ashirvad

PIPES

CPVC PLUMBING SYSTEM

HOT WHEN YOU WANT IT. **COLD** WHEN YOU NEED IT.

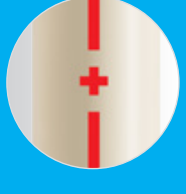
TECHNICAL MANUAL

Design Registered
Only with Ashirvad

FLOWGUARD PLUS
PIPE & FITTINGS™

Ideal for hot and cold water supply

Ashirvad is a licensee of Lubrizol - USA, manufacturing and marketing FLOWGUARD™ PLUS CPVC (Chlorinated Polyvinyl Chloride) hot and cold water systems in India.



Raw material from **Lubrizol, USA**

Alignment system **Design registered** only with Ashirvad

To date Ashirvad has produced 2,25,000 kilometres of CPVC pipes - that can wrap the earth 5 times over!

FLOWGUARD PLUS
PIPE & FITTINGS™


FLOWGUARD™ PLUS
SDR 11
ashirvad

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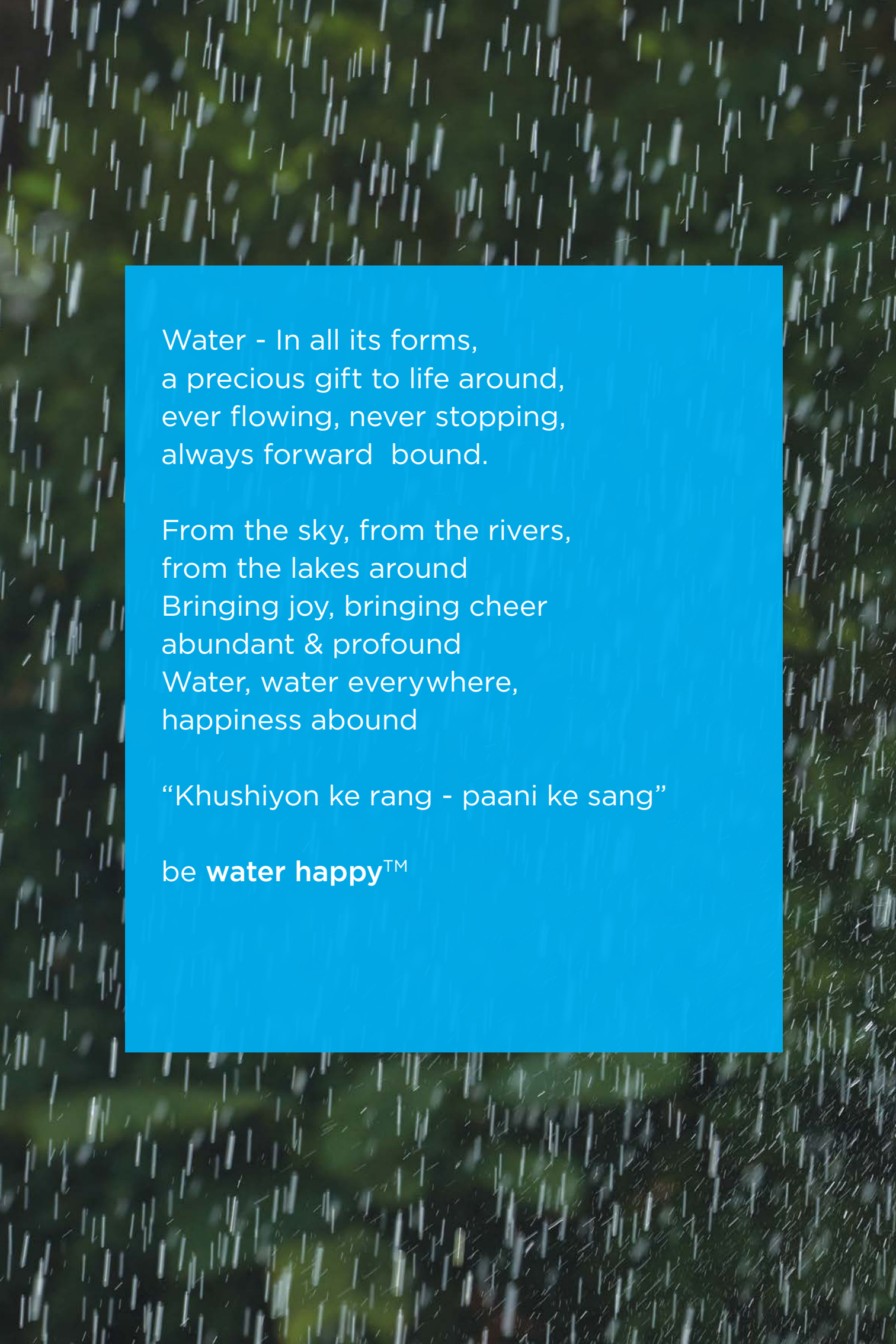


Water - In all its forms,
a precious gift to life around,
ever flowing, never stopping,
always forward bound.

From the sky, from the rivers,
from the lakes around
Bringing joy, bringing cheer
abundant & profound
Water, water everywhere,
happiness abound

“Khushiyon ke rang - paani ke sang”

be **water happy**™


ashirvad
160MM O.D. S.W.R. SILENT PLUS PIPES 10dB/2LPS TESTED TO EN 14366.
ashirvad
110MM O.D. S.W.R. SILENT PIPES 13dB/2LPS TESTED TO EN 14366.
ashirvad SDR 11 FLOWGUARD™ PLUS
ashirvad SDR 11 FLOWGUARD™ PLUS
ashirvad AQUALIFE™ (DN 20mm) 3/4" uPVC ASTM - D - 1785 SCHD 40 LEAD FREE
ashirvad HEAVY CLASS
ashirvad STANDARD CLASS

About Ashirvad

Ashirvad Pipes has been relentless in its commitment to quality and service since 1975. The product base has been enhanced through the years so as to suit the customer's requirements better. With its base in Bengaluru, Ashirvad Pipes is an ISO 9001-2008 certified company with a constant endeavour towards achieving the highest level of customer satisfaction.

Ashirvad has partnered with Aliaxis S.A. /N.V., a € 2.5 billion (~ INR 20,000 crores) Belgium conglomerate and a global leader in plastic fluid handling systems.

Ashirvad Pipes today:

- Manufacturing capacity in excess of 1,08,000 MT per annum
- Total factory area of 40 acres
- 325 sales & marketing staff
- 3,000 workforce
- 15 warehouses across the Country
- 1,800 distributors
- 16,000 dealers
- Exports to over 30 countries

Ashirvad Pipes today is the pioneer, largest manufacturer and exporter of Column pipes in India. Ashirvad is also a licensee of The Lubrizol Corporation, a Berkshire Hathaway Company, to manufacture and market CPVC plumbing systems in India. Ashirvad foresees to become a "one stop shop" for all plumbing and sanitary products needed by the Indian markets.

In 2007, Ashirvad won the National Award

for **"OUTSTANDING ENTREPRENEURSHIP IN MEDIUM ENTERPRISES"**

The award was presented by the Prime Minister of India.

WCRC LEADERS SUMMIT - 2014

"Ashirvad Pipes"

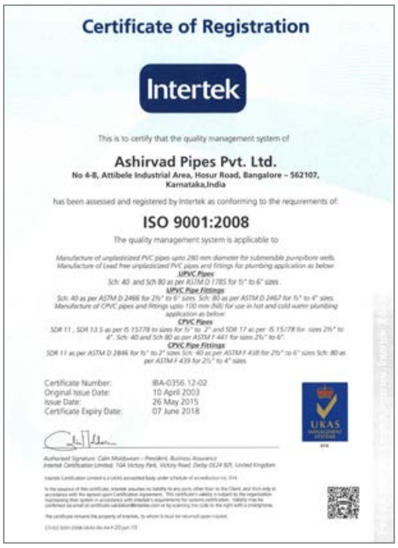
One of the 100

"FASTEST GROWING MARKETING BRANDS IN ASIA"

(Evaluated and selected by KPMG)

The Global Audit Firm

Certifications



Certificate of Registration

Intertek

This is to certify that the quality management system of

Ashirvad Pipes Pvt. Ltd.
No 4-B, Attibele Industrial Area, Hosur Road, Bangalore – 562107, Karnataka,India

has been assessed and registered by Intertek as conforming to the requirements of:

ISO 9001:2008

The quality management system is applicable to

Manufacture of unplasticized PVC pipes upto 280 mm diameter for submersible pump/bore wells. Manufacture of Lead free unplasticized PVC pipes and fittings for plumbing application as below:

UPVC Pipes
Sch: 40 and Sch 80 as per ASTM D 1785 for ½" to 6" sizes.

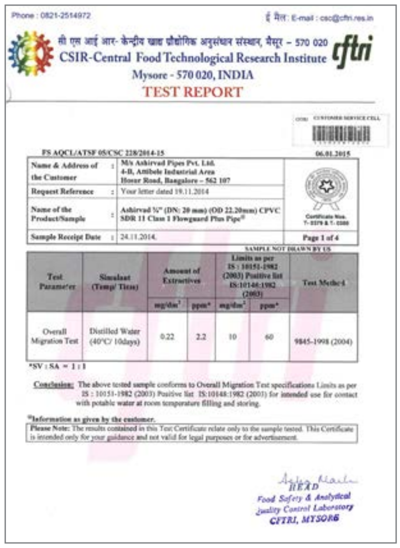
UPVC Pipe Fittings
Sch: 40 as per ASTM D 2466 for 2½" to 6" sizes. Sch: 80 as per ASTM D 2467 for ½" to 4" sizes. Manufacture of CPVC pipes and fittings upto 100 mm (NB) for use in hot and cold water plumbing application as below:

CPVC Pipes
SDR 11, SDR 13.5 as per IS 15778 to sizes for ½" to 2" and SDR 17 as per IS 15778 for sizes 2½" to 4". Sch: 40 and Sch 80 as per ASTM F 441 for sizes 2½" to 6".

CPVC Pipe Fittings
SDR 11 as per ASTM D 2846 for ½" to 2" sizes Sch: 40 as per ASTM F 438 for 2½" to 6" sizes Sch: 80 as per ASTM F 439 for 2½" to 4" sizes.

Certificate Number:	IBA-0356.12-02
Original Issue Date:	10 April 2003
Issue Date:	26 May 2015
Certificate Expiry Date:	07 June 2018

UKAS MANAGEMENT SYSTEMS



Phone : 0821-2514972 | ई मेल: E-mail : csc@cftri.res.in

सी एस आई आर- केन्द्रीय खाद्य प्रौद्योगिक अनुसंधान संस्थान, मैसूर – 570 020
CSIR-Central Food Technological Research Institute
Mysore - 570 020, INDIA

TEST REPORT

FS AQCL/ATSF 05/CSC 228/2014-15 — 06.01.2015

Name & Address of the Customer	:	M/s Ashirvad Pipes Pvt. Ltd. 4-B, Attibele Industrial Area Hosur Road, Bangalore – 562 107	
Request Reference	:	Your letter dated 19.11.2014	
Name of the Product/Sample	:	Ashirvad ¾" (DN: 20 mm) (OD 22.20mm) CPVC SDR 11 Class 1 Flowguard Plus Pipe®	Certificate Nos. T-3379 & T-3380
Sample Receipt Date	:	24.11.2014.	Page 1 of 4

SAMPLE NOT DRAWN BY US

Test Parameter	Simulant (Temp/ Time)	Amount of Extractives		Limits as per IS : 10151-1982 (2003) Positive list IS:10146:1982 (2003)		Test Method
		mg/dm²	ppm*	mg/dm²	ppm*	
Overall Migration Test	Distilled Water (40°C/ 10days)	0.22	2.2	10	60	9845-1998 (2004)

*SV : SA = 1 : 1

Conclusion: The above tested sample conforms to Overall Migration Test specifications Limits as per IS : 10151-1982 (2003) Positive list IS:10146:1982 (2003) for intended use for contact with potable water at room temperature filling and storing.

*Information as given by the customer.

Please Note: The results contained in this Test Certificate relate only to the sample tested. This Certificate is intended only for your guidance and not valid for legal purposes or for advertisement.

HEAD
Food Safety & Analytical Quality Control Laboratory
CFTRI, MYSORE

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
Bengaluru Branch Office: Peenya Industrial Area, 1st Stage, Tumkur Road, Bengaluru - 560 058

PAN No. : AAATB0431G

REGISTERED A.D

Our Ref: BNBO /L- 3323039 — Dated: 18 Feb 2014

Subject : RENEWAL OF CERTIFICATION MARKS LICENCE NO. CM/L- 3323039 AS PER IS 15778 : 2007

M/s ASHIRVAD PIPES PVT LTD
4-B, ATTIBELE INDUSTRIAL AREA, HOSUR ROAD,,
BANGALORE-562107.
Distt : Bangalore Urban
Karnataka.

Dear Sir,
With reference to your application for renewal of the above mentioned Certification Marks Licence, we are pleased to inform you that it has been renewed from 22/02/2014 to 21/02/2015.

It may please be noted that your licence shall expire at the end of the above mentioned period. You are, therefore, requested to send your application for its renewal at least two months before the expiry of the licence.

The endorsement sheet No.4 regarding renewal of licence is enclosed. This may be annexed to the original licence document available with you.

You are also requested to subscribe to our monthly Technical Journal 'Standards India' and also make use to publicise your product through advertisement. The details of the advertisement charges and subscription rates are available in our website www.bis.org.in
Thanking you.

Yours faithfully,
(H.JUNNUR)
SCIENTIST-E

Encl: As above.

मुख्यालय: मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली 110 002
Head Quarters : Manak Bhavana, 9 Bahadur Shah Zafar Marg, New Delhi 110 002
E-mail : info@bis.org.in

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
Bengaluru Branch Office: Peenya Industrial Area, 1st Stage, Tumkur Road, Bengaluru - 560 058

PAN No. : AAATB0431G

By Regd. Post

Dated29 Oct 2013
04/11/2013

Our Ref: BNBO /L -4497178

Dear Sirs,
This has reference to BIS Certification Marks Licence No. CML/L- 4497178 held by you for Specification for UPVC pipes for soil and waste discharge systems inside buildings including ventilation and rainwater system as per IS 13592 : 1992 which is valid upto 06/09/2014.

We are pleased to inform you that the Competent Authority of Bureau has agreed to include the following variety in your licence with immediate effect :

Specification for UPVC pipes for soil and waste discharge systems inside buildings including ventilation and rainwater system as per the following ratings :

Sizes of DN 63mm to 110mm, Type A and Type B Sliding Socket.

Please inform us as and when you start marking the new variety. You are advised to maintain separate records for the above variety after testing the same as per STI.

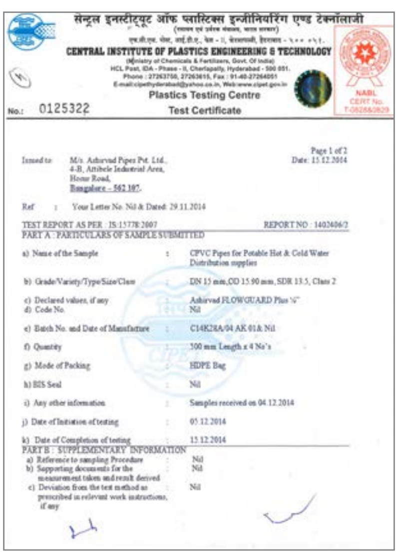
Endorsement sheet No.3 for the above is enclosed .

Thanking You,

Yours faithfully,
(S D SELVAN)
SCIENTIST-E

Encl: AS above.

मुख्यालय: मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली 110 002
Head Quarters : Manak Bhavana, 9 Bahadur Shah Zafar Marg, New Delhi 110 002



सेन्ट्रल इनस्टीट्यूट ऑफ प्लास्टिक्स इन्जीनियरिंग एण्ड टेक्नॉलाजी
CENTRAL INSTITUTE OF PLASTICS ENGINEERING & TECHNOLOGY
(Ministry of Chemicals & Fertilizers, Govt. Of India)
HCL Post, IDA - Phase - II, Cherlapally, Hyderabad - 500 051.
Phone : 27263750, 27263615, Fax : 91-40-27264051
Plastics Testing Centre

No.: 0125322 — Test Certificate — NABL CERT No. T-0828&0829

Page 1 of 2
Date: 15.12.2014

Issued to: M/s. Ashirvad Pipes Pvt. Ltd., 4-B, Attibele Industrial Area, Hosur Road, Bangalore – 562 107.

Ref : Your Letter No. Nil & Dated: 29.11.2014

TEST REPORT AS PER : IS:15778:2007 — REPORT NO : 1402406/2

PART A : PARTICULARS OF SAMPLE SUBMITTED

a) Name of the Sample	:	CPVC Pipes for Potable Hot & Cold Water Distribution supplies
b) Grade/Variety/Type/Size/Class	:	DN 15 mm,OD 15.90 mm, SDR 13.5, Class 2
c) Declared values, if any	:	Ashirvad FLOWGUARD Plus ½"
d) Code No.		Nil
e) Batch No. and Date of Manufacture	:	C14K28A/04 AK 01& Nil
f) Quantity	:	300 mm Length x 4 No's
g) Mode of Packing	:	HDPE Bag
h) BIS Seal	:	Nil
i) Any other information	:	Samples received on 04.12.2014
j) Date of Initiation of testing	:	05.12.2014
k) Date of Completion of testing	:	15.12.2014

PART B : SUPPLEMENTARY INFORMATION

a) Reference to sampling Procedure	:	Nil
b) Supporting documents for the measurement taken and result derived	:	Nil
c) Deviation from the test method as prescribed in relevant work instructions, if any	:	Nil

सेन्ट्रल इनस्टीट्यूट ऑफ प्लास्टिक्स इन्जीनियरिंग एण्ड टेक्नॉलाजी
CENTRAL INSTITUTE OF PLASTICS ENGINEERING & TECHNOLOGY
Cherlapally, Hyderabad - 500 051.

Test Certificate

No.: 0125321 — Continuation Sheet — NABL CERT No. T-0828&0829

REPORT No. 1402406/1 — Page 2 of 2
PART – C

TEST RESULTS
(AS PER : IS:15778:2007)

CPVC Pipe – DN 20 mm, SDR 11, Class 1

S.No.	Clause	Test	Specified Requirement	Results obtained
01	9.3	Effect on water	Max. ppm by Mass	
		Lead as pb,ppm (First extraction)	1.0 mg/ltr	0.0192
		Lead as Pb, ppm (Third Extraction)	0.05mg/ltr	0.0082
		Dialkyltin as C₄ (Third extraction)	0.02 mg/ltr	0.0074
		Cadmium as Cd, ppm (All three Extractions)	0.01 mg/ltr	Not detected
		Mercury as Hg, ppm (All three extractions)	0.001 mg/ltr	Not detected
		Other toxic substances such as "di-n-octyl-tin-s-s bis iso-octyl mercapto acetate" and "butyl stearate" (Third extraction)	0.01 mg/ltr	Not detected

PART D: REMARKS : NIL
NB: 1. The results related only to items/samples tested.
2. The report shall not be reproduced in full/part without written approval of the laboratory.

TECHNICAL MANAGER

QUALITY MANAGER
AUTHORISED SIGNATORY

ashirvad
PIPES

Global Partners - Aliaxis S.A./N.V.

The Aliaxis group is a leading global manufacturer and distributor primarily of plastic fluid handling systems used in residential, commercial and industrial buildings.

Head quartered in Brussels, Belgium, Aliaxis is present in over 40 countries, has more than 100 manufacturing and commercial entities and employs over 15,700 people.

Aliaxis leverages local and global knowledge of the industry as well as regulations and building habits to provide consistently excellent customer service through distribution partners to builders, installers, infrastructure contractors and others. The group is in the Indian plumbing and sanitary market through a partnership with Ashirvad Pipes.

New Range of Products

UNDERGROUND DRAINAGE SYSTEMS

Inspection Chamber

ITALY

SILENT / SILENT PLUS SWR SYSTEMS

'Girpi' bracket

FRANCE

WC PAN CONNECTORS

UNITED KINGDOM

BALL VALVES

ITALY

FIRE COLLARS

MALAYSIA

BUTTERFLY VALVES

ITALY

AIR ADMITTANCE VALVES

GERMANY

CONCEALED VALVES

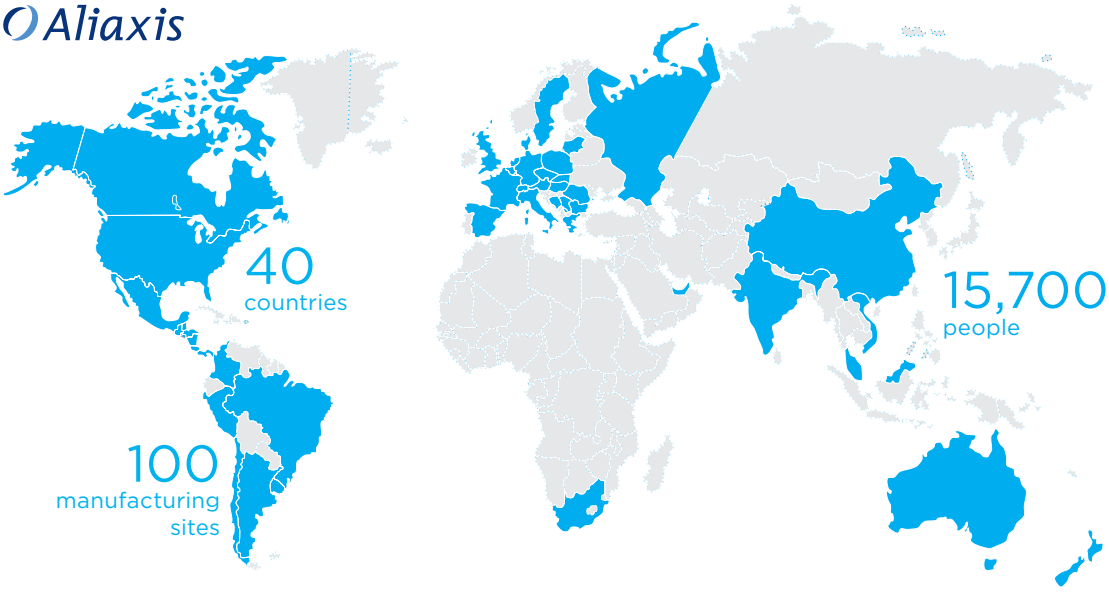
COSTA RICA

GREASE AND SOLIDS INTERCEPTOR

CANADA

WASTE AND TRAPS

SPAIN



Ashirvad production plant

Injection Moulding Facility

Raw material handling

Ashirvad workforce

Brass Fittings Quality Control

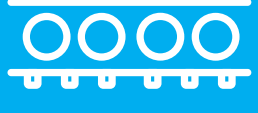
CPVC Extrusion Facility

10 ASSURANCES

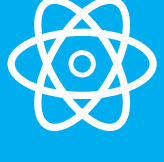
#01
STATE OF THE ART
MANUFACTURING FACILITIES

#02
ADVANCED MACHINERY
FOR SUPERIOR QUALITY

#03
ADVANCED MATERIAL
HANDLING SYSTEMS



#04
100% INCOMING RAW
MATERIAL INSPECTION



#05
HIGH DIMENSIONAL ACCURACY
TO MAINTAIN QUALITY OF
EACH PIECE, TO ENSURE
A DEFECT FREE SYSTEM

Ashirvad's stringent quality checks ensure premium products and maximum customer satisfaction

#06

STRINGENT QUALITY CHECKS AT EVERY LEVEL OF PRODUCTION

#07

100% FINISHED GOODS INSPECTION

#08

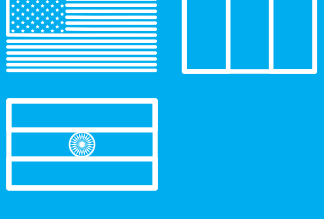
MULTIPLE QUALITY CHECKS IN PLACE FOR EVERY cPVC BRASS FITTING THAT LEAVES THE ASHIRVAD FACTORY

#09

EVERY BATCH OF PRODUCTS LAB TESTED

#10

REGULAR EXTERNAL LAB TESTING OF PRODUCTS IN USA, FRANCE AND INDIA



LEAK PROOF BATHROOMS

Ideal for use in hot and cold water applications in villas and individual homes, residential apartments, office complexes, commercial buildings, hotels and hospitals.

What is CPVC?

Chlorinated polyvinyl chloride (CPVC) is a thermoplastic produced by chlorination of polyvinyl chloride (PVC) resin used for hot and cold water lines. CPVC is the first choice of material for potable water supply across the world and is in use across the world for more than 50 years. It is ideal for use in hot and cold water applications in villas and individual homes, residential apartments, office complexes, commercial buildings, hotels and hospitals.

CPVC offers the following advantages against other piping materials:

Lowest bacterial growth

As compared to other piping systems (steel, copper, polypropylene, other thermoplastics) the bacterial growth in Ashirvad FLOWGUARD™ PLUS CPVC is much lower.

No Corrosion, leakage, scaling and pitting

Ashirvad FLOWGUARD™ PLUS CPVC has excellent corrosion resistance, preventing contamination, bad taste, bad odour and discoloration of the water. With CPVC there is no corrosive by - product ensuring the purest form of water to the very last drop. CPVC systems are unaffected by the low pH of water, coastal air or corrosive soils.

Fire Retardant

Characteristic of Ashirvad FLOWGUARD™ PLUS CPVC is its outstanding fire safety profile. It will not burn unless an external flame source is present and will not sustain ignition once the flame source is removed.
It has:

- High ignition temperature
- Low toxicity
- Low heat of combustion
- 25/50 flame smoke development rating

Limiting Oxygen Index (LOI)

It must be forced to burn due to its very high Limiting Oxygen Index (LOI) of 60. LOI is the percentage of oxygen needed in an atmosphere to support combustion. Since the Earth's atmosphere contains only 21% oxygen, CPVC will not burn unless a flame is constantly applied, and stops burning when the ignition source is removed.

FEATURES AND BENEFITS OF ASHIRVAD FLOWGUARD™ PLUS CPVC PIPING SYSTEM

- **Quick and easy to install**
  Ashirvad FLOWGUARD™ PLUS CPVC is light in weight which reduces the transportation, handling and installation cost. CPVC pipes and fittings have seamless interior walls and require no special tools for cutting.
- **Tough and reliable**
  Highly resilient, tough and durable with high tensile strength and high impact strength.
- **Freedom from toxicity, odours and tastes**
- **Low thermal expansion**
- **Low thermal conductivity**
- **Suitable for use up to 93°C**
- **Energy saving**
- **Smooth internal surface finish**
- **UV resistant**

Why only CPVC?

Property	Ashirvad FLOWGUARD™ PLUS CPVC	Copper	GI	PP-R
Corrosion	No effect due to excellent chemical resistance	Will corrode over a period of time	Corrodes faster and deteriorates	Has a certain amount of chemical resistance
Scaling, Pitting and Leaching and full bore flow	Absence of scaling, pittings and leaching leads to full bore flow	Scaling, pitting and leaching leads to reduced bore flow	Severe scaling, pitting and leaching leads to reduced bore flow	Scaling, pitting and leaching can occur and reduce bore flow in some instances
Thermal conductivity and insulation levels	Lower thermal conductivity reduces heat loss and requires reduced insulation levels	Very high thermal conductivity increases heat loss and requires high insulation	Very high thermal conductivity increases heat loss and requires high insulation levels	Higher thermal conductivity than CPVC, leading to heat loss and requires higher Insulation levels.
Bacterial growth	Extremely low	More than CPVC	More than copper	More than CPVC
Fire Resistance	LOI of is 60% and hence does not catch fire or sustain burning	Being metallic, better Fire Resistance	Being metallic, better Fire Resistance	LOI is 18%, hence can easily catch fire and sustain burning
Installation	Easy. Through cold welding, requiring less manhours. No electric / heat source required. Hence cost effective	Requires highly skilled manpower and electric / heat source	Very slow and cumbersome. Requires more man hours	Jointing process is by heat fusion. Requires greater skill and electric/ heat source
Leakage	Leakfree installation for the entire life span of the piping system	Leakfree, provided carried out by highly trained manpower	Always susceptible to leakage from day one of installation	Relatively leak free if highly skilled manpower is employed
Thermal Expansion	Lower. Leads to less pipe expansions, less looping and offsets	Although thermal expansion is lower, the stress induced is far greater.	Although thermal expansion is lower, the stress Induced is far greater	Higher expansion requires more looping/offsets
Range of Fittings	Wide range of fittings makes layout easier and compact for Architects, consultants, builders and end users	Limited range of fittings involves frequent cutting / welding to achieve the desired layout	Limited range of fittings	Nominal range of fittings
Special Tools	Simple cutter or saw blade and CPVC solvent cement Is adequate for 100% leak-proof joint and satisfactory plumbing	Needs special tools like metal cutting flame torch, solder, flux, etc. to carry out the desired plumbing	Needs heavy tools for pipe cuttings and threading	Needs special electrical heater to achieve the desired hot welded joint. Any failure can result in poor plumbing and therefore leakages

ashirvad PIPES

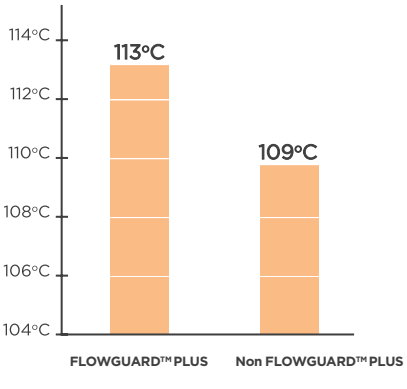
Ashirvad Material Handling Facility

Why only Ashirvad FLOWGUARD™ PLUS?

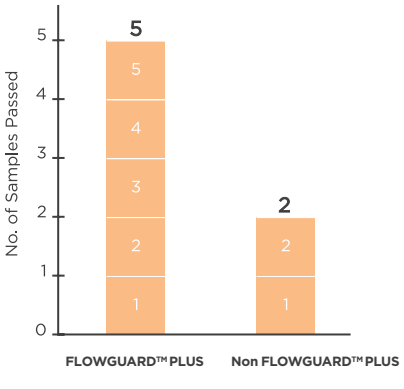
Features and Benefits	Ashirvad FLOWGUARD™ PLUS
Raw material has a successful track record of over 50 years – across the globe	Yes
Raw material has been used in the highest number of projects in India over the last 12 years	Yes
Raw material is NSF certified	Yes
Widest range of pipes and fittings from ½" to 6"	Yes
Consistent lab testing in Europe, USA and India	Yes
Tested and proven for over 10 years in Indian conditions	Yes
Nationwide marketing and support team	Yes
Factory warranty on all products	Yes

THE SUPERIOR HOT/COLD WATER DISTRIBUTION SYSTEM

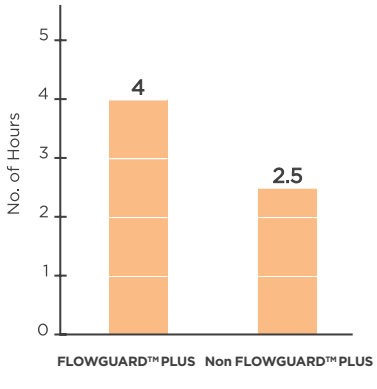
When you specify FLOWGUARD™ PLUS pipes and fittings, you benefit from the most experienced installation and support network in the industry. Let us help you specify the pipes, fittings, solvent cements and installation technologies that meet your most stringent standards for reliability and performance.



Vicat Softening



100% Flattening Test



Sustained Pressure Test at 82°C

Parameters	Ashirvad FLOWGUARD™ PLUS Pipes and Fittings	Pipes Processed From Non FLOWGUARD™ PLUS Material	Remarks
Vicat Softening	Pass	Fail	Generic CPVC product has continuous problem in hot water lines.
Vice Crush	Pass	Fail	In generic CPVC product, material is inconsistent which weakens pipe and has high risk of pipe failure.
Malfunction Failure at 95°C	Pass	Fail	Generic CPVC product has less life expectancy.
Manufacturing Process	Pass	Fail	FLOWGUARD™ PLUS pipes have strong quality control and has no batch to batch variation.
Specification and Code Acceptance	Pass	Fail	FLOWGUARD™ PLUS pipe is strong on technical grounds and is a well accepted brand.
Product Consistency	Pass	Fail	FLOWGUARD™ PLUS pipe assures product uniformity

ashirvad PIPES

FLOWGUARD PLUS PIPE & FITTINGS™

Standards and Codes

STANDARDS FOR PIPES AND FITTINGS

FLOWGUARD™ PLUS CPVC pipes and fittings are manufactured in sizes from ½" to 6".

Class of Pipe /Fitting	Standard	Sizes available	Class of Pipe /Fitting	Standard	Sizes available
Class-1 / SDR 11 Pipe	IS 15778 ASTM D 2846	½" - 2"	SDR 11 Fittings	ASTM D 2846	½" - 2"
Class-2 / SDR 13.5 Pipe	IS 15778 ASTM D 2846	½" - 2"	SCH 40 Fittings	ASTM F 438	2½" - 6"
SCH 40 Pipe	ASTM F 441	2½" - 6"	SCH 80 Fittings	ASTM F 439	2½" - 4"
SCH 80 Pipe	ASTM F 441	2½" - 6"			

COLOUR CODING OF PIPES AND FITTINGS

FLOWGUARD™ PLUS CPVC pipes and fittings can be easily distinguished by the manufacturer's trademark and appropriate colour coding on the product.

Class of Pipe	Colour	Class of Fitting	Colour
Class-1 / SDR 11 PIPE	Tan red stripe with logo	SDR 11 FITTINGS	Tan
Class-2 / SDR 13.5 PIPE	Tan brown stripe with logo	SDR 11 FITTINGS	Tan
SCH 40 PIPE	Tan brown stripe	SCH 40 FITTINGS	Tan
SCH 80 PIPE	Tan red stripe	SCH 80 FITTINGS	Tan

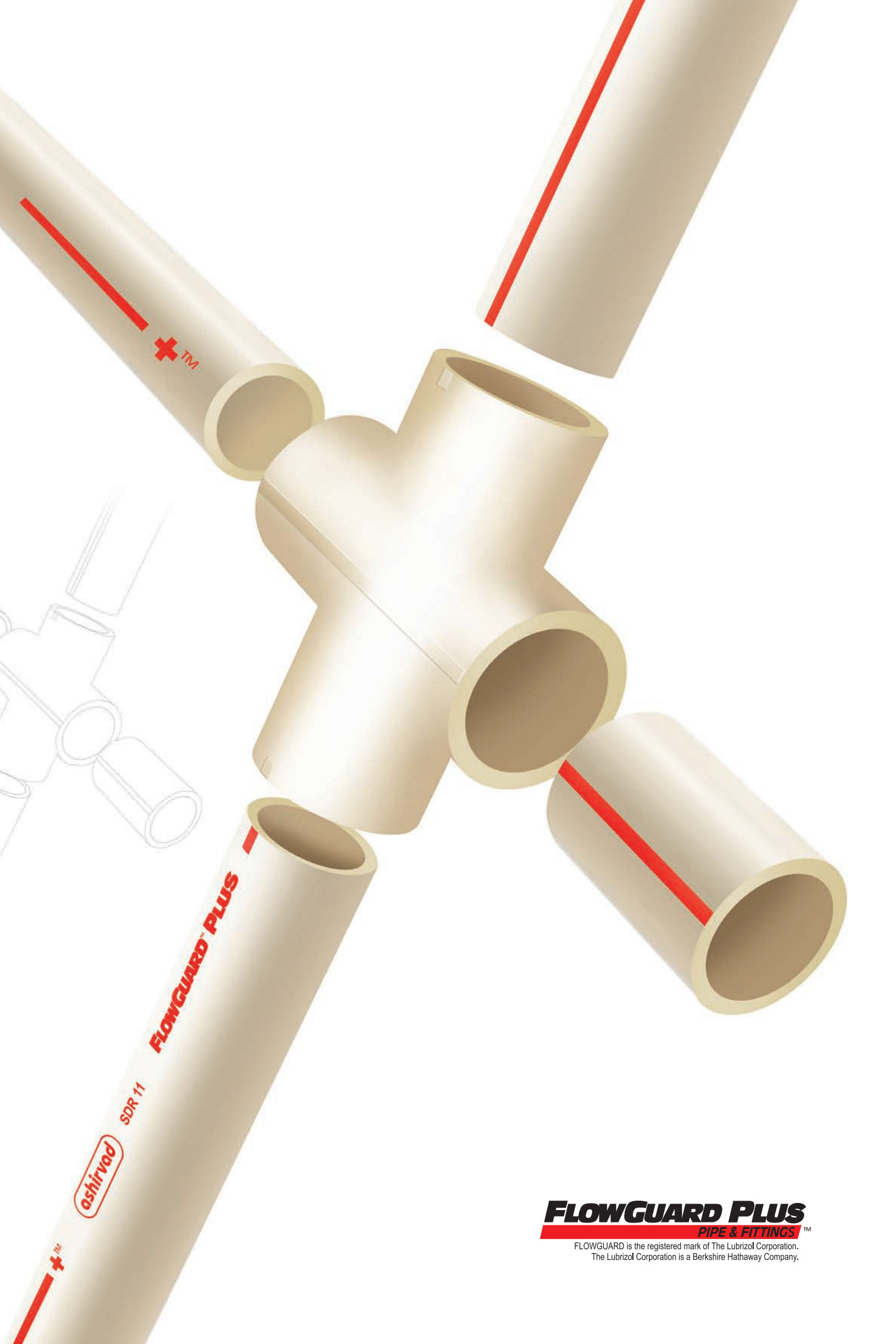
FLOWGUARD™ PLUS CODE COMPLIANCE

Code	Organisation
BOCA National Plumbing Code	Officials and Code Administrational, Inc.
National Standard Plumbing Code	National Association of Plumbing-Heating-Cooling Contractors
Standard Plumbing Code	Southern Building Code Congress International, Inc
Uniform Plumbing Code	International Association of Plumbing and Mechanical Officials
CAB01 and 2 Family Dwelling Code	Council of American Building Officials

APPROVALS OF FLOWGUARD™ PLUS CPVC PIPES AND FITTINGS ACROSS THE GLOBE

NSF	National Sanitation Foundation	USA
DVGW	Deutscher Verein Des Gas-Und Wasserfaches	Germany
WRAS	Water Regulations Advisory Scheme	UK
CSTB	Centre Scientifique Et Technique Du Bâtiment	France

BIS	Bureau of India Standards	India
CFTRI	Central Food Technological Reaseach Institute	India
TSE	Turkish Standard Institution	Turkey
CSA	Canadian Standard Association	Canada
KIWA	Kiwa	Netherlands



FLOWGUARD PLUS
PIPE & FITTINGS™

Basic Properties of FLOWGUARD™ PLUS CPVC

Sl.No.	Property	Test	Condition	English Units	S.I. Units
General					
1	Specific Gravity	ASTM D792	73°F/23°C	1.52	1.52
2	Specific Volume	-	73°F/23°C	0.645 cm^3/g	0.645 cm^3/g
3	Water Absorption	ASTM D570	73°F/23°C 212°F/100°C	0.03% 0.55%	0.03% 0.55%
4	Rockwell Hardness	ASTM D785	73°F/23°C	119	-
5	Cell Classification	ASTM D1784	-	23447	-
Mechanical					
1	Izod impact	ASTM D256	73°F/23°C	1.5 ft lbs/in. o.n	80 J/m o.n
2	Tensile Strength	ASTM D638	73°F/23°C	8000 psi	55 N/mm^2
3	Tensile Modulus	ASTM D638	73°F/23°C	360,000 psi	2500 N/mm^2
4	Flexural strength	ASTM D790	73°F/23°C	15,100 psi	104 N/mm^2
5	Flexural modulus	ASTM D790	73°F/23°C	415,000 psi	2860 N/mm^2
6	Compressive strength	ASTM D695	73°F/23°C	10,100 psi	70 N/mm^2
7	Compressive Modulus	ASTM D695	73°F/23°C	196,000 psi	1350 N/mm^2
Thermal Properties					
1	Expansion	ASTM D696	-	$3.4x10^{-5}$in/in/°F	$6.1x10^{-2}$m/m/K
2	Thermal Conductivity	ASTM C177	-	0.95 BTU in/hr/ft^2/°F	0.14Wm/K/m^2
3	Heat Distortion Temperature	ASTM D648	-	217°F	103°C
4	Heat capacity	DSC	73°F/23°C 212°F/100°C	0.21 BTU/lb°F 0.26 BTU/lb°F	0.90 J/gK 1.10 J/gK
Flammability					
1	Flammability rating	UL94	-	0.062 in/0.157cm	V-0,5VB, 5VA
2	Flame spread	ASTM E84	-	15	
3	Smoke developed	ASTM E84	-	70-125	-
4	Limiting oxygen index	ASTM D2863	-	60%	-
Electrical					
1	Dielectric Strength	ASTM D147	-	1250 V/mil	492,000 V/cm
2	Dielectric Constant	ASTM D150	60 Hz, 30°F/-1°C	3.7	3.7
3	Power Factor	ASTM D150	1000 Hz	0.007%	0.007%
4	Volume Resistivity	ASTM D257	73°F/23°C	$3.4x10^{15}$ohm/cm	$3.4x10^{15}$ohm/cm

Dimensional Details

Dimensional details and Pressure Ratings of SDR 11 (Class 1) CPVC Pipes as per IS 15778

Nominal Size		Outside Diameter (mm)		Wall Thickness (mm)		Pressure Rating at 27°C		Pressure Rating at 82° C	
(inch)	(mm)	Average	Tolerance	(mm)	Tolerance	(kg/cm²)	(MPA)	(kg/cm²)	(MPA)
½	15	15.90	±0.1	1.95	±0.25	28.14	2.76	6.93	0.68
¾	20	22.20	±0.1	2.25	±0.25	28.14	2.76	6.93	0.68
1	25	28.60	±0.1	2.85	±0.25	28.14	2.76	6.93	0.68
1¼	32	34.90	±0.1	3.45	±0.25	28.14	2.76	6.93	0.68
1½	40	41.30	±0.1	4.05	±0.25	28.14	2.76	6.93	0.68
2	50	54.00	±0.1	5.20	±0.30	28.14	2.76	6.93	0.68

Dimensional details and Pressure Ratings of SDR 13.5 (Class 2) CPVC Pipes as per IS 15778

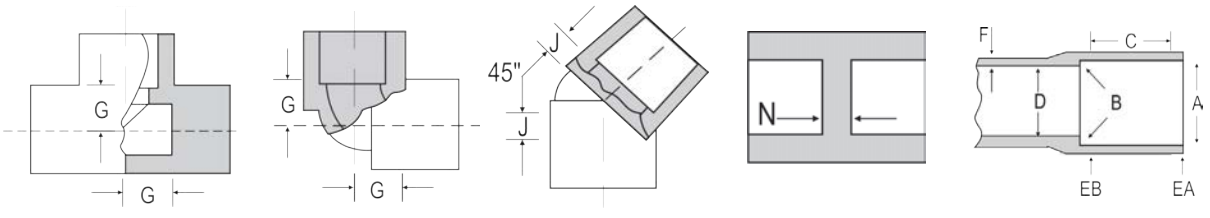
Nominal Size		Mean Outside Diameter (mm)		Wall Thickness (mm)		Pressure Rating at 27°C		Pressure Rating at 82° C	
(inch)	(mm)	Average	Tolerance	(mm)	Tolerance	(kg/cm²)	(MPA)	(kg/cm²)	(MPA)
½	15	15.9	±0.1	1.65	±0.25	22.23	2.18	5.61	0.55
¾	20	22.2	±0.1	1.95	±0.25	22.23	2.18	5.61	0.55
1	25	28.6	±0.1	2.35	±0.25	22.23	2.18	5.61	0.55
1¼	32	34.9	±0.1	2.85	±0.25	22.23	2.18	5.61	0.55
1½	40	41.3	±0.1	3.35	±0.25	22.23	2.18	5.61	0.55
2	50	54.0	±0.1	4.25	±0.25	22.23	2.18	5.61	0.55

Dimensional details of 4120 Sch. 40 Pipes with maximum water pressure rating as per ASTM F 441

Nominal Size		Outside Diameter				Wall Thickness				Pressure at 23°C	Pressure at 83°C
		Average		Tolerance		Minimum		Tolerance			
(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	PSI (Kg/cm²)	PSI (Kg/cm²)
2½	65	2.875	73.03	±0.007	0.18	0.203	5.16	0.024	0.61	300 (21.09)	75 (5.27)
3	80	3.500	88.90	±0.007	0.18	0.216	5.49	0.026	0.66	260 (18.28)	65 (4.57)
4	100	4.500	114.30	±0.008	0.20	0.237	6.02	0.028	0.71	220 (15.47)	55 (3.87)
6	150	6.625	168.28	±0.011	0.28	0.280	7.11	0.034	0.86	180 (12.66)	45 (3.16)

Dimensional details of CPVC 4120 Sch. 80 Pipes with maximum water pressure rating as per ASTM F 441

Nominal Size		Outside Diameter				Wall Thickness				Pressure at 23°C	Pressure at 83°C
		Average		Tolerance		Minimum		Tolerance			
(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	(inch)	(mm)	PSI (Kg/cm²)	PSI (Kg/cm²)
2½	65	2.875	73.03	±0.007	0.18	0.276	7.01	+0.033	+0.84	420 (29.53)	105 (7.38)
3	80	3.500	88.90	±0.007	0.18	0.300	7.62	0.036	+0.91	370 (26.01)	90 (6.33)
4	100	4.500	114.30	±0.008	0.20	0.337	8.56	0.040	+1.02	320 (22.49)	80 (5.62)
6	150	6.625	168.30	±0.011	0.28	0.432	10.97	0.052	+1.32	280 (19.69)	70 (4.92)



Minimum Dimensions from Center to End of Socket (Laying Length) for CPVC 4120, SDR 11 Plastic Fittings

Nominal Size (inch)	"G" min. in (mm)	"J" min. in (mm)	"N" min. in (mm)
½	0.382 (9.70)	0.183 (4.65)	0.102 (2.59)
¾	0.507 (12.88)	0.235 (5.97)	0.102 (2.59)
1	0.633 (16.08)	0.287 (7.29)	0.102 (2.59)
1¼	0.758 (19.25)	0.339 (8.61)	0.102 (2.59)
1½	0.884 (22.45)	0.391 (9.93)	0.102 (2.59)
2	1.134 (28.83)	0.495 (12.57)	0.102 (2.59)

Tapered socket dimensions for CPVC 4120, SDR 11, Plastic Fittings.

Nominal Size	Socket Entrance Diameter, in (mm)		Socket Bottom Diameter, in (mm)		Socket Length in (mm)	Inside Diameter in (mm)	Wall Thickness in (mm)		
(inch)	'A' Average	'A' Tolerance	'B' Average	'B' Tolerance	"C" min	"D" min.	Socket Entrance "EA" min.	Socket Bottom "EB" min.	"F"
½	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	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	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	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	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	2.141 (54.38)	±0.004 (±0.10)	2.123 (53.92)	±0.004 (±0.10)	1.700 (43.18)	1.739 (44.170	0.193 (4.90)	0.193 (4.90)	0.241 (6.12)

Pressure Rating Comparison between FLOWGUARD™ PLUS and Non FLOWGUARD™ PLUS

FLOWGUARD™ PLUS			Non FLOWGUARD™ PLUS	
Pressure Ratings	ASTM Cell Class		ASTM Cell Class	Pressure Ratings
8.79 kg/cm² @ 82°C 28.1 kg/cm² @ 23°C	23447	← SDR 11 →	23447	7.03 kg/cm² @ 82°C 28.1 kg/cm² @ 23°C
7.03 kg/cm² @ 82°C 22.5 kg/cm² @ 23°C	23447	← SDR 13.5 →	23447	5.62 kg/cm² @ 82°C 22.5 kg/cm² @ 23°C

Temperature Derating Factors at Working Pressure

Working Temperature		Pipe Derating Factors	
°F	°C	Non FLOWGUARD™ PLUS	FLOWGUARD™ PLUS
73 - 80	23 - 27	1.00	1.00
90	32	0.91	0.91
100	38	0.82	0.83
120	49	0.65	0.70
140	60	0.50	0.57
160	71	0.40	0.44
180	82	0.25	0.31

Stringent dimensional inspection of CPVC

SMART WATER MANAGEMENT

With technical tie ups across the globe, Ashirvad strives to bring the latest technology and products into the Indian plumbing market, with more and more satisfied customers each day.

Quality Control Procedures at Ashirvad

Pipes and fittings manufactured at Ashirvad, follow a stringent quality control process before being rolled out into the market, in order to supply a defect free system to its users.

These processes follow the highest specifications of BIS (India), ASTM (USA), DIN and NSF.

PIPES

Effect on Water
To ensure the quality of water passing through the pipes.

Heat Reversion Test
How much the pipe changes in length when heated in an oven and left to cool. This is a measure of residual stresses left in the pipe during production process.

Hydrostatic Pressure Test at 20°C and 95°C
Short term (Acceptance Test) at 20°C: When subjected to internal hydrostatic pressure the pipe should not burst or crack at the given test pressure for minimum of 1 hour. This pressure must be over 3 times the normal pressure rating.

Long term (Type Test) at 95°C: The pipe should not crack or burst at the given test pressure for a period of 165 hours or 1000 hours.

Thermal Stability: When subjected to this test at 95°C the pipe shall not fail at the prescribed test pressure for a period of 8760 hours (1 year).

Drop Impact Test
Weights are dropped on the pipe to observe for any cracks or failures.

Flattening Test
Samples are compressed so that opposite walls are brought together without the pipe cracking, which is a good measure of correct extrusion techniques during production.

Tensile Strength
The maximum stress that a pipe can withstand while being stretched or pulled.

FITTINGS

Stress Relief Test
To determine the level of internal stress by heating the fitting in an aircirculated oven @ 150°C. There should not be any blisters, weld line splitting or any cracking.

Burst Pressure Check
Maximum pressure before the fittings burst. This must be over three times the normal pressure rating.

PIPES AND FITTINGS

Visual Appearance
To ensure that all pipes and fittings are uniform in colour and free visual effects such as black dots, scratches, burn marks, etc.

Dimensions
To ensure that all pipes and fittings conform to the appropriate standards.

Opacity
To measure the percentage of light flux passing through the wall and to ensure it is below 0.2%.

Vicat Softening Temperature
The temperature at which 1 mm^2 needle penetrates 1 mm through the wall of the pipe.

Density
Density of pipes and fittings is to be determined.

SYSTEMS

Malfunction Temperature Test at 95°C
An assembly of pipes and fittings should not leak or burst at 10 kg/cm^2 internal pressure at a temperature of 95°C for 1000 hours.

Handling and Storage

Proper Handling of Pipes

Please check and inspect the pipes on receipt. The pipes should be checked for any forms of transport damage due to shift in loads or improper handling/treatment. Visually examine the ends of pipes for any cracks or damage.

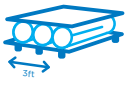
The pipes should be handled with care. The tendency to throw or drop the pipes to the floor should be avoided. Do not drag or push the pipes from a truck bed. Contact of the pipes with any sharp object should be totally avoided.

Storage of Pipes

The pipes should preferably be stored indoors.
When this is not possible, please ensure to

Protect the pipes from sun light, to reduce the effect of UV rays.

The pipes should be stored on level ground and on dry surface.



If pipes of same diameter but different classes are being stacked together, place the thicker pipes below. i.e., Stack SDR 11 below SDR 13.5 and stack Sch 80 below Sch 40.

If placing pipes on racks, ensure the spacing between the supports does not exceed 3 feet.

Safe Handling of Solvent Cements

When using solvent cements, primers and cleaners, there are some basic safety measures all users should keep in mind.

After every application of solvent on the pipe / fitting ensure to put the lid back on the solvent cement containers and tighten the lid slightly to avoid evaporation and escape of solvent.

Avoid prolonged breathing of solvent vapours.
When pipe and fittings are being joined in enclosed areas, please ensure sufficient ventilation.

Keep the 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 bin.

Avoid eye and skin contact. In case of eye contact, flush with plenty of water for 15 minutes and call a doctor.

Refer to ASTM F402, Standard Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings.

Solvent cementing instructions

Recommendations

One Step Solvent Cement is recommended for joining of pipes and fittings upto 2” in diameter.

Two Step Solvent Cement is recommended for joining of pipes and fittings above 2” in diameter.

Summary

1. The following procedures shall be clearly understood and followed:
   - The joining surfaces must be softened (dissolved) and made semi-fluid.
   - Sufficient solvent cement must be applied to fill the gap between pipe and fitting.
   - Assembly of pipe and fitting must be made while the surfaces are still wet and fluid.
   - Joint strength develops as the solvent cement dries. In the tight part of the joint, the surfaces will tend to fuse together; in the loose part, the One-Step solvent cement will bond to both surfaces.
2. For 1/2” to 2” (12 mm to 50 mm) diameters penetration and dissolving can be achieved by using the One-Step solvent cement itself (see Figure 1). DO NOT USE A PRIMER WITH ONE-STEP SOLVENT CEMENT.
3. Sufficient One-Step cement must be applied to fill the gap in the loose part of the joint (see Figure 2). Besides filling the gap, adequate One-Step solvent cement layers will penetrate the surfaces and also remain wet until the joint is assembled.
4. If the One-Step solvent cement coatings on the pipe and fittings are wet and fluid when assembly takes place, they will tend to flow together and become one solvent cement layer. Also, if the solvent cement is wet, the surfaces beneath them will still be soft, and these dissolved surfaces in the tight part of the joint will tend to fuse together (see Figure 3).
5. As the solvent dissipates, the One-Step solvent cement layer and the dissolved surfaces will dry and harden with a corresponding increase in joint strength. Completed joints should not be disturbed until they have cured sufficiently to withstand handling. Joint strength develops as the One-Step solvent cement dries. For information about curing and hardening and the minimum time before the piping system can be pressure tested, refer page 35.

Figure 1: outside of pipe and inside the fitting socket to be softened and penetrated

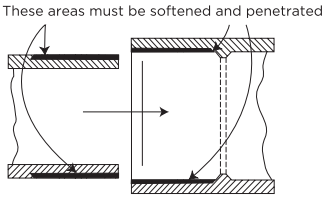


Figure 2: solvent cement coatings of sufficient thickness applied uniformly around pipe and inside fitting socket

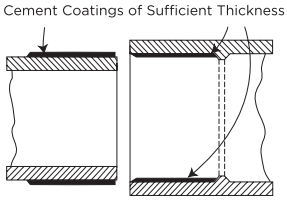
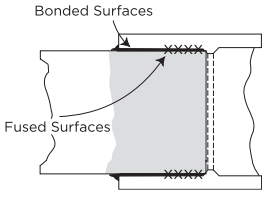


Figure 3: fused and bonded surfaces of joined pipe and fitting

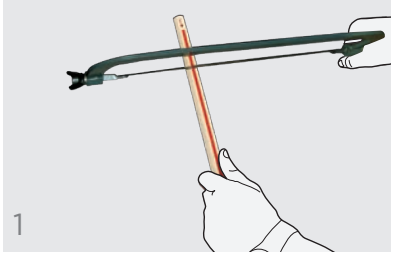


Warning:
Follow all preparation and installation procedures.

Easy and 100% leakproof installation.

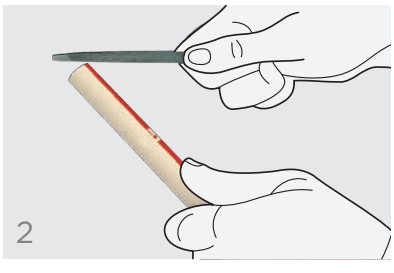
Step 1: Cutting

Measure the pipe length accurately and make a visible marking using a felt tip pen. Ensure that the pipe and fittings are size compatible. You can easily cut with a plywood cutting saw/ ratchet cutter or a wheel cutter. Cutting the pipe as squarely as possible (at 90°) provides optimal bonding area within a joint. Inspect pipe ends thoroughly prior to making a joint. If a crack or splintering is noticed cut-off a minimum of 25 mm beyond the visible crack before proceeding.



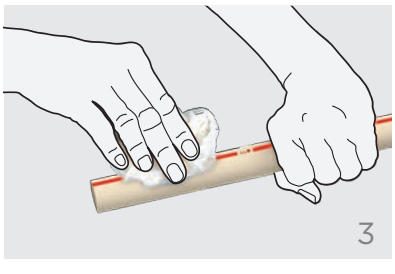
Step 2: Deburring/Beveling

Burrs in and on pipe end can obstruct flow/proper contact between the pipe and socket of the fitting during assembly and should be removed from both in and outside of the pipe. A 15 mm dia half round file/a pen knife or a deburring tool are suitable for this purpose. A slight bevel on the end of the pipe will ease entry of the pipe into the socket of the fitting socket.



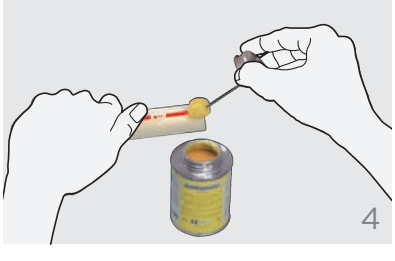
Step 3: Fitting Preparation

Using a clean dry rag, wipe the dirt and moisture from the fitting sockets and pipe end. Dry fit the pipe to ensure total entry into the bottom of the fittings socket and make a visible marking using a felt tip pen.



Step 4: One Step Solvent Cementing Procedure

Use only Ashirvad FLOWGUARD™ PLUS CPVC Cement conforming to ASTM F-493 to ensure a perfect solvent weld joint. When making a joint, apply an even coat of cement at the end of the pipe and also inside the fitting socket. Do not use thickened or lumpy solvent cement. It should have a flow consistency like that of syrup or paint.

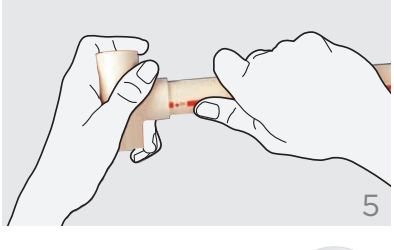


- For Two Step Solvent Cementing Procedure see next page.

Step 5: Assembly

Immediately insert the pipe into the fitting socket, rotate the pipe 1/4 to 1/2 turn while inserting. This motion ensures an even distribution of cement within the joint. **Properly align the fittings as per patented alignment system shown with picture diagram on the right side.** Hold the assembly for 30 seconds to allow the joint to setup and avoid push-out.

A bead of One-Step solvent cement must be formed around the entire socket fitting entrance. With a clean, dry cloth remove the excess solvent cement from the surface of the pipe and fitting.



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ashirvad PIPES

Step 4: **Two Step Solvent Cementing Procedure**

4a: Apply primer to socket keeping surfaces wet and applicator wet and in motion until the entire joining surface is properly softened. Avoid puddling.

4b: Apply to pipe surface in the same manner equal to depth of socket.

4c: Apply again to the fitting socket. Avoid puddling.

4d: While the primer is still wet and the surfaces are soft, apply a full, even layer of Ashirvad FLOWGUARD™ PLUS Two-Step solvent cement to the pipe end, equal to the depth of the fitting socket. Like the primer, be aggressive. Remember to apply enough Two-Step solvent cement to fill the gap between the pipe and fitting.

4e: Apply a thin layer of Ashirvad FLOWGUARD™ PLUS Two-Step solvent cement to the inside of the fitting socket. This will prevent puddling of the solvent cement inside of the pipe or fitting. Excessive solvent cement applied to the fitting socket can cause the joint to clog and the wall of the pipe or fitting to weaken due to softening by the trapped solvents.

4f: Apply a second full, even layer of Ashirvad FLOWGUARD™ PLUS Two-Step solvent cement to the pipe end. Excessive solvent cement on the pipe outer diameter (O.D.) can be wiped away after assembly.

Solvent Cement Cure Times

Average initial set schedule for CPVC solvent cements

Temperature Range	Pipe Sizes ½-1¼" (20 – 40 mm)	Pipe Sizes 1½-2" (50 – 63 mm)	Pipe Sizes 2½-4" (75 – 100 mm)
60° – 100°F / 16° – 38°C	2 minutes	5 minutes	30 minutes
40° – 60°F / 5° – 16°C	5 minutes	10 minutes	2 hours
0° – 40°F / -18° – 5°	10 minutes	15 minutes	12 hours

Note - Initial set schedule is the necessary time to allow before the joint can be carefully handled. In damp or humid weather allow 50% more set time.

Average joint cure schedule for CPVC solvent cements

Relative Humidity 60% or Less	Pipe Sizes ½-1¼" (20 – 40 mm)		Pipe Sizes 1½-2" (50 – 63 mm)		Pipe Sizes 2½-4" (75 – 100 mm)	
Temperature range during assembly and cure periods	psi (Bar)		psi (Bar)		psi (Bar)	
	up to 160 (up to 11)	160 to 370 (11 to 26)	up to 160 (up to 11)	160 to 315 (11 to 22)	up to 160 (up to 11)	160 to 315 (11 to 22)
60° – 100°F / 16° – 38°C	15 minutes	6 hours	30 minutes	12 hours	1 - ½ hours	24 hours
40° – 60°F / 5° – 16°C	20 minutes	12 hours	45 minutes	24 hours	4 hours	48 hours
0° – 40°F / -18° – 5°C	30 minutes	48 hours	1 hour	96 hours	72 hours	8 hours

Note - Joint cure schedule is the necessary time to allow before pressurizing system. In damp or humid weather allow 50% more cure time.

CAUTION: These figures are estimates based on testing done under laboratory conditions. Although this information is widely published across the industry, these charts should be used as a general reference only. Field working conditions can vary significantly and will increase set and cure times.

Pressuring Solvent Cement Joints

Care must be taken to allow solvent cemented joints to adequately cure and develop full strength. A number of factors will impact the required cure time before joints can be pressurised. These factors include:

a. On-site temperature and humidity

b. Pipe diameter (larger diameter joints require more time to cure)

c. Internal operating pressure

d. Internal operating temperature

In general, the cure times will allow cold water lines to be pressurised to the cited levels shown.

Based on field experience, hot water lines may require an additional 50% longer cure time or more, before operating at full hot water service conditions. Contractors performing repairs, modifications or maintenance must allow joints to properly cure before pressurising the system with hot water. Reduced operating pressures and temperatures may allow the system to return to service earlier.

Hot Weather Solvent Cementing - Above 86°F (30°C)

1. Store solvent cement in a cool or shaded area prior to use.
2. If possible store pipe and fittings in a shaded area prior to solvent cementing.
3. Cool surfaces to be joined with a clean, damp rag. Be sure the surface is dry prior to solvent cementing.
4. Try solvent cementing joints in the cooler morning hours.
5. Make sure both surfaces to be joined are still wet with solvent cement when joining them together.
6. Vigorously stir or shake the solvent cement before use.
7. System anchoring and final connections should be made during the cooler hours of the day to account for expansion and contraction.

System Acceptance (Hydrostatic Pressure) Test

Once an installation is completed and cured as per these recommendations, the system should be hydrostatically pressure tested at 10 bar for one hour. When pressure testing, the system should be filled with water and all air removed from the farthest and highest points in the run.

If a leak is found, the joint must be cut out and discarded and a new section should be installed using couplings.

Danger: Pressure testing with compressed air is dangerous and can result in injury or death. do not use air to test Ashirvad FLOWGUARD™ PLUS CPVC pipe, fittings and accessories.

ashirvad PIPES

Installation Warning

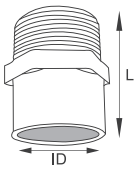
1. Dry fit all joints prior to solvent cementing to confirm proper interference fit.
2. Discard fitting joints without proper interference fit.
3. DO NOT solvent cement joints that are too loose or too tight.
4. Always use proper bevelling tools to prepare pipe ends before cementing.
5. DO NOT solvent cement joints without first bevelling pipe ends.
6. Use only One-Step cement to connect 1/2” to 2” (12 mm to 50 mm) pipe, fittings and accessories.
7. DO NOT use primer with One-Step solvent cement.
8. DO NOT use other cements to connect Ashirvad FLOWGUARD™ PLUS CPVC pipe, fittings and accessories.
9. Follow all solvent cementing instructions provided with this product.
10. Ashirvad fully endorses safety and protective measures recommended by government agencies when installing FLOWGUARD™ PLUS CPVC pipe, other plastic pipe or metal pipe.
11. Always provide proper ventilation when applying primers and cements.
12. Avoid unnecessary skin or eye contact with primers and cements.
13. Wash immediately if contact occurs to avoid prolonged exposure.
14. Follow all manufacturer-recommended precautions when cutting or sawing pipe or when using any flame, heat or power tools.
15. After hydrostatic testing, thoroughly flush the system for at least 10 minutes to remove residual trace amounts of solvent cement.
16. Avoid open flames or soldering around solvent cement joints.

Never test Ashirvad FLOWGUARD™ PLUS CPVC pipe, fittings or accessories with compressed air. Serious injury or death can occur.

Inspection of CPVC brass fittings

Fittings - Dimensions

MALE ADAPTER PLASTIC THREADED - MAPT

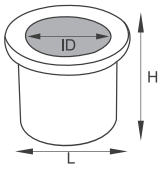


SIZE	ID	OD	WT	SL	L
½"	16.08	21.26	2.59	12.70	32.0
¾"	22.45	27.63	2.59	17.78	42.3
1"	28.83	33.56	2.59	22.86	48.0
1¼"	35.20	41.56	3.18	27.94	54.5
1½"	41.66	49.18	3.76	33.02	61.5
2"	54.38	64.18	4.90	43.18	75.0

Reducing Male Adapter Plastic Threaded - MAPT

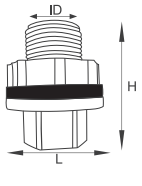
¾ x ½"	22.45	27.63	2.59	17.78	41.6
1 x ¾"	28.83	33.56	2.59	22.86	44.0

CONVERTER BUSHING



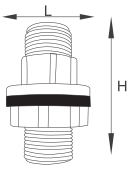
SIZE	ID	OD	WT	SL	L	H
½"	16.08	21.26	2.59	12.70	25.60	24.30
¾"	22.45	27.63	2.59	17.78	33.10	28.75
1"	28.83	33.56	2.59	22.86	40.10	32.00
1¼"	35.20	41.56	3.18	27.94	48.70	35.10
1½"	41.66	49.18	3.76	33.02	54.70	38.20
2"	54.38	64.18	4.90	43.18	66.75	46.50

TANK NIPPLE (WITH ONE SIDE PIPE FITMENT)



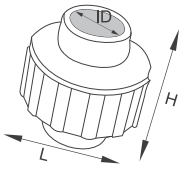
SIZE	ID	SL	L	H
¾"	22.45	17.78	45.60	75
1"	28.83	22.86	56.30	86

TANK NIPPLE



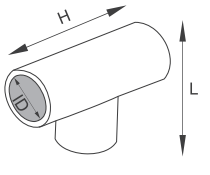
SIZE	ID	L	H
½"	16.08	40.90	68.8
¾"	22.45	45.60	75.0
1"	28.83	56.30	86.0
1¼"	35.20	65.00	94.0
1½"	41.66	71.50	102.0
2"	54.38	82.00	103.3
2½"	To be introduced shortly		
3"	To be introduced shortly		

UNION



SIZE	ID	OD	WT	SL	L	H
½"	16.08	21.26	2.59	12.70	39.2	36.8
¾"	22.45	27.63	2.59	17.78	53.0	47.0
1"	28.83	33.56	2.59	22.86	65.0	57.4
1¼"	35.20	41.56	3.18	27.94	60.0	70.0
1½"	41.66	49.18	3.76	33.02	71.5	86.0
2"	54.38	64.18	4.90	43.18	90.0	108.0

TEE



SIZE	ID	OD	WT	SL	L	H
½"	16.08	21.26	2.59	12.70	33	45.0
¾"	22.45	27.63	2.59	17.78	44	62.5
1"	28.83	33.56	2.59	22.86	56	78.0
1¼"	35.20	41.56	3.18	27.94	70	94.5
1½"	41.66	49.18	3.76	33.02	80	111.0
2"	54.38	64.18	4.90	43.18	106	143.5

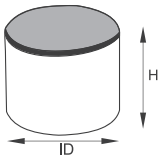
The following notation (symbols) shall apply in this reference manual.

L - Length
W - Width
H - Height

T - Thickness
U - No. of holes
SL - Socket Length

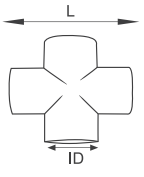
ID - Inner Diameter
OD - Outer Diameter
WT - Wall Thickness

END CAP



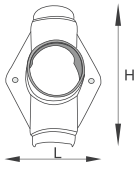
SIZE	ID	OD	WT	SL	H
½"	16.08	21.26	2.59	12.70	18.5
¾"	22.45	27.63	2.59	17.78	25.8
1"	28.83	33.56	2.59	22.86	32.5
1¼"	35.20	41.56	3.18	27.94	41.0
1½"	41.66	49.18	3.76	33.02	44.0
2"	54.38	64.18	4.90	43.18	56.0

CROSS TEE



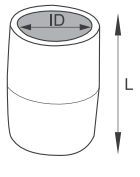
SIZE	ID	OD	WT	SL	L
½"	16.08	21.26	2.59	12.70	18.5
¾"	22.45	27.63	2.59	17.78	25.8
1"	28.83	33.56	2.59	22.86	32.5

TEE HOLDER



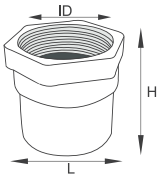
SIZE	ID	WT	L	H
½ x ½ x ½"	33.34	1.50	63.7	75.7
¾ x ¾ x ½"	33.34	1.60	64.7	90.0
1 x 1 x ½"	28.83	2.59	70.2	110.5

COUPLER



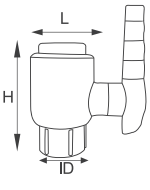
SIZE	ID	OD	WT	SL	L
½"	16.08	21.26	2.59	12.70	28
¾"	22.45	27.63	2.59	17.78	38
1"	28.83	33.56	2.59	22.86	48
1¼"	35.20	41.56	3.18	27.94	60
1½"	41.66	49.18	3.76	33.02	70
2"	54.38	64.18	4.90	43.18	90

FEMALE ADAPTER PLASTIC THREADED - FAPT



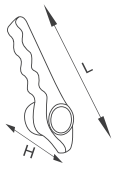
SIZE	ID	OD	WT	SL	L	H
½"	16.08	21.26	2.59	12.70	34.0	26.7
¾"	22.45	27.63	2.59	17.78	42.0	32.4
1"	28.83	33.56	2.59	22.86	49.0	40.0
1¼"	35.20	41.56	3.18	27.94	61.5	51.0
1½"	41.66	49.18	3.76	33.02	67.0	89.5
2"	54.38	64.18	4.90	43.18	81.0	72.5

BALL VALVE



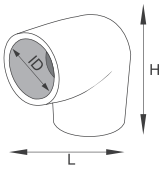
SIZE	ID	SL	L	H
½"	16.08	12.70	60.4	63.5
¾"	22.45	17.78	78.3	75.1
1"	28.83	22.86	98.6	93.3
1¼"	35.20	27.94	114.0	108.4
1½"	41.66	33.02	125.0	129.0
2"	54.38	43.18	161.0	160.0

BALL VALVE - HANDLE



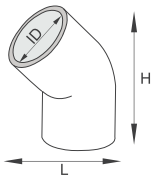
SIZE	L	H
½"	74.4	19.5
¾"	84.3	21.5
1"	108.0	30.0
1¼"	116.0	34.0
1½"	130.0	36.0
2"	158.0	50.0

ELBOW 90°



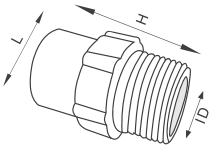
SIZE	ID	OD	WT	SL	L	H
½"	16.08	21.26	2.59	12.70	33	33
¾"	22.45	27.63	2.59	17.78	44	44
1"	28.83	33.56	2.59	22.86	56	56
1¼"	35.20	41.56	3.18	27.94	70	70
1½"	41.66	49.18	3.76	33.02	80	80
2"	54.38	64.18	4.90	43.18	105	105

ELBOW 45°



SIZE	ID	OD	WT	SL	L	H
½"	16.08	21.26	2.59	12.70	27	33.0
¾"	22.45	27.63	2.59	17.78	38	44.0
1"	28.83	33.56	2.59	22.86	50	56.0
1¼"	35.20	41.56	3.18	27.94	56	69.5
1½"	41.66	49.18	3.76	33.02	65	80.0
2"	54.38	64.18	4.90	43.18	88	105.0

MALE ADAPTER BRASS THREADED - MABT

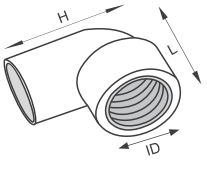


SIZE	ID	OD	WT	SL	L	H
½"	16.08	21.26	2.59	12.7	26.7	50.40
¾"	22.45	27.63	2.59	17.78	30.0	56.23
1"	28.83	33.56	2.59	22.86	37.7	73.20
1¼"	35.20	41.56	3.18	27.94	50.0	80.40
1½"	41.66	49.18	3.76	33.02	56.8	87.40
2"	54.38	64.18	4.90	43.18	69.5	102.50

REDUCING MALE ADAPTER BRASS THREADED - MABT

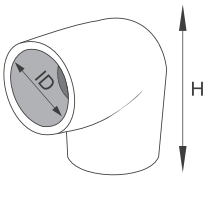
¾ x ½"	16.08	21.26	2.59	17.78	26.8	55.0
1 x ½"	22.45	27.63	2.59	22.86	36.8	55.7
1 x ¾"	28.83	33.56	2.59	22.86	37.0	55.0

ELBOW 90° (BRASS)



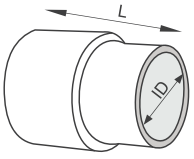
SIZE	ID	OD	WT	SL	L	H
½ x ½"	16.080	21.260	2.59	12.700	38.00	46.0
¾ x ½"	22.450	27.630	2.59	17.780	43.00	51.0
¾ x ¾"	22.450	27.630	2.59	17.780	41.20	54.0
1 x ½"	28.830	33.560	2.59	22.860	52.60	55.6
1 x ¾"	28.830	33.560	2.59	22.860	54.85	57.0
1 x 1"	32.707	37.887	2.59	26.416	58.10	61.9
1¼ x ½"	35.200	41.560	3.18	27.940	55.13	64.6
1¼ x ¾"	36.200	42.560	3.18	27.940	55.00	68.8
1¼ x 1¼"	37.200	43.560	3.18	27.940	63.70	75.5

REDUCER ELBOW 90°



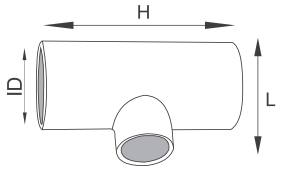
IN	ID-1	OD-1	WT-1	SL-1	ID-2	OD-2	WT-2	SL-2	L	H
¾ x ½"	22.45	27.63	2.59	17.78	16.08	21.26	2.59	12.70	40.4	39.6
1 x ½"	28.83	33.56	2.59	22.86	16.08	21.26	-	12.70	62.5	44.0
1 x ¾"	28.83	33.56	2.59	22.86	22.45	27.63	2.59	17.78	51.0	56.6

REDUCER COUPLER



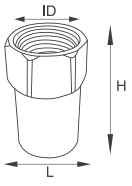
SIZE	ID-1	OD-1	WT-1	SL-1	ID-2	OD-2	WT-2	SL-2	H
¾ x ½"	22.45	27.63	2.59	17.78	16.08	21.26	2.59	12.70	34.0
1 x ½"	28.83	33.56	2.59	22.86	16.08	21.26	2.59	12.70	40.0
1 x ¾"	28.83	33.56	2.59	22.86	22.45	27.63	2.59	17.78	44.0
1¼ x ½"	35.20	41.56	3.18	27.94	16.08	21.26	2.59	12.70	51.5
1¼ x ¾"	35.20	41.56	3.18	27.94	22.45	27.63	2.59	17.78	61.5
1¼ x 1"	35.20	41.56	3.18	27.94	28.83	33.56	2.59	22.86	44.5
1½ x ½"	41.66	49.18	3.76	33.02	16.08	21.26	2.59	12.70	50.0
1½ x ¾"	41.66	49.18	3.76	33.02	22.45	27.63	2.59	17.78	56.0
1½ x 1"	41.66	49.18	3.76	33.02	28.83	33.56	2.59	22.86	67.0
1½ x 1¼"	41.66	49.18	3.76	33.02	35.20	41.56	3.18	27.94	55.0
2 x ½"	54.38	64.18	4.90	43.18	16.08	21.26	2.59	12.70	62.0
2 x ¾"	54.38	64.18	4.90	43.18	22.45	27.63	2.59	17.78	71.5
2 x 1"	54.38	64.18	4.90	43.18	28.83	33.56	2.59	22.86	69.0
2 x 1¼"	54.38	64.18	4.90	43.18	35.20	41.56	3.18	27.94	76.0
2 x 1½"	54.38	64.18	4.90	43.18	41.66	49.18	3.76	33.02	81.5

REDUCER TEE



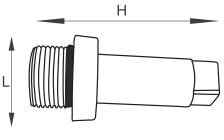
SIZE	ID-1	OD-1	WT-1	SL-1	ID-2	OD-2	WT-2	SL-2	L	H
½ x ½ x ¾"	16.08	21.26	2.59	12.70	22.45	27.63	2.59	17.78	62.5	44.0
¾ x ½ x ¾"	22.45	27.63	2.59	17.78	16.08	21.26	2.59	12.70	62.5	44.0
½ x ¾ x ½"	16.08	21.26	2.59	12.70	22.45	27.63	2.59	17.78	62.5	44.0
¾ x ¾ x ½"	22.45	27.63	2.59	17.78	16.08	21.26	2.59	12.70	40.0	62.5
1 x 1 x ½"	28.83	33.56	2.59	22.86	16.08	21.26	2.59	12.70	46.4	78.0
1 x 1 x ¾"	28.83	33.56	2.59	22.86	22.45	27.63	2.59	17.78	51.0	78.0
1¼ x 1¼ x ½"	35.20	41.56	3.18	27.94	16.08	21.26	2.59	12.70	53.0	94.5
1¼ x 1¼ x ¾"	35.20	41.56	3.18	27.94	22.45	27.63	2.59	17.78	58.0	94.5
1¼ x 1¼ x 1"	35.20	41.56	3.18	27.94	28.83	33.56	2.59	22.86	62.0	94.5
1½ x 1½ x ½"	41.66	49.18	3.76	33.02	16.08	21.26	2.59	12.70	62.0	111.0
1½ x 1½ x ¾"	41.66	49.18	3.76	33.02	22.45	27.63	2.59	17.78	66.0	111.0
1½ x 1½ x 1"	41.66	49.18	3.76	33.02	28.83	33.56	2.59	22.86	70.0	111.0
1½ x 1½ x 1¼"	41.66	49.18	3.76	33.02	35.20	41.56	3.18	27.94	75.0	111.0
2 x 2 x ½"	54.38	64.18	4.90	43.18	16.08	21.26	2.59	12.70	72.3	143.5
2 x 2 x ¾"	54.38	64.18	4.90	43.18	22.45	27.63	2.59	17.78	78.6	143.5
2 x 2 x 1"	54.38	64.18	4.90	43.18	28.83	33.56	2.59	22.86	82.0	143.5
2 x 2 x 1¼"	54.38	64.18	4.90	43.18	35.20	41.56	3.18	27.94	87.0	143.5
2 x 2 x 1½"	54.38	64.18	4.90	43.18	41.66	49.18	3.76	33.02	93.0	143.5

FEMALE ADAPTER BRASS THREADED - FABT



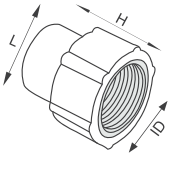
SIZE	ID	OD	WT	SL	L	H
½"	16.08	21.26	2.59	12.70	26.6	44.3
¾"	22.45	27.63	2.59	17.78	33.2	53.2
1"	28.83	33.56	2.59	22.86	41.4	67.0
1¼"	35.20	41.56	3.18	27.94	50.3	78.0
1½"	41.66	49.18	3.76	33.02	56.8	82.7
2"	54.38	64.18	4.90	43.18	69.4	93.6

THREADED END PLUG



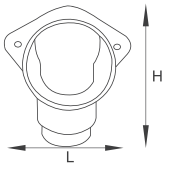
SIZE	L	H
½"	30.34	77.1
¾"	35.25	76.3

REDUCING FEMALE ADAPTER BRASS THREADED



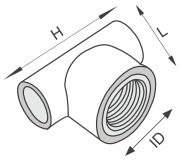
SIZE	ID	OD	WT	SL	L	H
¾ x ½"	16.08	21.26	2.59	17.78	33.1	38.8
1 x ½"	22.45	27.63	2.59	22.86	37.0	44.2
1 x ¾"	28.83	33.56	2.59	22.86	37.2	44.3

ELBOW HOLDER



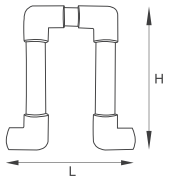
SIZE	ID	WT	L	H
½ x ½"	33.34	1.5	65.7	61.5
¾ x ½"	33.34	1.6	65.6	65.5

TEE (BRASS)



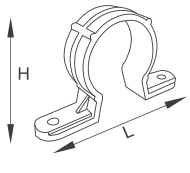
SIZE	ID	OD	WT	SL	L	H
½ x ½ x ½"	16.08	21.26	2.59	12.70	37.0	51.30
¾ x ¾ x ½"	22.45	27.63	2.59	17.78	45.1	68.00
¾ x ¾ x ¾"	22.45	27.63	2.59	17.78	45.5	69.25
1 x 1 x ½"	28.83	33.56	2.59	22.86	50.3	78.00
1 x 1 x ¾"	28.83	33.56	2.59	22.86	53.0	75.10
1¼ x 1¼ x ½"	35.20	41.56	3.18	27.94	54.1	85.90

EXPANSION LOOP



SIZE	ID	WT	SL	H	L
½"	16.08	1.73	12.70	190	95
¾"	22.45	2.03	17.78	225	112
1"	28.83	2.59	22.86	255	128
1¼"	35.20	3.18	27.94	282	141
1½"	41.66	3.76	33.02	306	153
2"	24.38	4.90	43.18	350	175

PLASTIC CLAMP



SIZE	WT	L	H
½"	2.2	40.0	23.46
¾"	2.4	62.5	30.50
1"	2.6	71.0	38.40
1¼"	2.8	79.5	46.75
1½"	3.0	87.0	54.14
2"	3.0	100.5	68.50

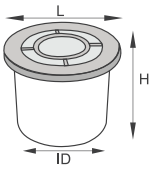
The following notation (symbols) shall apply in this reference manual.

L - Length
W - Width
H - Height

T - Thickness
U - No. of holes
SL - Socket Length

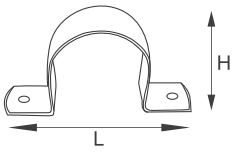
ID - Inner Diameter
OD - Outer Diameter
WT - Wall Thickness

BUSHING



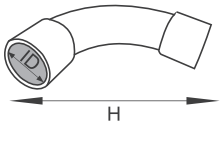
SIZE	ID-1	ID-2	SL	L	H
¾ x ½"	22.45	16.08	12.70	22.45	18.00
1 x ½"	28.83	16.08	12.70	34.0	26.35
1 x ¾"	28.83	22.45	17.78	34.0	26.35
1¼ x ½"	35.20	16.08	12.70	41.5	31.10
1¼ x ¾"	35.20	22.45	17.78	41.5	31.10
1¼ x 1"	35.20	28.83	22.86	41.5	31.10
1½ x ½"	41.66	16.08	12.70	49.3	36.30
1½ x ¾"	41.66	22.45	17.78	49.3	36.30
1½ x 1"	41.66	28.83	22.86	49.3	36.30
1½ x 1¼"	41.66	35.20	27.94	49.3	36.30
2 x ½"	54.38	16.08	12.70	64.0	46.00
2 x ¾"	54.38	22.45	17.78	64.0	45.00
2 x 1"	54.38	28.83	22.86	64.0	45.00
2 x 1¼"	54.38	35.20	27.94	64.0	45.00
2 x 1½"	54.38	41.66	33.02	64.0	45.00

POWDER COATED METAL CLAMP



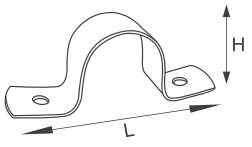
SIZE	WT	L	H
½"	1.2	60.0	22
¾"	1.2	65.0	27
1"	1.2	71.0	34
1¼"	1.2	80.5	42
1½"	1.2	88.0	49
2"	1.2	104.0	60

SWEEP BEND - SOCKET AT BOTH SIDES



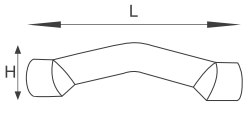
SIZE	ID	OD	WT	SL	H
1"	28.83	33.56	2.59	22.86	102

SS CLAMP



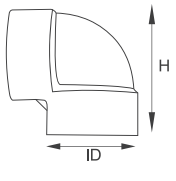
SIZE	WT	L	H
½"	1.2	56.03	16.40
¾"	1.2	66.88	23.43
1"	1.2	74.32	30.39
1¼"	1.2	78.08	33.38
1½"	1.2	88.40	41.95
2"	1.2	99.20	57.90

STEP OVER BEND



SIZE	ID	L	H
½"	16.08	150	42
¾"	22.45	190	50
1"	28.83	268	70
1¼"	35.20	365	65
1½"	41.66	370	80
2"	54.38	500	105

ELBOW 90° (SCH 80)

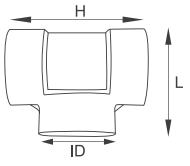


SIZE	ID	OD	WT	SL	H
2½"	73.38	87.40	7.01	44.45	132
3"	89.31	104.55	7.62	47.63	150
4"	114.76	131.92	8.58	57.15	182

ELBOW 90° (SCH 40)

2½"	73.38	83.68	5.15	44.45	129
3"	89.31	100.29	5.49	47.63	148
4"	114.76	126.80	6.02	57.15	182
6"	168.10	182.32	7.11	77.80	250

TEE 90° (SCH 80)

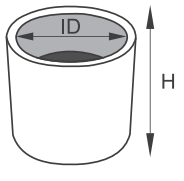


SIZE	ID	OD	WT	SL	L	H
2½"	73.38	87.40	7.01	44.45	130.0	174
3"	89.31	104.55	7.62	47.63	140.0	200
4"	114.76	131.92	8.58	57.15	188.0	245

TEE 90° (SCH 40)

2½"	73.38	83.68	5.15	44.45	129.0	174
3"	89.31	100.29	5.49	47.63	140.0	200
4"	114.76	126.80	6.02	57.15	186.0	245
6"	168.10	182.32	7.11	250.00	77.8	330

COUPLER (SCH 80)

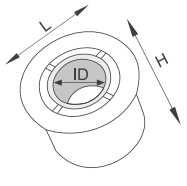


SIZE	ID	OD	WT	SL	H
2½"	73.38	87.40	7.01	44.45	96.5
3"	89.31	104.55	7.62	47.63	102.0
4"	114.76	131.92	8.58	57.15	121.0

COUPLER (SCH 40)

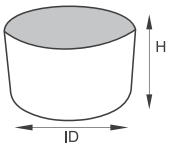
2½"	73.38	83.68	5.15	44.45	96.5
3"	89.31	100.29	5.49	47.63	102.0
4"	114.76	126.80	6.02	57.15	121.0
6"	168.10	182.32	7.11	77.80	160.0

BUSHINGS (SCH 40 AND 80)



SIZE	ID-1	ID-2	SL	L	H
2½ x 2"	73.38	54.38	43.18	79.7	56.3
3 x 2"	89.31	54.38	43.18	98.0	56.3
3 x 2½"	89.31	73.38	44.45	98.1	56.3
4 x 2"	114.76	54.38	43.18	123.0	66.0
4 x 2½"	114.76	73.38	44.45	123.0	66.0
4 x 3"	114.76	89.31	47.62	123.0	66.0
6 x 3"	168.10	89.31	47.62	170.0	85.0
6 x 4"	168.10	114.76	57.15	170.0	85.0

END CAP (SCH 80)

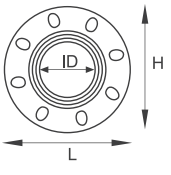


SIZE	ID	OD	WT	SL	H
2½"	73.38	83.68	5.15	44.45	60
3"	89.31	100.29	5.49	47.63	66
4"	114.76	126.80	6.02	57.15	80

END CAP (SCH 40)

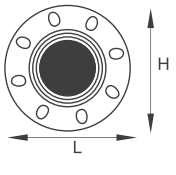
6"	168.10	182.32	7.11	77.80	105

FLANGE - END CAP OPEN



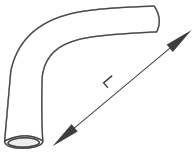
SIZE	ID	OD	WT	L	H
1'	28.83	33.56	2.59	115	27.0
1¼"	35.20	41.56	3.18	126	32.0
1½"	41.66	49.18	3.76	135	39.0
2"	54.38	64.18	4.90	160	49.0
2½"	73.38	83.68	5.15	176	50.7
3"	89.31	100.29	5.49	188	55.3
4"	114.76	126.80	6.02	225	68.0
6"	168.10	182.32	7.11	278	87.0

FLANGE - END CAP CLOSED



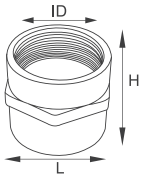
SIZE	L	H
1"	115	15
1¼"	126	16
1½"	135	18
2"	160	18
2½"	176	23
3"	188	23
4"	225	28
6"	278	28

SHORT BEND



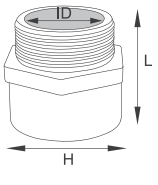
SIZE	ID	H
½	16.08	125
¾	22.45	130
1	28.83	140
1¼	35.20	150
1½	41.66	160
2	54.38	185

FEMALE ADAPTER PLASTIC THREADED - FAPT (SCH 80)



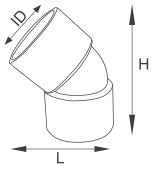
SIZE	ID	OD	WT	SL	L	H
2½	73.38	87.40	7.01	44.45	87.5	77.5
3	89.31	104.55	7.62	47.63	104.0	87.0
4	114.76	131.92	8.58	57.15	128.0	105.0

MALE ADAPTER PLASTIC THREADED - MAPT (SCH 80)



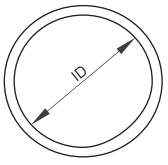
SIZE	ID	OD	WT	SL	L	H
2½	73.38	87.40	7.01	44.45	87.5	81.5
3	89.31	104.55	7.62	47.63	104.0	87.5
4	114.76	131.92	8.58	57.15	132.0	108.0

ELBOW 45° (SCH 80)



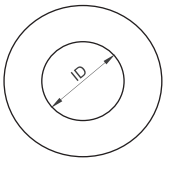
SIZE	ID	OD	WT	SL	L	H
2½	73.38	87.40	7.01	44.45	130	168
3	89.31	104.55	7.62	47.63	126	188
4	114.76	131.92	8.58	57.15	145	235

RUBBER WASHER - UNION O-RING



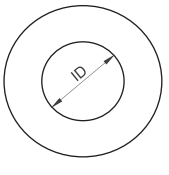
SIZE	ID	W	T
½"	19.9	2.5	3.0
¾"	22.0	3.4	3.7
1"	30.0	3.9	4.3
1¼"	35.7	2.8	2.8
1½"	42.0	2.8	3.3
2"	54.9	3.8	3.8

FAPT WASHER



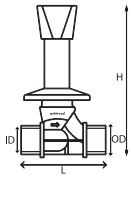
SIZE	ID	OD	W	WT
½"	15.3	19.0	3.1	1.8
¾"	19.2	24.4	3.1	2.5
1"	24.1	30.7	3.4	3.3
1¼"	32.0	39.9	5.4	4.0
1½"	36.8	45.7	5.1	4.5
2"	46.5	57.6	7.1	5.4

TANK NIPPLE WASHER



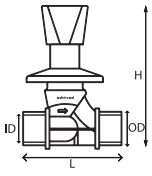
SIZE	ID	OD	W	WT
½"	20.0	40.9	10.4	3
¾"	25.5	45.6	9.9	3
1"	32.4	55.5	11.5	3
1¼"	41.3	65.0	11.8	3
1½"	47.3	71.0	11.8	3
2"	58.7	83.0	12.2	3

LONG CONCEALED VALVE



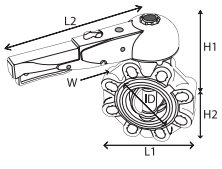
SIZE	ID	OD	SL	H
½"	16.08	21.26	12.70	138
¾"	22.45	27.63	17.78	138
1"	To be introduced shortly			

SHORT CONCEALED VALVE



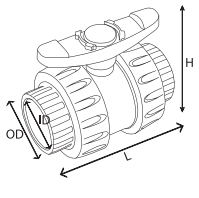
SIZE	ID	OD	SL	H
½"	16.08	21.26	12.70	109
¾"	22.45	27.63	17.78	109
1"	To be introduced shortly			

BUTTERFLY VALVE



SIZE	ID	L1	H1	H2	L2	W	U
2½"	65	147	112	70	175	43	4
3"	80	165	119	80	175	46	4
4"	100	185	133	93	272	49	8
6"	125	211	147	107	272	56	8

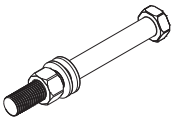
BALL VALVE



SIZE	ID	OD	SL	H	L
2½"	73.38	83.68	44.45	138	230
3"	89.31	100.29	47.63	138	252
4"	114.76	126.80	57.15	171	295

BUTTERFLY VALVE BOLT & NUTS

SIZE	L
M12	125 MM
M16	125 MM
M16	150 MM
M16	160 MM



ASHIRVAD FLOWGUARD™ PLUS SOLVENT CEMENT

1 STEP

SIZE (OZ)	SIZE (ML)	TIN/TUBE
½	15.0	TUBE
1	29.5	TUBE
2	59.0	TUBE
4	118.0	TIN
8	237.0	TIN
16	473.0	TIN
32	946.0	TIN

2 STEP

SIZE (OZ)	SIZE (ML)	TIN/TUBE
PRIMER		
8	237	TIN
SOLVENT CEMENT		
8	237	TIN

NUMBER OF JOINTS PER LITRE OF SOLVENT CEMENT

Diameter of Pipe (inch)	Approx. no. of joints/ litre of solvent cement
½"	1200
¾"	750
1"	500
1¼"	450
1½"	325
2"	225
2½"	50
3"	40
4"	30
6"	10

CPVC fittings storage

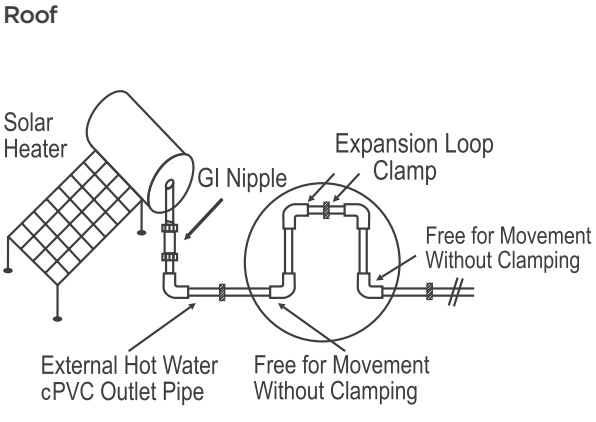
Thermal Expansion and Contraction

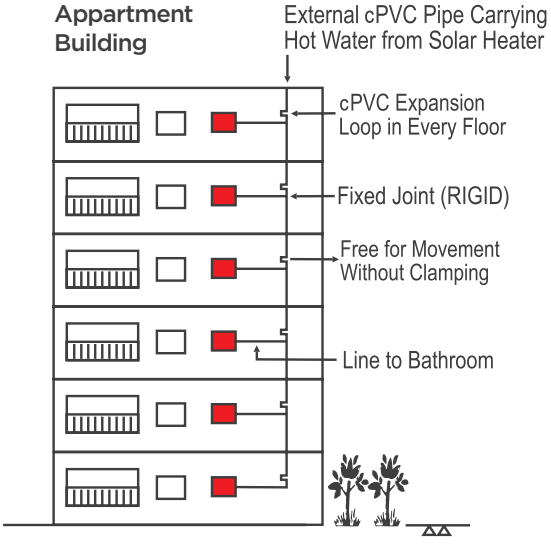
For CPVC pipes which are not embedded inside the wall but are carrying hot water from Boiler/Solar water heater etc., it is important to use ready made expansion loops supplied by Ashirvad Pipes. Use one Ashirvad expansion loop for every 12 feet run of the pipe, between two fixed joints.

For longer lines and longer distances between the fixed joints expansion loops can be made at site with calculations as per the FLOWGUARD™ PLUS manual. Illustration for use and correct clamping is provided separately.

Use one company supplied expansion loop between two consecutive fixed joints (9-15 ft distance minimum)

Carrying Hot Water from Solar Heating System





Correct installation in solar water heater lines

It is not recommended to directly connect CPVC pipes to the water heater outlet.

One meter long metal nipple should be connected directly to the heater so that the CPVC pipe is not damaged by the buildup of excessive radiant heat from the flue.

ashirvad PIPES

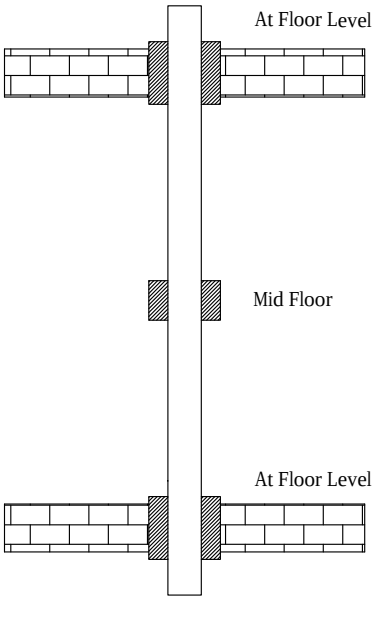
Horizontal and Vertical Spacing in Installation

A typical Hot and Cold water distribution system operating at 60° - 70°C requires support for horizontal lines every 90 cm for diameters below 32 mm and every 120 cm on larger sizes.

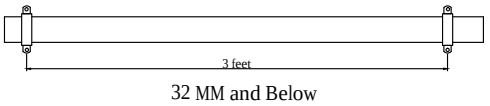
However the following spacings are based on assumptions and can be used at water temperatures indicated below.

Nominal in	Size mm	20°C feet	68°F mtr	50°C feet	122°F mtr	70°C feet	158°F mtr	80°C feet	176°F mtr
½	12.70	5.5	1.7	4.5	1.4	3.0	0.9	2.5	0.8
¾	19.05	5.5	1.7	5.0	1.5	3.0	0.9	2.5	0.8
1	25.40	6.0	1.8	5.5	1.7	3.5	1.1	3.0	0.9
1¼	31.75	6.5	2.0	6.0	1.8	3.5	1.1	3.0	0.9
1½	38.10	7.0	2.1	6.0	2.0	3.5	1.1	3.5	1.1
2	50.80	7.0	2.1	6.5	2.0	4.0	1.2	5.5	1.1
2½	63.50	8.0	2.4	7.5	2.3	4.5	1.4	4.0	1.2
3	76.20	8.0	2.4	7.5	2.3	4.5	1.4	4.0	1.2
4	101.60	9.0	2.7	8.5	2.6	4.5	1.4	4.5	1.4
6	152.40	10.0	3.0	9.0	2.7	5.5	1.7	5.0	1.5

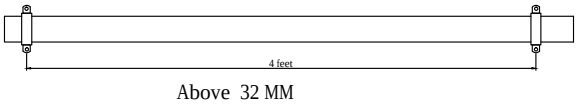
VERTICAL PIPE



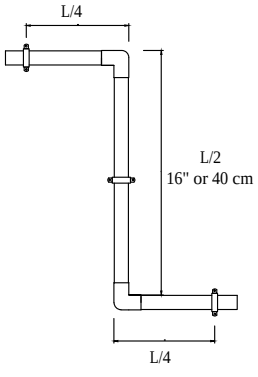
HORIZONTAL PIPE



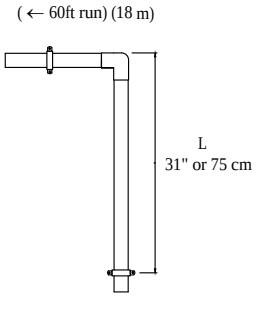
32 MM and Below



Above 32 MM



OFFSET



CHANGE IN DISTANCE

Do not butt up against fixed structures (joist, stud, wall)

Frictional Losses Table

for SDR 11 Pipes

	Friction Head Loss (Milli bar per meter pipe) for SDR 11 Pipe					
	1/2" (15 mm) SDR 11		3/4" (20 mm) SDR 11		1" (25 mm) SDR 11	
Pipe ID - di (mm)	12.00		17.70		22.90	
Flow Rate - Q (Litre/min)	Velocity (m/sec)	Flow rate (millibar/mt)	Velocity (m/sec)	Flow rate (millibar/mt)	Velocity (m/sec)	Flow rate (millibar/mt)
1	0.15	0.32	0.07	0.05	0.04	0.01
2	0.29	1.14	0.14	0.17	0.08	0.05
3	0.44	2.42	0.20	0.36	0.12	0.10
4	0.59	4.11	0.27	0.62	0.16	0.18
5	0.74	6.22	0.34	0.94	0.20	0.27
6	0.88	8.71	0.41	1.31	0.24	0.37
7	1.03	11.58	0.47	1.74	0.28	0.50
8	1.18	14.83	0.54	2.23	0.32	0.64
9	1.33	18.44	0.61	2.78	0.36	0.79
10	1.47	22.41	0.68	3.38	0.40	0.96

For data on other diameters or flow rates, please contact your local Ashirvad Representative.

for SDR 13.5 Pipes

	Friction Head Loss (Milli bar per meter pipe) for SDR 13.5 Pipe					
	1/2" (15 mm) SDR 13.5		3/4" (20 mm) SDR 13.5		1" (25 mm) SDR 13.5	
Pipe ID - di (mm)	12.60		18.30		23.90	
Flow Rate - Q (Litre/min)	Velocity (m/sec)	Flow rate (millibar/mt)	Velocity (m/sec)	Flow rate (millibar/mt)	Velocity (m/sec)	Flow rate (millibar/mt)
1	0.13	0.25	0.06	0.04	0.04	0.01
2	0.27	0.90	0.13	0.15	0.07	0.04
3	0.40	1.90	0.19	0.31	0.11	0.08
4	0.53	3.24	0.25	0.53	0.15	0.14
5	0.67	4.90	0.32	0.80	0.19	0.22
6	0.80	6.87	0.38	1.12	0.22	0.30
7	0.94	9.13	0.44	1.48	0.26	0.40
8	1.07	11.69	0.51	1.90	0.30	0.52
9	1.20	14.54	0.57	2.36	0.33	0.64
10	1.34	17.67	0.63	2.87	0.37	0.78

For data on other diameters or flow rates, please contact your local Ashirvad Representative.

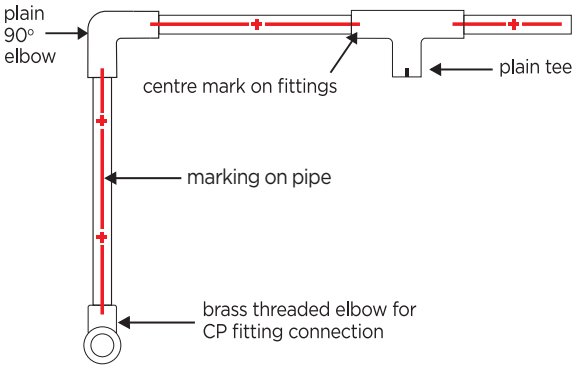
ashirvad PIPES

Frequently Asked Questions

1. How are Ashirvad FLOWGUARD™ PLUS CPVC pipes and fittings aligned?

Ashirvad has made innovation for correct alignment of fittings with pipes during fitment. Elbows and fittings in ½", ¾" and 1" have an alignment mould mark which should be matched with the red stripe on the pipe during solvent cement push fitment process. This is to ensure that in the concealed installations the water outlet fittings are perpendicular to the wall surface and to avoid any repair, breakage, etc. after the wall finishing has been completed. Since there is no reference surface available to the plumber during installation in unplastered walls, this Self Alignment System is very useful and convenient. Ashirvad's self alignment system also saves on the extra cost in correcting those non aligned joints.

This alignment mark on the plastic fittings is an innovation done for the first time in the world by Ashirvad and is design registered.



2. Is Ashirvad CPVC UV protected?

CPVC compound (supplied by Lubrizol) used for manufacture of pipes and fittings are already UV protected. More than 50 years of use has shown that there is no deterioration in pressure withstanding capacity of FLOWGUARD™ PLUS CPVC pipes which have been installed under the sunlight, even after several years of installation. However, for extra protection for pipes which are directly under harsh sunlight, Ashirvad recommends covering all pipes and fittings installed on the roof to prevent any kind of mechanical damage to the system.

3. How to repair the punctures in the wall chasing/concealed installations?

Repair of punctured and damaged pipe due to drilling/chiseling can be done by removing the cement plaster and using the pipe repair piece supplied by the company. Thoroughly clean the area of pipe damaged and make it dry. Apply solvent cement on the surface of pipe at damaged portion in the entire circumference. Also apply solvent cement on the inner surface of pipe repair piece and snap on over damaged area. Tie a small piece of string/binding wire around the repair piece and pipe for sometime to allow to set. This is an unique system available with CPVC pipe where the damaged pipe need not be cut or shifted back and forth for repair. Do pressure test before replastering.

4. Do we need to insulate the CPVC pipes?

Thermal conductivity of FLOWGUARD™ PLUS CPVC pipes and fittings is 0.14 W/MK whereas of copper is 400 W/MK. Since CPVC is a very bad conductor of heat, light insulation is recommended only for installations where there is a continuous flow of hot water e.g. solar/centralised heaters. In bathrooms with independent heaters within 3 meters location insulation may not be necessary.

Please ensure that the insulation material or glue being used to hold the insulation material does not contain any pthalate plasticiser as it is not compatible with CPVC and can cause failure to plumbing system in the long run.

- At the end of this section, a list of all incompatible materials with CPVC is given for ready reference.

5. How to prevent the damage due to drilling / hammering?

After concealing, like any other plastic/ copper pipes FLOWGUARD™ PLUS CPVC pipes and fittings are prone to damage and punctures due to drilling/hammering or chiseling. To avoid such accidents, piping route/layout diagrams and proper instruction may be given to the customer, tiling, carpentry and electrician teams. Also contrasting colour may be added to the cement mortar used to fill the chasings.

6. Why to give the expansion loops in the solar heater hot water line?

For CPVC pipes which are not embedded inside the wall but are carrying hot water from boiler/solar water heater, etc it is most

important to use ready made expansion loop supplied by Ashirvad Pipes. Use one ready made loop for every 9-12 ft. run of the pipe, between two fixed joints. The loops are designed for a max and min differential temp of 70°C. For longer lines and longer distances between the fixed joints expansion loops can be made at site with calculations as per the FLOWGUARD™ PLUS manual or existing available loops can be used after every 12 feet length of pipe.

7. Can we use the combination of CPVC and uPVC piping system?

It is strictly advised to use CPVC pipes in all internal plumbing for both Hot and Cold water line. There has been instances of the non-return valve failure or pressure differential in Hot and Cold water line due to which hot water has entered in the cold line. If the cold water line pipe is not temperature resistant then it will lead to leakage or bursting causing huge loss and inconvenience to the customer.

8. At what distance do we need to clamp the pipes?

Please see previous section.

9. Is the water passing through the solvent cement joints safe for drinking?

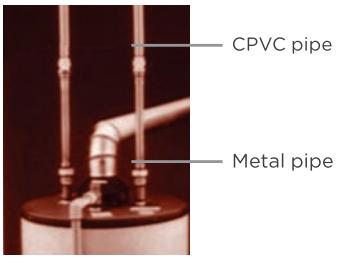
Ashirvad FLOWGUARD™ PLUS is made from NSF approved CPVC compound. NSF is an independent non-government body in USA for water purity standards and certifies the piping system including solvent joint to be used for potable drinking water application. Certification from CFTRI and CIPET has also been obtained by Ashirvad CPVC pipes and fittings.

10. How to support the pipe line during wall chase installations?

The installation may be supported with the help of pre-drilled 15 mm thick plywood piece, 6" long by 2" wide. After fixing the pipe in the wall chasing it may be supported by fixing the plywood piece over the pipe and the chasing. Only 3 to 4 such supports may be needed in one toilet/bathroom installation. During installation it is best to avoid contact between pipe and nails. Properly align and firmly grout all threaded fittings inside the chasing with strong mix of cement and sand. Pipe line ends or elbows should be laid at least 2.5 cms. inside the wall surface.

11. Protection against household hot water storage geyser temperature and safety mechanism malfunction

Some plumbing codes contain detailed requirements for connections to gas or electric storage type water heaters. Determine whether your code has such requirements and satisfy them. CPVC can be piped to the electric water heaters with special metal-to-CPVC transition fittings as shown in the photo. For wall mounted electrical geyser connection always keep the inlet valve open and use flexible plastic hose pipe to connect geyser inlet to CPVC piping system. On gas water heaters there should be at least 6 inches of clearance between the exhaust flue and any CPVC piping. Twelve inch long metal nipple or appliance connector should be connected directly to the heater so that the CPVC pipe Is not damaged by the build-up of excessive radiant heat from the flue. An approved temperature/ pressure (T/P) relief valve should be installed so that the probe or sensing element is in the water at the top of the heater. CPVC is approved by all the model codes for use as relief valve drain line piping. Use a metal-to-CPVC transition fitting to connect to the relief valve and continue the pipe full size to the outlet. For horizontal runs, slope the pipe toward the outlet and support it at three-foot centers or closer. The pipe must discharge to the atmosphere at an approved location. Do not use CPVC pipe and fittings with commercial-type non-storage water heaters.



12. What are the frictional losses encountered in CPVC systems?

Please see previous section for the table of frictional losses in CPVC systems.

13. Are any materials not compatible with CPVC systems?

Please see next section for the list of materials that are incompatible with CPVC.

Warranty and Incompatibility

Note on incompatibility

The following items are generally deemed incompatible with CPVC pipes and fittings as they can lead to environmental stress cracking or premature failure of the system. These materials are thus not be to used with FLOWGUARD™ PLUS CPVC pipes and fittings.

1. Aggressive chemical agents
2. Fire stopping systems
3. Thread sealants
4. Insulation materials with pthalate plasticiser
5. Vaseline
6. Roofing tar
7. Silicone pipe sealants
8. Peppermint oil
9. Vegetable oil
10. Lubricants such as WD40
11. Insecticides
12. Leak detectors
13. Dioctyl phthalate (instead use foam polyethylene)
14. Liquid adhesive
15. PVC pipe wrap tape
16. Acrylic latex caoul and silicone
17. Tiles and all purpose adhesive caulk

The limited warranty will not apply if

1. Ashirvad products are used in combination with any other brand / make of pipes, fittings and solvent cement.
2. The product is used for purposes other than distribution of domestic water.
3. The product fails due to defects or deficiencies in design, engineering or installation.
4. The joints are not pressure tested before plastering of the casings.
5. The Installation manual for the use of the product is not followed.
6. The temperature exceeds 93°C for short term use and 82°C for continuous use.
7. The pipe is not warranted against any mechanical damage by nails, drilling, chiseling, etc.
8. The warranty will not apply in case of geyser short circuit or temperature control system failure.
9. For open hot water line, the expansion loop is not used as per instruction. For pipes under severe sunlight condition, coating of recommended paint to be done on pipes and fittings.

Ashirvad FLOWGUARD™ PLUS CPVC limited warranty

Ashirvad Pipes Pvt. Ltd., Bengaluru warrants to the original owner that the product will be free from manufacturing defects and conform to current applicable ASTM standards under normal use. Buyers' 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.

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CPVC TM - Ver 03

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