8" 100 mm to 200 mm	Pipe Size 10" to 12" 250 mm to 300 mm
15.5°C - 37.7°C	15 min	30 min	1 hrs.	2 hrs.
4.4°C - 15.5°C	1 hrs.	2 hrs.	4 hrs.	8 hrs.

### Recommended initial cure times.

Temperature Range	Pipe Size ½" to 1 ¼" 15 mm to 32 mm	Pipe Size 1½" to 3" 40 mm to 80 mm	Pipe Size 4" to 8" 100 mm to 200 mm	Pipe Size 10" to 12" 250 mm to 300 mm
15.5°C - 37.7°C	6 hrs.	12 hrs.	24 hrs.	48 hrs.
4.4°C - 15.5°C	12 hrs.	24 hrs.	48 hrs.	96 hrs.

### CHOOSING CEMENTS & PRIMERS :

Solvent cements for ASTRAL CPVC PRO systems must conform to the requirements of ASTM F-493 or equivalent and should carry this identification on the can label. A primer or cleaner must be used on CPVC Primers for PVC pipe are acceptable for CPVC. The National Sanitation Foundation (NSF) mark or other potable water approval should also be located on the container.

Certain code bodies require orange CPVC solvent cement and purple primer to facilitate identification by plumbing inspectors. However, unpigmented (clear) CPVC solvent cement and primer are available and accepted by various jurisdictions. If you decide to use clear products, we strongly recommend contracting the local plumbing inspector prior to beginning a job to determine if these clear cements and primers are acceptable.

### CPVC CEMENT'S SHELF LIFE :

CPVC solvent cement are formulated to have a Shelf life of two years. Cans are usually marked with manufacturing dates. Good CPVC cement should have the consistency of syrup or honey with no undissolved materials. Ages cement will often change colour or begin to thicken and become gelatinous or jelly-like. When this occurs, the cement must be thrown away.

### SOLVENT CEMENT FREEZING :

Use the same precautions to protect CPVC solvent cement from freezing as you would with PVC cement. Once cement gels, it can not be recovered and should be discarded.

## BEFORE BEGINNING

1. Verify the cement is the same as the pipes and fittings being used.
2. Check the temperature where the cementing will take place.
  - Cement take longer time to set up in cold weather. Be sure to allow extra time for curing. Do not try to speed up the cure by artificial means this could cause porosity and blisters in the cement film.
  - Solvents evaporate faster in warm weather. Work quickly to avoid the cement setting up before the joint is assembled. Keep the cement as cool as possible. Try to stay out of direct sunlight.
3. Keep the lid on cements, cleaner, and primers when not in use. Evaporation of the solvent will effect the cement.
4. Stir or shake cement before using.
5. Use 20 mm (¾") dauber on small diameter pipes, 40 mm (1½") dauber up through 80 mm (3") pipe, and a natural bristle brush, swab, or roller ½ the pipe diameter on pipes 4" and up.
6. Do not mix cleaner or primer with cement.
7. Do not use thickened or lumpy cement. It should be like the consistency of syrup or honey.
8. Do not handle joints immediately after assembly.
9. Do not allow daubers to dry out.
10. Maximum temperature allowable for CPVC pipe is 180°F.
11. All coloured cements, primers, and cleaners will have a permanent stain. There is no known cleaning agent.
12. Use according to the step outline in ASTM D-2846, joining of pipe and fittings.



# IMPORTANT NOTES

## NUMBER OF JOINTS PER LITER OF CEMENT BY PIPE SIZE



Dia of Pipe (mm)		Appx. Nos of joints*
15	½"	1200
20	¾"	750
25	1"	500
32	1¼"	450
40	1½"	325
50	2"	225
65	2½"	50
75	3"	40
100	4"	30
150	6"	10
200	8"	5
250	10"	2-4
300	12"	1-2

\* Approximate numbers of joints which can be made per ltr. of solvent cement  
\* For primer, number of joints are approximate double than solvent cement

### SAFE HANDLING OF SOLVENT CEMENT

When using solvent cements, primers and cleaners there are some basic safety measures.

### ALL USERS SHOULD KEEP IN MIND.

- Avoid prolonged breathing of solvent vapors. When pipes and fittings are being joined in enclosed area, the use of ventilating devices are advised.
- Keep cements, primers and cleaners away from all sources of ignition, heat, sparks and open flame.
- Keep containers of cements, primers and cleaners tightly closed except when the product is being used.
- Dispose of all rags used with solvents in a proper outdoor waste receptacle.
- Avoid eye and skin contact. In case of eye contact, flush with plenty of water for 15 minutes and call a physician.

### THREAD SEALANTS

Threaded CPVC fittings with tapered pipe threads (e.g. male thread adapters) must be used with a suitable thread sealant to insure leak-proof joints. Over the years, PTFE (Teflon® or equivalent) tape has been the preferred thread sealant, it is still the most widely accepted and approved sealant. Some paste sealant can affect CPVC fittings; therefore only sealants recommended for use with CPVC by the thread sealant manufacturer should be used.



# GENERAL GUIDELINE FOR ALL INSTALLATIONS

# NOTES

## DO'S

1. Install product according to ASTRAL's Installation instructions and manual and follow recommended safe work practices.
2. Keep Pipe and Fittings in original packaging until needed and store pipes in covered areas.
3. Use tools designed for use with plastic pipe and fittings.
4. Cut-off minimum 25 mm beyond the edge of the crack in case any crack is discovered on the pipe.
- 4A. Pipe may be cut quickly and efficiently by several methods. Wheel-type plastic tubing cutters are preferred. Ratchet type cutters or fine tooth saws are another option. However, when using the ratchet cutter, be certain to score the exterior wall by rotating the cutter blade in a circular motion around the pipe. Do this before applying significant downward pressure to finalise the cut. This step leads to a square cut. In addition, make sure ratchet cutter blades are sharp. Cutting tubing as squarely as possible provides optimal bonding area within a joint.
- 4B. Burrs and filings can prevent proper contact between the tube and fittings during assembly, and should be removed from the outside and inside of the tube. A chamfering tool is preferred, but a pocket knife or file is also suitable for this purpose.
- 4C. Use CPVC Cement only. Use only CPVC Cement or an all purpose cement conforming to ASTM F-493 or joint failure may result.
5. Always conduct hydraulic pressure testing after installation to detect any leaks and faults. Wait for appropriate cure time before pressure testing. Fill lines slowly and bleed air from the system prior to pressure testing.
6. Rotate the pipe 90° to 180° to spread the CPVC Solvent Cement evenly in the joint while pushing the Pipe into Fitting.
7. Use Teflon tapes with threaded fittings.
8. Ensure that there are no sharp edges in contact with the pipe while embedding the pipes on the walls or in the floors.
- 8A. When making a transition connection to metal threads, use a special transition fitting or CPVC male threaded adapter whenever possible. Do not over-torque plastic threaded connections. Head tight plus one-half turn should be adequate.

9. Provide Vertical & Horizontal Supports as recommended using the Plastic Straps only.
10. Apply a water-based paint only on exposed pipes & fittings.
11. Visually inspect all joints for proper cementing at the end of shift or day. A Visual inspection of the complete system is also recommended during pressure testing.
12. When connecting to a gas water heater, CPVC tubing should not be located within 50cm of the flue. For water heaters lacking reliable temperature control, this distance may be increased up to 1m. A metal nipple or flexible appliance connector should be utilized. This measure eliminates the potential for damage to plastic piping that might result from excessive radiant heat from the flue.
13. Use of a brass/CPVC transition adapter when connecting CPVC to a water heater will help facilitate water heater replacement in the future.
14. Pressure test CPVC systems in accordance with local code requirements.



## DONT'S

1. Do not use Metal Hooks or Nails to support / hold or put pressure on the pipes. Do not use straps & hangers with rough or sharp edges. Do not tighten the straps over the pipes.
2. Never expose the pipe to Open Flame while trying to bend it.
3. Do not drop pipes on edges from heights. Do not drop heavy objects on pipes or walk on pipes.
4. Do not dilute Solvent Cement with Thinners /MTO or any other liquid etc.
5. Do not use air or gases for pressure testings.
6. Do not use any other petroleum or solvent-based sealant, adhesive, lubricant or fire stop material on CPVC pipes and fittings.
7. Do not use CPVC Pipes & Fittings for pneumatic applications.

*ASTRAL POLYTECHNIK LIMITED - Ahmedabad warrants to the original owner that the product will be free from manufacturing defect and confirm to current applicable ASTM standards under normal use. Buyer's remedy for breach of this warranty is limited to replacement of or credit for the defective product. This warranty excludes any expense for removal or reinstallation of any defective product and any other incidental, consequential or punitive damages.  
The limited warranty only applicable if ASTRAL CPVC PRO Pipes, Fittings & Weld-on solvent cement are used.*





## **ASTRAL PIPES**

**STRONG NAHIN, ASTRAL STRONG!!™**

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