PRINCE® PIPES

ONEFIT™

CPVC Industrial Piping Systems

TECHNICAL MANUAL

Corzan® MATERIAL & PIPING SOLUTIONS

PRINCE®
PIPES

INDIA KI
PRAGATI KA TAJ

40 YEARS OF
PROVEN EXPERTISE

PLUMBING • INDUSTRIAL • SEWERAGE • UNDERGROUND • AGRICULTURE • WATER TANKS
CABLE PROTECTION • SURFACE DRAINAGE SYSTEM • BATHWARE

CONTENTS

PRINCE PIPES

Greener Better Together

Prince Pipes is not just about creating products; it is about delivering solutions that drive meaningful progress for the nation. With over 40 years of proven experience, the organisation has evolved alongside India, consistently meeting the country's growing infrastructure needs with reliability, innovation, and purpose at its core. Progress, after all, is never built in a day-it is shaped over time through ambition, effort, and excellence.

Guided by the belief that "better lasts longer," Prince Pipes remains committed to responsible manufacturing through the use of recycled materials, solar-equipped plants, and energy-efficient systems, reducing environmental impact while delivering durable, high-quality solutions. Every pipe sold, every promise delivered, and every relationship nurtured reflects a shared commitment to performance, conservation, and nation-building.

With pride, Prince Pipes presents ***"India Ki Pragati Ka Taj"*** - a tribute to those on the frontline who make progress visible and tangible. Because every step forward is a step towards India's progress, shaping a brighter future for all.

THE JOURNEY

2024
• Prince Pipes got recognized as a 'Great Place to Work®' in November 2024. This prestigious recognition reinforces our commitment to building a sustainable and inclusive workplace ecosystem.

• Prince Pipes and Fittings Limited is among the Top 2 Most Desired Brands – Pipes Category, by TRA Research in its Most Desired Brand Report 2024.

2023
• Embarks on a new phase of growth with the launch of the Modern Plumbing Division

• Haridwar Plant honoured with the "IMexl Commitment Prize" by Kaizen Hansei

• Prince Pipes Chennai plant has achieved the "IGBC Gold Rated Green Factory Building Certification"

2022
• Prince Pipes awarded "IGBC Platinum Rated Green Building Certification" by the Indian Green Building Council (IGBC) for the Jaipur Plant

• Gold Award for Jaipur Facility in February 2022 in the 8th edition of the National Awards for Manufacturing Competitiveness (NAMC) 2021, by IRIM

2021
• Manufacturing unit commissioned at Sangareddy, Telangana, to strengthen our strategic presence in Southern India

2020
• Prince Pipes collaborates with Lubrizol, the world's largest manufacturers and inventors of CPVC compounds

• Technical collaboration with Tooling Holland, a global leader in plastic mould manufacturing

• Marked the expansion of product portfolio with the launch of Storefit Water Tanks across India

2019
• Manufacturing unit established at Jobner, Rajasthan, to cater to the increasing volume demand

• Company successfully listed on BSE and NSE

2018
Prince expands its reach as a B2C brand with Akshay Kumar as brand ambassador

2015
• Mr. Jayant Chheda received the "Lifetime Achievement Award" at the Vinyl India Conference

• "IMEA Award" for Haridwar factory by Frost & Sullivan

2012
Prince Pipes acquired "Trubore" from Chemplast Sanmar Group, along with their two manufacturing units at Kolhapur & Chennai

2008
Manufacturing unit established in Haridwar (Uttarakhand) to cater to the increasing demand for Prince Pipes products

2005
Prince Pipes achieved the `100 Crore benchmark

2000
Manufacturing unit established in Dadra (Silvassa - D & N.H) to augment the pipe manufacturing capacity by setting up a new extrusion unit

1995
Manufacturing unit established in Athal (Silvassa-D & N.H) to setup a large-scale Injection Moulding Unit which marked the beginning for Prince Pipes to be one of the market leaders in PVC Fittings

1987
• Mr. Jayant Chheda commenced the manufacturing unit of PVC products

• 1st PVC Fittings Manufacturing Unit initiated to provide total piping solutions

MANUFACTURING UNITS

SANGAREDDY EST. 2021

JAIPUR EST. 2019

KOLHAPUR EST. 2012

CHENNAI EST. 2012

HARIDWAR EST. 2008

DADRA EST. 2000

ATHAL EST. 1995

CERTIFICATIONS

Certificate

Standard: ISO 9001:2015

Certificate Registr. No.: 01 100 2036834/03

Certificate Holder:

PRINCE PIPES AND FITTINGS LTD
Survey no.132/1/1/3 Athal Road,
Village Athal,Naroli, Silvassa- 396235,
Dadra & Nagar Haveli, India.

Scope: Manufacture of uPVC, CPVC and HDPE Fittings.

Proof has been furnished by means of an audit that the requirements of ISO 9001:2015 are met.

Validity: The certificate is valid from 2021-05-28 until 2024-05-27.

2021-05-28

TÜV Rheinland Cert GmbH
Am Grauen Stein · 51105 Köln

www.tuv.com

TÜVRheinland® Precisely Right.

Certificate

Standard: ISO 9001:2015

Certificate Registr. No.: 01 100 2036834/01

Certificate Holder:

PRINCE PIPES AND FITTINGS LTD
Khasara No 1548, 1549, / 4 & 5,
Salempur, Mehdood – 2, Haridwar -249402,
Uttarakhand, India.

Scope: Manufacture of uPVC, CPVC, PPR and HDPE Pipes and Fittings.

Proof has been furnished by means of an audit that the requirements of ISO 9001:2015 are met.

Validity: The certificate is valid from 2021-05-28 until 2024-05-27.

2021-05-28

TÜV Rheinland Cert GmbH
Am Grauen Stein · 51105 Köln

www.tuv.com

TÜVRheinland® Precisely Right.

Certificate

Standard: ISO 9001:2015

Certificate Registr. No.: 01 100 2036834

Certificate Holder:

PRINCE PIPES AND FITTINGS LTD
The Ruby, 8th floor, 29, Senapati Bapat Marg (Tulsi Pipe Road), Dadar - West, Mumbai 400028.
Maharashtra, India.

Scope: Design, Development, Marketing, Procurement, Purchase/CAPEX, H.R., Logistics Management and Corporate Support functions.

Proof has been furnished by means of an audit that the requirements of ISO 9001:2015 are met.

Validity: The certificate is valid from 2021-05-28 until 2024-05-27.

2021-05-28

TÜV Rheinland Cert GmbH
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TÜVRheinland® Precisely Right.

Certificate

Standard: ISO 14001:2015

Certificate Registr. No.: 01 104 2036834

Certificate Holder:

PRINCE PIPES AND FITTINGS LTD
The Ruby, 8th floor, 29, Senapati Bapat Marg (Tulsi Pipe Road), Dadar - West, Mumbai 400028,
Maharashtra, India.

Scope: Design, Development, Marketing, Procurement, Purchase/CAPEX, H.R., Logistics Management and Corporate Support functions.

Proof has been furnished by means of an audit that the requirements of ISO 14001:2015 are met.

Validity: The certificate is valid from 2021-05-28 until 2024-05-27.

2021-05-28

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TÜVRheinland® Precisely Right.

Certificate

Standard: ISO 45001:2018

Certificate Registr. No.: 01 213 2036834

Certificate Holder:

PRINCE PIPES AND FITTINGS LTD
The Ruby, 8th floor, 29, Senapati Bapat Marg (Tulsi Pipe Road), Dadar - West,
Mumbai 400028, Maharashtra, India.

Scope: Design, Development, Marketing, Procurement, Purchase/CAPEX, H.R., Logistics Management and Corporate Support functions.

Proof has been furnished by means of an audit that the requirements of ISO 45001:2018 are met.

Validity: The certificate is valid from 2021-05-28 until 2024-05-27.

2021-05-28

TÜV Rheinland Cert GmbH
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TÜVRheinland® Precisely Right.

Certificate

Standard: ISO 50001:2018

Certificate Registr. No.: 01 407 1836340/01

Organization:

Prince Pipes and Fittings Ltd.
Kasara No. 1548,1549/4 & 5, Salempur,Mehdood – 2, Industrial Park-2, Haridwar 249402
India

Site:

PRINCE PIPES AND FITTINGS LTD.
The Ruby, 8th floor, 29, Senapati Bapat Marg,
(Tulsi Pipe Road), Dadar West,
MUMBAI 400028, India

Scope: Design, Development, Marketing, Procurement, Purchase / CAPEX, H.R. Logistics Management and Corporate Support Functions.

Proof has been furnished by means of an audit that the requirements of ISO 50001:2018 are met.

Validity: The certificate is valid in conjunction with the main certificate 01 407 1836340 from 2021-05-21 until 2024-05-20.

2021-05-21

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ISO 50001:2018

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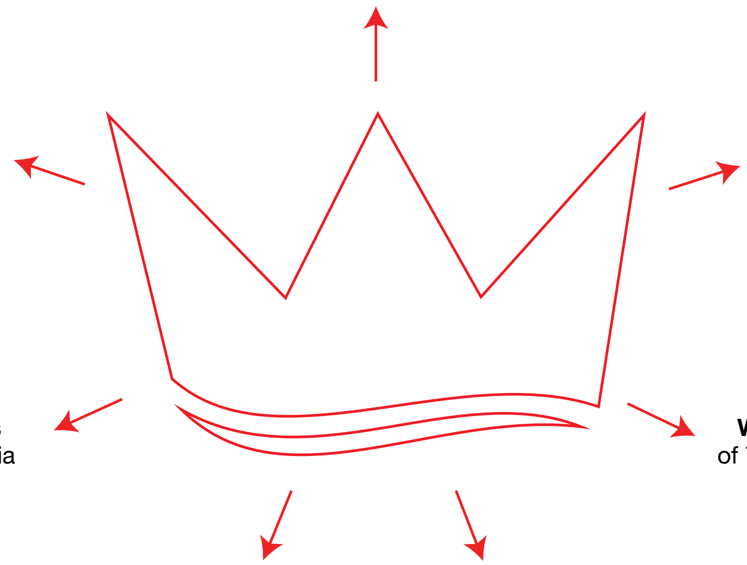
ID 9108653794

COMPANY OVERVIEW

One of **India's largest integrated piping solutions**



Amongst **top 5** processors in India

8 Patented designs backed by robust R&D

9 Depots across India

Wide range of 7,200+ SKUs

Strong legacy of more than **4 decades**

Comprehensive product portfolio **across polymers**

TECHNICAL COLLABORATION

Tooling holland

A global leader in plastic moulds manufacturing

Lubrizol

World's largest manufacturers and also the inventors of CPVC compound

FlowGuard Plus

WORLD'S NO. 1 CPVC PLUMBING SYSTEMS

Corzan

MATERIAL & PIPING SOLUTIONS

FlowGuard® & Corzan® is a registered trademark of Lubrizol Advanced Materials, Inc.

PRODUCT COLLABORATION

Ostendorf Kunststoffe

HT safe by Gebr. Ostendorf Kunststoffe

Skolan safe by Gebr. Ostendorf Kunststoffe

hauraton

AWARDS

most preferred BUILDING MATERIAL COMPANY (PIPES & FITTINGS) 2022

IGBC GREEN FACTORY BUILDING – INDIAN GREEN BUILDING COUNCIL – Prince Pipes and Fittings Limited JAIPUR – PLATINUM 2022 - 2025

Green Building certification by the Indian Green Building Council (IGBC) for Jaipur Plant

INTERNATIONAL RESEARCH INSTITUTE FOR MANUFACTURING

Gold Award for Jaipur facility in February 2022 in 8th edition of National Awards for Manufacturing Competitiveness (NAMC) 2021, by IRIM

Prince Pipes Wins brand of the year award at INEX 2023

PRINCE PIPES - A LEADER OF INDUSTRIAL PIPING SYSTEMS

Prince Pipes has a 35+ years legacy of being at the forefront of the piping industry as the only brand in India to produce industrial piping systems in three polymer categories - PPR, uPVC and CPVC.

Making Prince Pipes India's No. 1 manufacturer to have a 3 polymer solutions for the Industrial application.

Prince's vision extends beyond the domestic segment but also provides a complete range of solutions to the industrial segment by manufacturing trusted products like Greenfit PPR and Easyfit iN uPVC.

Introducing a revolutionary product, Prince Onefit with Corzan® CPVC technology in association with Lubrizol.

Lubrizol is a pioneer in safe and ultra-modern CPVC pipes technology. Lubrizol CPVC product is known globally as the cornerstone of performance par excellence. Lubrizol has always believed in providing indispensable industrial solutions to manufacturers and production engineers. Their patented corzan compound composition is chemical corrosionresistant, heat-cold stable and highly durable.

WHY PRINCE ONEFIT MADE WITH CORZAN® CPVC TECHNOLOGY?

For decades, metal piping systems have dominated the piping sector, becoming the status quo for many industrial applications. However, these pipes have some significant shortcomings, since the chemicals encountered in the process industry aggressively corrode most metal equipment resulting in process leaks, flow restriction and ultimately premature failure. Moreover there is a high jobsite labour cost.

That's where Prince Onefit with Corzan® CPVC technology comes into play.

It is the solution that overcomes the drawbacks of metal piping system. Prince Onefit excels under conditions that could degrade and reduce the service life of many metals and other plastic materials. Prince Onefit is a high-pressure, high-temperature and high-impact strength CPVC industrial piping system for the transmission of chemical fluids made with superior compounds. Prince Onefit comes with a longer service life and also decreasing the minimum downtime enabling continuous production in process industry. It is the perfect solution for the harshest conditions.

APPLICABLE STANDARDS

Prince Onefit made with Corzan® CPVC technology meets the performance requirements of following ASTM standards.

- **ASTM D1784-20:** Standard Classification System and Basis for Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
- **ASTM D1784:** Onefit Corzan CPVC confirms to Cell Classification of 24448 of ASTM D1784
- **ASTM D2855-20:** Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets
- **ASTM F402:** Standard Practice for Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings
- **ASTM F437:** Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
- **ASTM F438:** Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40
- **ASTM F439:** Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
- **ASTM F441:** Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
- **ASTM F493:** Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
- **ASTM F656:** Standard Specification for Primers for Use in Solvent Cement Joints in Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings

APPLICATIONS

CHEMICAL PROCESSING

Chemical processing plants create some of the most challenging environments for industrial piping systems. The combination of aggressive chemicals and high temperatures can compromise the long-term integrity of most piping materials, causing corrosion, process leaks and premature failures that lead to costly replacements. Even the more expensive alloys, lined carbon steel, and nonmetallic alternatives, such as HDPE and FRP, are challenged to provide a cost-effective, reliable solution.

Prince Onefit is inert to most acids, bases and salts, as well as aliphatic hydrocarbons. Due to its superior corrosion resistance, highly durable Prince Onefit piping solutions stand up to the immense challenges of chemical processing plants over the long-term better than any other piping material, metallic or non-metallic.

CHLOR-ALKALI PROCESSING INDUSTRY

Chlor-alkali plants create some of the most corrosive environments imaginable. The transport of harsh chemicals at extreme temperatures, in combination with the high voltage electrolysis process, can quickly compromise the integrity of most piping systems.

In fact, many facilities have been forced to choose whether to invest in expensive, exotic alloys or to face ongoing maintenance challenges and costly premature failures. Chemicals such as Sulphuric acid, Sodium hydrochloride, Hydrochloric acid, Chlorine gas etc generally attack carbon and stainless steel, significantly limiting its service life.

Prince Onefit piping solutions stand up to the unique challenges of the chlor-alkali industry like few other piping materials can, providing facilities with a reliable and affordable solution.

MINERAL PROCESSING INDUSTRY

Piping used to convey chemical solutions in the mineral processing industry faces tough challenges. Whether the operation is extracting precious materials from the ground or processing raw materials after being excavated, the challenge to the long-term reliability of the piping system is significant. And, this challenge is only expected to increase as existing pits and mine sites are often extracting ores of lower concentrations from deeper in the Earth's crust, causing a shift in the chemistry of processed ores.

Highly corrosive chemicals typically used in mining operations, often at high temperatures, can wreak havoc on the integrity of most piping systems, creating ongoing maintenance challenges and costly, premature failures.

Corrosion, sedimentation, and crystallisation compromise the integrity of most metallic systems. Comparatively, Prince Onefit pipe and fittings offer superior resistance to most acids, bases and salts, and aliphatic hydrocarbons.

POWER GENERATION INDUSTRY

In the power generation industry, there are often few choices when it comes to specifying the product or material being used in plant processes. Selecting the correct piping solution directly increases operational efficiency, while minimising downtime and improving bottom-line performance.

Prince Onefit CPVC is used by all types of power generation plants, including nuclear, coal combined cycle and CHP plants. The material has a proven track record of providing reliable piping, ducting and liners that mitigate corrosion issues and prolong the life of a system.

Existing power plants often turn to Corzan® CPVC for emergency repairs because the piping is readily available and can be installed and tested quickly using mechanical couplings.

New power plants and plants looking to upgrade or replace existing systems rely on Corzan® CPVC because of its low installation costs and long-term, corrosion-free capabilities.

WASTEWATER TREATMENT PLANTS

Corrosion to pipes, valves and fittings caused by chemicals and microbes can greatly impact the bottom line at water and wastewater treatment plants.

For more than 20 years, Corzan® CPVC Industrial Systems-made from non-corrosive, high-performance chlorinated polyvinyl chloride (CPVC)-has provided an excellent balance of properties that improve reliability and confidence while reducing capital and life-cycle costs for water and wastewater treatment plants.

From primary wastewater treatment to wastewater odour control, Prince Onefit CPVC meets the demands of the process.

PRIMARY WASTEWATER TREATMENT

Prince Onefit pipes and fittings are ideal for primary wastewater treatment, as they are not susceptible to microbial corrosion and are resistant to commonly used chemicals, including ferrous chloride, ferric chloride, alum, and alkaline lime slurry systems that neutralise the acid generated during the nitrification of ammonia. Since it is resistant to scaling and fouling, Prince Onefit maintains its friction factor throughout its entire service life.

SECONDARY WASTEWATER TREATMENT

In this part of the process, piping is exposed to high concentrations of microorganisms when excessive biological growth washes out and collects in a clarifier. Byproducts of these microbes, including acids or hydrogen sulfide, or disinfectants and dechlorination chemicals, contribute to the corrosion of metallic piping systems. Prince Onefit Industrial piping stands up to both chemical and microbial corrosion, even when used to transport highly concentrated acids and caustic solutions used for pH control. It can also be used in outdoor applications, as it has excellent UV resistance and high heat tolerance.

ADVANCED WATER TREATMENT

Prince Onefit CPVC provides reliable performance even when exposed to cooling tower applications and handling nominal concentrations of methanol for biological denitrification. Prince Onefit pipe and fittings are pressure rated to 93°C, making them ideal for double-containment systems, which are often required to transport treatment chemicals underground.

WASTEWATER ODOUR CONTROL

With today's long list of odour control mandates, Corzan® CPVC Industrial Systems are a proven material used in both traditional wastewater applications and in scrubbers and ancillary equipment. Whether a plant is using sodium hydroxide and sodium hypochlorite in its wet air scrubbers at temperatures as high as 93°C, or metal chelating agents in a liquid redox process, Prince Onefit pipes and fittings offer the chemical resistance and superior high-temperature performance that wastewater odour control processes require.

ABOUT PRINCE ONEFIT CORZAN CPVC

Prince Onefit Corzan CPVC is a PVC homopolymer that has been subjected to a chlorination reaction. Typically, chlorine and PVC react according to a basic free radical mechanism. This can be brought about by various approaches using thermal and/or UV energy for initiation of the reaction. A generalized mechanism for the free radical chlorination of PVC can be schematically represented as follows, where RH denotes PVC:

Initiation: $Cl_2 \xrightarrow[\text{UV Energy}]{\text{Heat}} 2Cl\bullet$

Propagation: $RH + 2Cl\bullet \longrightarrow R\bullet + HCl$

$R\bullet + Cl_2 \longrightarrow RCl + Cl\bullet$

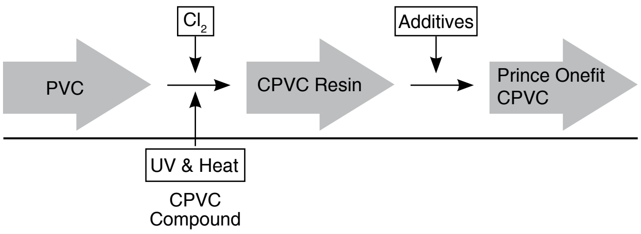
Termination: $R\bullet + Cl\bullet \longrightarrow RCl$

$Cl\bullet + Cl\bullet \longrightarrow Cl_2$

$R\bullet + R\bullet \longrightarrow R_2$

CPVC produced in such a manner can be quite varied structurally depending on the chlorination method, conditions, and the amount of chlorine reacted. The chlorine content of base PVC can be increased from 56.7 percent to as high as 74 percent, though typically most commercial CPVC resins have 63 to 69 percent chlorine. As the chlorine content in CPVC is increased, the lass transition temperature (Tg) of the polymer increases significantly. Also, as the molecular weight of base PVC is increased, there is a smaller proportionate increase in the Tg at an equivalent level of chlorine.

The CPVC resin manufactured from this free radical chlorination reaction is not processable without the addition of additives. These additives may include, but are not limited to, stabilizers (heat and UV), impact modifiers, pigments and lubricants. The quantity and combination of these additives enhances many of the CPVC resin's inherent properties, while easing its processability.



The family of these various compound formulations comprises Prince Onefit CPVC.
This design manual provides instructions for handling and installing a Prince Onefit industrial system as well as information regarding system design. It is intended as a supplement to basic, fundamental knowledge relating to the installation and/or repair of CPVC industrial systems. It is also intended to supplement installation instructions published by manufacturers of pipe, fittings and duct. Before commencing installation, a user should understand and confirm local code approval and installation requirements for CPVC industrial systems.

MATERIAL PROPERTIES

SAFETY

Extensive studies of CPVC® piping demonstrate that no significant health risks are associated with installing CPVC® piping, and that risk levels are well below accepted standards. Prince Onefit CPVC pipe and fittings fully endorse safety and protective measures recommended by government agencies.
Whenever possible, ensure proper ventilation when applying primers and cements and/or soldering materials.

Avoid unnecessary skin or eye contact with primers and cements and/or soldering materials. Wash immediately if contact occurs to avoid prolonged exposure.

Follow all manufacturer-recommended precautions when cutting or sawing pipe or when using any flame,
heat or power tools.

TABLE 1

	Physical Properties of Prince Onefit CPVC	
Physical Properties	Prince Onefit Pipe	Standard
Specific gravity	1,52	ISO 1183
Modulus of Elasticity @ 23°C, MPa	2700	ISO 527-1,-2
Tensile strength, MPa	55	ISO 527-1,-2
Compressive Strength, MPa	69,6	ISO 604
Poisson's ratio	0.35 - 0.38	-
Hazen Williams C factor	150	-
Coefficient of Linear expansion m/ (m.K)	6.4 x 10-5	ISO 11359
Thermal conductivity (W/(m.K)	0,137	ISO 8302
Limiting oxygen index	60	ISO 4589
Impact, Charpy, notched	24 kJ/m²	ISO 178
Elongation at Yield	5%	ISO 527-1,-2
Flexural Modulus	2560 MPa	ISO 178
Vicat (VST B-50, annealed)	115°C%	ISO 306
Electrical conductivity	non conductor	-

FIRE PERFORMANCE CHARACTERISTICS

Prince Onefit Industrial Systems are well suited for many process applications due to their outstanding resistance to many corrosive chemicals at temperatures up to 95°C. When thermoplastic piping materials are selected, consideration is often given to the fire performance characteristics of the material. Evaluating fire performance involves consideration of many factors such as resistance to ignition, heat of combustion, Limiting Oxygen Index (LOI), flame spread and smoke generation characteristics.

Without the benefit of flame retardants and smoke inhibitors, Prince Onefit CPVC inherently exhibits outstanding fire performance characteristics in terms of limited flame propagation and low smoke generation. When coupled with its excellent balance of mechanical strength, low thermal conductivity, improved hydraulics and outstanding corrosion resistance, Prince Onefit CPVC provides excellent value in terms of safety and performance in a wide range of industrial process piping and ducting applications.

IGNITION RESISTANCE

Prince Onefit CPVC has a flash ignition temperature of 482°C which is the lowest temperature at which sufficient combustible gas is evolved to be ignited by a small external flame. Many other ordinary combustibles, such as wood, ignite at 260°C or less.

Flash Ignition Temperature Comparison	
Material	°C
CPVC	482
PVC, Rigid	399
Polyethylene	343
White Pine	204
Paper	232

BURNING RESISTANCE

Prince Onefit CPVC will not sustain burning. 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 is only 21% oxygen, Prince Onefit CPVC will not burn unless a flame is constantly applied and stops burning when the ignition source is removed. Other materials will support combustion due to their low LOI.

Limiting Oxygen Index Comparison	
Material	LOI
CPVC	60
PVC, Rigid	45
PVDF	44
ABS	18
Polypropylene	17

FLAME SPREAD / SMOKE GENERATION

The flame spread and smoke generation characteristics of Corzan CPVC materials have been tested according to EN 13501-1 Fire Classification of Construction Products and Building Elements and achieved a rating of B s1 d0 for low flammability, no contribution to flashover, low smoke development and no burning drops. We consider this to be the best possible rating a plastic material can achieve.

EN 13501-1:2002: FIRE CLASSIFICATION OF CONSTRUCTION PRODUCTS AND BUILDING ELEMENTS	
Fire behavior	B → Low flammability, no contribution to flashover
Smoke development	s1 → Low smoke development
Flaming droplets	d0 → No burning drops

WEATHERABILITY

Weatherability is defined as a material's ability to maintain its basic physical properties after prolonged exposure to sunlight, wind, and rain/humidity. Over 45 years of experience with CPVC, including many long-standing outdoor installations, demonstrate that Prince Onefit Industrial Systems will be able to withstand long-term exposure to the environment without significant adverse effects.

Prince Onefit CPVC has been blended with a significant concentration of both carbon black and titanium dioxide (TiO2). Both carbon black and TiO2 are widely recognized as excellent ultraviolet blocking agents and help to protect the polymer backbone from the effects of ultraviolet radiation.

In fact, Lubrizol experience verifies that the pressure bearing capability of Prince Onefit piping systems is maintained after extended exposure. Depending on the specific installation, there has been some gradual reduction in impact properties with prolonged exposure. If the specific installation requires additional protection from UV exposure, Prince Onefit piping systems can be painted with common acrylic latex paint. Priming of the piping is not necessary prior to painting.

ABRASION RESISTANCE

A piping system's resistance to abrasion is a function of many factors:

- Particle size and shape
- Hardness of particles
- Particle concentration
- Densities (fluid, particle, and pipe)
- Velocities
- Properties of piping materials
- Design of the piping system

While all piping systems will exhibit some degree of wear over time, the actual erosion will depend on the specific combination of these factors. Excluding the piping material itself, the system conditions which will minimize abrasion include:

- Lower velocities (<5 ft/sec)
- Large, round particles
- Uniform particle distribution
- Minimum changes in direction

When these ideal slurry conditions do not exist, the selection of the piping material becomes important. Prince Onefit piping systems will usually outperform metal when transporting abrasive media and have been used successfully in many abrasive industrial applications.

No single test method exists which can consistently predict the abrasion resistance of a material to the broad range of potentially abrasive conditions. As a result, the best guide in selecting materials for abrasive service is past experience. In lieu of such case histories, attention should be directed towards approaching the ideal system conditions mentioned above, particularly minimizing changes in direction. At the same time, changes in direction can be designed to minimize abrasion potential. Large radius elbows and capped tee bends are usually specified to reduce particle impingement on the pipe wall.

One widely referenced test method is the Taber Abrasion Test, in which the weight loss of a material is measured after being exposed to an abrasive wheel for 1000 cycles. While the Taber test cannot predict actual performance of a material to a given application, it does provide a relative measure to compare materials.

Taber Abrasion Tester Abrasion Ring CS-10, Load 1 kg	
Material	LOI
Nylon 6-10	5 mg/1000 Cycles
UHMW PE	5
PVDF	10-5
PVC (Rigid)	15-20
PP	15-20
CPVC	20
ECT FE	13
PS	40-50
Steel (304 SS)	50
ABS	60-80
PTFE	500-1000

BIOLOGICAL RESISTANCE

Biofilms form when biomasses such as fungi, algae and mold adhere to surfaces in wet environments. This buildup can contain dangerous bacteria including legionella and e.Coli. Independent scientists have repeatedly shown that CPVC is less likely to support the formation of biofilms than other common piping materials. This is a particularly important feature for applications where water remains stagnant inside the piping system for a longer period. While in domestic pipes water can be stagnant for several days if the occupants are absent, in commercial structures this can amount to several months. A typical example of an application where water sits in the piping for a long time are safety showers in laboratories and chemical plants.Keeping the staff safe from chemical contamination is a very high on priority and the same should apply for biological contamination.

No piping system will actively fight bacterial growth, but factors such as the microscopic surface profile can affect the growth properties. CPVC has a smooth, hard microscopic surface that reduces the risk of bacterial growth. In fact, numerous studies have found that CPVC is among the best performing piping materials for biofilm formation potential, consistently rating better than PEX and Copper over the life of the system.

Prince Onefit Corzan CPVC is also resistant to most commonly used biocides, such as quaternary amines or isothiazoline derivatives, when used at typically recommended concentrations in stagnant or recirculating systems. For occasional or pre-start-up disinfecting of piping systems, bleach solutions can be used at any concentration deemed necessary by the entity requiring the disinfection procedure, at temperatures up to 90°C.

CHEMICAL RESISTANCE DATA

One of the key advantages of Prince Onefit Corzan CPVC is its excellent resistance to a broad range of corrosive environments. By replacing traditional materials with Prince Onefit Corzan CPVC, engineers can extend equipment service life and reduce maintenance, while minimizing process life-cycle costs.

The data in this manual is intended to provide engineers and end users with guidance as to the suitability of CorzanR industrial process piping systems in corrosive applications and chemical waste drain systems. In general, Prince Onefit Corzan CPVC is inert to most mineral acids, bases, salts, and aliphatic hydrocarbons, and compares favorably to other non-metals in these chemical environments. Specific use conditions must also be considered since these will determine the chemical resistance of any thermoplastic piping system. Variables that can affect chemical resistance include chemical concentration, temperature, pressure, external stress, and final product quality. Since the number of possible use conditions is so large, the final decision regarding material suitability often must be based on in-service testing.

The information contained in this manual for process piping systems was developed to include conditions that are most often encountered in industry. CPVC samples were immersed in the particular reagent for at least 90 days at 23°C and 82°C.

Chemical waste drain systems must be designed to convey the mixtures of corrosive liquids generated by commercial and industrial laboratories to the point where they are either sufficiently diluted or neutralized before being discharged into the sanitary sewer system. Therefore, the information in this manual for chemical waste systems was developed by exposing CPVC samples to water/chemical mixtures at room temperature. For both applications, test data was reviewed in conjunction with field experience and information gathered from various sources to develop the recommendations shown.

Note: the chemical resistance recommendations for chemical process piping and chemical waste drain systems are significantly different for some chemicals. These recommendations are based on specific use conditions and may not apply to all situations. For this reason, the final decision regarding material suitability must rest with the end- user. The notes following the chemical resistance chart list specific areas where caution must be used when considering Prince Onefit Corzan CPVC. Additional chemical resistance data will become available as testing of Prince Onefit Corzan CPVC continues. Consult with your product supplier, Lubrizol or visit www.corzan. com for the most current Prince Onefit Corzan CPVC chemical resistance information.

CPVC products are made with base resins having different molecular weights and chlorine content as well as different compound additives. Therefore, the compatibility recommendations made in this document can only apply to the products with which they have been tested (i.e. Lubrizol products.)

Tested against over 500 chemicals and compounds for suitability

H_2O Water	NaClO Sodium Hypo Chlorite	H_2SO_4 Sulfuric Acid	HCl Hydrochloric Acid	NaOH Sodium Hydroxide
NaCl Sodium Chloride	H_3PO_4 Phosphoric Acid	ClO_2 Chlorine Dioxide	HNO_3 Nitric Acid	H_2O_3 Hydrogen Peroxide

PRINCE ONEFIT CPVC CHEMICAL RESISTANCE FOR INDUSTRIAL PIPING APPLICATIONS

HYDRAULIC DESIGN

DESIGN VELOCITY

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

$$V = 2.122 * 10^{-5} * \frac{Q}{d^2_t}$$

WHERE:

V = linear fluid flow velocity in meter per second

Q = flow rate in liters per minutes

di = inside diameter of pipe in mm

WATER HAMMER SURGE PRESSURE:

Whenever the flow rate of fluid in a pipe is changed, 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:

$$P_{wh} = \Delta V * Þ * \sqrt{\frac{1}{Þ} * \frac{k}{1 + \frac{DK}{tE}}}$$

WHERE:

Pwh = maximum surge pressure, Pa

Þ = fluid density, kg/m3 (1000 kg/m³ for water)

ΔV = change in fluid velocity, m/sec

D = pipe diameter (m)

t = pipe wall thickness (m)

K = bulk modulus of elasticity of fluid (Pa), 215 MPa for water at 23°C

E = Elastic modulus of the pipe (Pa) (refer below table)

MODULUS OF ELASTICITY AND WORKING STRESSFOR CPVC		
Temperature (°C)	Modulus Mpa	Stress S Mpa
2	2,916	13.79
3	2,779	13.79
40	2,558	10.34
50	2,448	8.96
60	2,227	6.89
70	2,006	5.17
82	1,855	3.45

The values in tables 13 and 14 are based on this formula at 23°C and the assumption that water flowing at a given rate of litres per minute is suddenly completely stopped. At 80°C the surge pressure is approximately 15% less. The value for fluids other than water may be approximated 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 1,5 TIMES 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 1,5 m/s for industrial applications, particularly for pipe sizes of 160 mm or larger.

Velocity at system start-up should be limited to 0,3 m/s during filling until it is certain that all air has been flushed from the system and the pressure has been brought up to operating conditions. Air should not be allowed to accumulate in the system while it is operating. Pumps 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.

HAZEN-WILLIAM C FACTOR

A great advantage that Corzan pipe enjoys over metallic pipe 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-Williams formula is the generally accepted method of calculating friction head losses in piping systems. The values in the following fluid flow tables are based on this formula and a surface roughness constant of C=150 for Corzan pipe.

Surface roughness constants for other piping materials are given below:

Constant (C)	Type of Pipe
150	CPVC pipe, 45+ years
130-140	Steel/cast iron pipe, new
125	Steel pipe, old
120	Ccast iron, 4-12 years
110	Galvanized steel; cast iron, 13-20 yrs
60-80	Cast iron, worn/pitted

HEAD-LOSS CHARACTERISTICS - PIPE:

The flow characteristics of water flowing through piping systems are affected by several factors including system configuration, pipe size and length, friction at the pipe and fitting surfaces, etc. These and other factors cause a reduction in pressure (head-loss, also expressed as pressure drop) over the length of the system. This section deals only with the head-losses that result from frictional forces in the various sizes of CPVC pipe and fittings.

The following formula was used to calculate water velocities, head-losses and pressure drops as function of flow rates. The results are given in Table 13 for SDR 16 Corzan Pipe and Table 14 for SDR 21 Corzan Pipe. The HazenWilliam formula can be used to adequately describe these losses:

$$f = \left[\frac{6.05 * Q^{1.85}}{C^{1.85} * d_i^{4.87} * 10^5} \right] * 1000$$

WHERE:

f = friction head in mbar per meter of pipe

di = inside diameter of pipe in mm

Q = flow rate in liters per minute

C = pipe surface roughness constant (150 for Corzan Pipe)

HEAD-LOSS CHARACTERISTICS - 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 below.

EQUIVALENT LENGTH OF PIPE (METER)*				
DN	90° Elbow	45° Elbow	Tee branch flow	Tee run flow
16	0.44	0.22	0.10	0.28
20	0.61	0.32	0.13	0.43
25	0.76	0.43	0.21	0.52
32	1.00	0.56	0.34	0.70
40	1.22	0.64	0.53	0.82
50	1.74	0.77	0.82	1.22
63	2.15	0.98	1.3	1.50
75	2.59	1.15	1.9	1.80
90	3.13	1.37	2.7	2.19
110	3.86	1.66	4.0	2.70
125	4.41	1.88	5.2	3.09
140	4.96	2.10	6.5	3.47
160	5.69	2.39	8.4	3.99

* The data provided in this table is for reference only. Consult the fitting manufacturer's literature for additional information.

HEAD-LOSS CHARACTERISTICS – VALVES AND STRAINERS

Pressure drop in valves and strainers is calculated using flow coefficient values which are published by the valve manufacturer. The equation for calculating pressure drop in this manner is:

$$P = \frac{G^2}{C_v^{\,2}}$$

WHERE:

P = pressure drop in MPa

G = flow rate in liters per minute

Cv^2 = the valve flow coefficient

Typical flow coefficients for different valves and strainers can be found in the valve/strainer manufacturer's literature. Pressure drops for fluids other than water may be calculated by multiplying the value calculated from the above equation by the specific gravity of the fluid.

THERMAL EXPANSION AND THERMAL STRESSES

It is important to consider thermal expansion when designing a system with Corzan pipe. Most thermoplastics have a coefficient of thermal expansion which is significantly higher than those of metals. The thermal expansion of a piping system subject to a temperature change can therefore be significant and may need compensation in the system design. The expansion or contraction of thermoplastic pipe may be calculated from the following formula:

$$\Delta L = Y * \Delta T * \frac{L}{5}$$

WHERE:

ΔL = meters of expansion

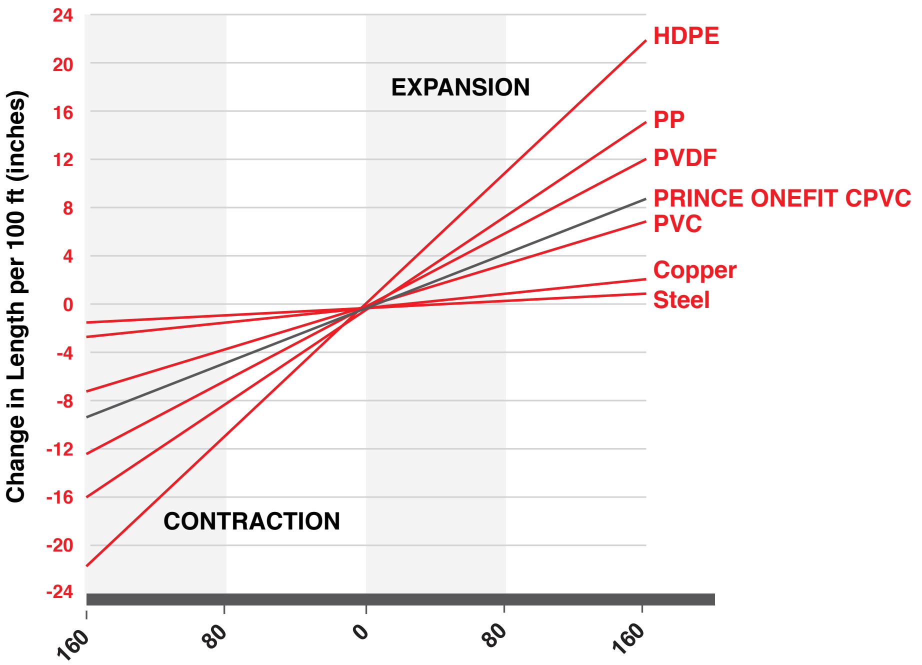
Y = 3.4mm/5°C/10m

ΔT = Delta temperature in °C

L = Length of pipe

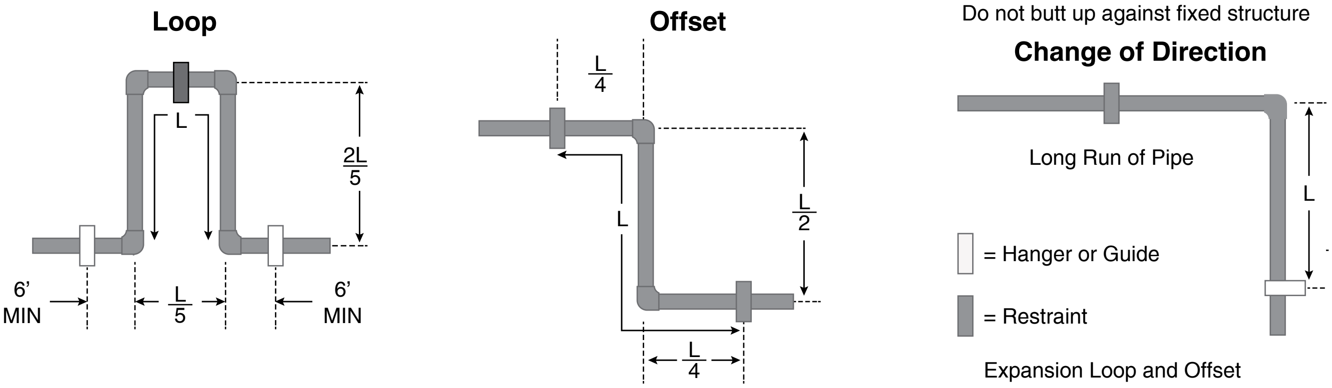
Expansion loop and offset compensation

EXPANSION LOOP AND OFFSETS:



Expansion Loops and Offsets As a rule of thumb, if the total temperature change is greater than 30°F (17°C), compensation for thermal expansion should be included in the system design. The recommended method of accommodating thermal expansion is to include expansion loops, offsets, or changes in direction were necessary in the system design. An expansion loop schematic is presented in Figure 4.

EXPANSION LOOP AND OFFSET CONFIGURATION



Expansion Loop and Offset Configuration

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

WHERE:

L = loop length (m)

E = modulus of elasticity at maximum temperature (MPa) (Refer following table)

S = working stress at maximum temperature (MPA) (Refer following table)

D = outside diameter of pipe (m)

ΔL = change in length due to change in temperature (m)

MODULUS OF ELASTICITY AND WORKING STRESS FOR CPVC		
Temperature (°C)	Modulus Mpa	Stress S Mpa
2	2,916	13.79
3	2,779	12.41
40	2,558	10.34
50	2,448	8.96
60	2,227	6.89
70	2,006	5.17
82	1,855	3.45

Expansion loops and offsets should be constructed with straight pipe and 90° elbows which are solvent cemented together. If threaded pipe is used in the rest of the system, it is still recommended that expansion loops and offsets be constructed with solvent cement to better handle the bending stresses incurred during expansion. The expansion loop or offset should be located approximately at the midpoint of the pipe run and should not have any supports or anchors installed in it. Valves or strainers should not be installed within an expansion loop or offset.

THERMAL STRESSES:

If thermal expansion is not accommodated, it is absorbed in the pipe as an internal compression. This creates a compressive stress in the pipe. The stress induced in a pipe which is restrained from expanding is calculated with the following formula: stress in the pipe. The stress induced in a pipe which is restrained from expanding is calculated with the following formula:

$$S = E * Y * \Delta T$$

WHERE:

S = stress induced in the pipe (MPa)

E = modulus of elasticity at maximum temperature (MPa) (refer above table "Modulus of elasticity and working stress for CPVC")

y = coefficient of thermal expansion (7 x 10-5 cm/cm.°C for Corzan pipe)

ΔT = total temperature change in ºC of the system

Because the coefficient of thermal expansion of steel is five times lower than that of CPVC, dimensional changes due to thermal expansion will be five times less. However, as can be seen by the equation above, the stresses induced in the piping system due to restrained thermal expansion are dependent on the material's modulus as well as its coefficient of thermal expansion. Because the modulus of steel is approximately 80 times higher than that of CPVC, the stresses resulting from restrained expansion over a given temperature change will be approximately 16 times higher for steel than for CPVC.

For instance, restrained expansion over a 10°C temperature change will produce approximately 40 bar of stress in a CPVC system, but 675 bar of stress in a steel system. CPVC's relatively more flexible nature will usually allow it to absorb its lower stresses in a buckling or snaking of the line if necessary. Because steel piping is too rigid to buckle, its higher stresses are often transferred to surrounding structures, resulting in damaged supports, anchors, or even abutting walls.

The project and local conditions should be considered and the recommendations of construction/design professionals and building department inspectors should be controlling on the thermal expansion and contraction issues.

JOINING PRINCE ONEFIT PIPE AND FITTINGS SOLVENT CEMENTING

1. CUTTING

Prince Onefit Corzan CPVC can be easily cut with a ratchet cutter, wheel-type plastic tubing cutter, power saw, or fine-toothed saw. To ensure the pipe is cut square, a mitre box must be used when cutting with a saw. Cutting the pipe as squarely as possible provides the maximum bonding surface area.

2. CHAMFERING AND DEBURRING

Burrs and filings can prevent proper contact between the pipe and fitting and may put undue stress on the pipe and fitting assembly. Burrs and filings must be removed from the outside and inside of the pipe. A chamfering tool or file is suitable for this purpose. A slight bevel should be placed at the end of the pipe to ease entry of the pipe into the socket and minimize the chances of wiping solvent cement from the fitting. For pipe sizes 50 mm and larger a 10°15° chamfer is recommended. The depth of the fitting socket should be measured from the internal shoulder and the corresponding distance marked on the end of the pipe to assure proper insertion.

3. FITTING PREPARATION

Loose soil and moisture should be wiped from the fitting socket and pipe end with a clean, dry rag. Moisture can slow the curing, and at this stage of assembly excessive water can reduce the joint strength. The dry fit of the pipe and fitting should be checked. The pipe should enter the fitting socket easily 1/3 to 2/3 of the depth. If the pipe bottoms in the fitting with little interference, extra solvent cement should be used to prepare the joint.

4. PRIMER APPLICATION

Use primer conforming to EN 14814 or ASTM F656. Primer is needed to prepare the bonding area for the addition of the cement and subsequent assembly. It is important that a proper applicator be used. A dauber, swab or paintbrush approximately half the size of the pipe diameter is appropriate. Primer is applied to both the outside of the pipe end and inside of the fitting socket, redipping the applicator as necessary to ensure that the entire surface of both is tacky.

5. SOLVENT CEMENT APPLICATION:

Use only CPVC solvent cement conforming to EN 14814 or ASTM F493. Solvent cement must be applied when the pipe is tacky, not wet, from primer. Joining surfaces must be penetrated and softened. Cement should be applied with a natural bristle brush or swab half the size of the pipe diameter. A dauber may be used to apply cement on pipe sizes below 50mm. A heavy even coat of cement should be applied to the outside of the pipe end, and a medium coat should be applied to the inside of fitting socket. Pipe sizes greater than 50mm should receive a second coat of cement on the pipe end.

6. ASSEMBLY:

After cement application, the pipe should immediately be inserted into the fitting socket and rotated 1/8 to 1/4th turn until the fitting -stop is reached. The fitting should be properly aligned for installation at this time. The pipe must meet the bottom of the fitting socket. The assembly should be held in place for 10 to 30 seconds to ensure initial bonding and to avoid push out. A bead cement should be evident around the pipe and fitting juncture. If this bead is not continuous around the socket shoulder, it may indicate that insufficient cement was applied. In this case, the fitting should be discarded and the joint joint reassembled. Cement in excess of the bead may be wiped off with a rag.

JOINING OF LARGE DIAMETER PIPE

For 160 mm or larger diameter pipe, a pipe puller (come-a-long) is recommended to assemble the joint and hold it in place for the initial set time without applying excess force that may damage the pipe or fitting. This equipment should be set up prior to the start of priming so the assembly can happen quickly while primer and cement are still fluid.

SET AND CURE TIMES

SOLVENT CEMENT SET TIMES				
Ambient Temperature	mm to 32	mm 40 to 63	mm 75 to 200	mm >225
20°C to 40°C	2 min.	5 min.	30 min.	4 hr.
0°C to 20°C	5 min.	10 min.	2 hr.	16 hr.
-20°C to 0°C	10 min.	15 min.	12 hr.	48 hr.

Solvent cement set and cure times are a function of pipe size, temperature, relative humidity, and tightness of fit. Drying time is faster for drier environments, smaller pipe sizes, high temperatures and tighter fits. The assembly must be allowed to set, without any stress on the joint per the time shown in below table “Solvent cement set times”. Following the initial set period, the assembly can be handled carefully avoiding significant stresses to the joint. Refer to Table “Solvent cement cure time” for minimum cure times prior to testing.

SOLVENT CEMENT CURE TIMES							
	To 32 mm		40 to 63 mm		75 to 200 mm		>225 mm
Ambient Temperature.	Up to 10 bar	Above 10 bar to 25 bar	Up to 10 bar	Above 10 bar to 20 bar	Up to 10 bar	Above 10 bar to 20 bar	Up to 10 bar
20°C to 40°C	15 min.	6 hr.	30 min.	12 hr.	1 ½ hr.	24 hr.	72 hr.
0°C to 20°C	20 min.	12 hr.	45 min.	24 hr.	4 hr.	48 hr.	6 days
-20°C to 0°C	30 min.	48 hr.	1 hr.	96 hr.	72 hr.	8 days	14 days

Extra care should be exercised when systems are assembled in extreme temperature conditions. Extra set and cure times should be allowed when the temperature is below 4°C. When the temperature is above 38°C, the assembler should ensure that both surfaces to be joined are still wet with cement before joining them.

RECOMMENDED SET TIMES

After a joint is assembled using solvent cement, it should not be disturbed for a period of time to allow for proper “setting” of the newly prepared joint.
Recommended set times are shown in above Table “Solvent Cement Set Time”.

RECOMMENDED CURE TIMES

After a joint is assembled using solvent cement, the cement must be allowed to properly “cure” before the piping system is pressurized. Recommended minimum cure times are shown below. These recommendations should only serve as a guide since atmospheric conditions during installation will affect the curing process.

High humidity and/or colder weather will require longer cure times: typically add 50% to the recommended cure time if surroundings are humid or damp.

DO'S AND DON'TS

DO'S

- Install product according to the manufacturer's installation instructions and this manual.
- Follow recommended safe work practices.
- Follow proper handling procedures.
- Use tools designed for use with plastic pipe and fittings.
- Use proper solvent cement and follow application instructions.
- Cut pipe ends square. Deburr and bevel pipe before solvent cementing.
- Rotate the pipe 1/4 to 1/2 turn when bottoming pipe in fitting socket.
- Avoid puddling of solvent cement in fittings and pipe.
- Follow manufacturer's recommended cure times prior to pressure testing.
- Visually inspect all joints for proper cementing at end of the shift or day. A visual inspection of the complete system and all joints is also recommended during pressure testing.

DON'TS

- Do not use solvent cement that exceeds its shelf life or has become discoloured or gelled.
- Do not use solvent cement near sources of heat, open flame or when smoking.
- Follow proper handling procedures.
- Do not pressure test until recommended cure times are met.
- Do not use dull or broken cutting tool blades.

FLANGING OF PRINCE ONEFIT PIPE

Flanging can be used to provide temporary disassembly of a piping system or when it is not possible to make up solvent cemented joints at the assembly site.

Flanges are joined to the pipe by solvent cement or threaded joints. Refer to the sections on solvent cementing or threading of Corzan pipe for the proper techniques.

Flanged joints incorporate an elastomeric gasket between the mating faces to provide for a seal. The gasket selected must be full-faced and have a hardness of 55-80 durometer. The gasket material must be resistant to the chemical environment. Many manufacturers of gasketing materials supply this kind of information. If the piping system is for potable water service, the gasket must also be approved for potable water.

The flanges should be carefully aligned and the bolts inserted through matching holes. A flat washer should be used beneath each nut and bolt head.

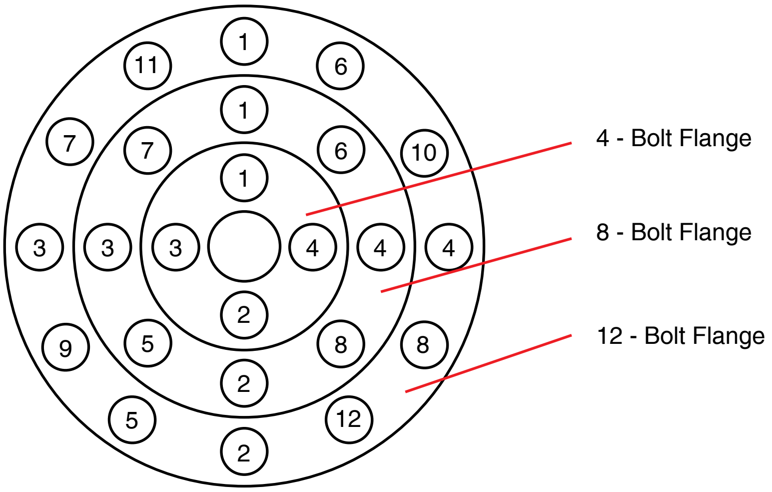
Each bolt should be partially tightened in the alternating sequence indicated in the patterns below. A torque wrench should be used for the final tightening of the bolts. The bolts should be tightened to the torque recommended in the table 22 below in the same alternating sequence used previously.

Flange joints are typically rated to 10 bar at 23°C.

Recommended Bolt Torque* (in mm)			
Nominal Pipe Size	Number of Bolt Holes	Bolt Nominal Diameter	Recommended Torque (Nm)
15-32	4	12	15-20
40-63	4	16	30-40
75-90	8	16	30-40
110-125	8	20	45-65
140-160	8	20	45-65
180-200	12	22	70-100
225	12	24	110-150

*Information given as guidelines only.

Flange Bolt Tightening Sequence



PRESSURE TESTING

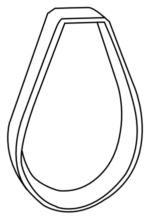
After the piping system is installed and any solvent cement is fully cured, the system should be pressure tested and checked for leaks using water. Testing using compressed air or inert gas is not recommended. All entrapped air should be allowed to vent as the system is filled with water. Water filling should occur at a velocity not more than 0,3 m/sec. After filling, the system should be pressured to 125% of the maximum design pressure of the lowest rated part of the system. Pressure should be held for no more than one hour while the system is checked for leaks.

HORIZONTAL PIPING HANGERS AND SUPPORTS

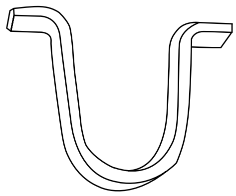
Prince Onefit Corzan CPVC should be supported per the hanger support spacing found in following tables. Piping should not be anchored tightly to supports, but rather secured with smooth straps or hangers that allow for movement caused by expansion and contraction.

Hangers should not have rough or sharp edges which come in contact with the pipe.

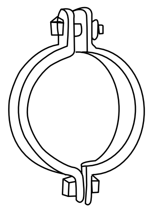
PIPE HANGERS, CLAMPS AND SUPPORTS



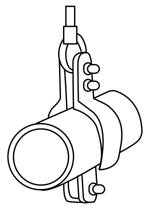
Band Hanger



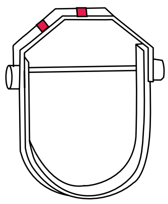
Anchor Strap



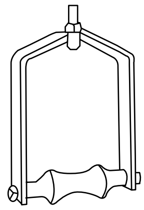
Pipe Clamp



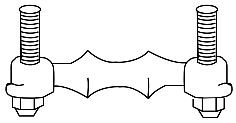
Pipe Clamp



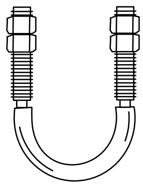
Clevis Hanger



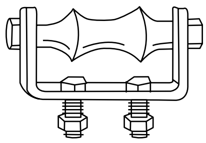
Roller Hanger



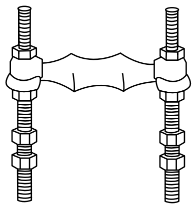
Roller Hanger



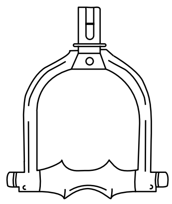
U-Bolt



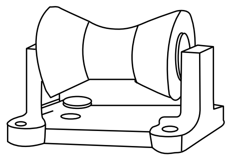
Roller Chair



Roller Hanger



Roller Hanger



Roller Stand

HORIZONTAL PIPING HANGERS AND SUPPORTS

Vertical runs of Prince Onefit pipe should be supported by pipe clamps or by hangers located on the horizontal connection close to the riser. Hangers and straps that do not distort, cut or abrade the piping should be utilized. Maintain vertical piping in straight alignment with supports at each level plus use a mid-story guide for pipe sizes 2" and smaller or as specified by the design engineer to allow for expansion/contraction.

ISO 15493 CORZON PIPE HORIZONTAL HANGER/SUPPORT SPACING (MM)								
Temp °C	≤ 20°C	30°C	40°C	50°C	60°C	70°C	80°C	90°C
16 mm	1.000	950	900	850	750	675	600	500
20 mm	1.150	1.100	1.025	950	875	775	700	600
25 mm	1.200	1.150	1.100	1.000	900	800	700	600
32 mm	1.350	1.250	1.200	1.100	1.00	900	800	700

*Chart based on spacing for continuous spans and for uninsulated lines conveying fluids of density 1 g/cm³ (water and other fluids of equal intensity).

PN 10 (ISO 15493) CORZAN PIPE HORIZONTAL HANGER/SUPPORT SPACING (MM)								
Temp °C	≤ 20°C	30°C	40°C	50°C	60°C	70°C	80°C	90°C
40 mm	1.500	1.400	1.300	1.250	1.150	1.050	900	800
50 mm	1.650	1.600	1.500	1.400	1.300	1.200	1.100	900
63 mm	1.850	1.750	1.650	1.600	1.500	1.350	1.250	1.050
75 mm	2.050	1.950	1.850	1.750	1.650	1.500	1.350	1.200
90 mm	2.250	2.100	2.000	1.900	1.800	1.650	1.500	1.300
110 mm	2.500	2.350	2.200	2.100	1.950	1.800	1.650	1.450
125 mm	2.650	2.500	2.350	2.250	2.100	1.950	1.750	1.550
140 mm	2.800	2.650	2.500	2.350	2.200	2.050	1.820	1.650
160 mm	3.000	2.850	2.700	2.550	2.400	2.200	2.000	1.750
180 mm	3.150	3.000	2.850	2.700	2.500	2.300	2.100	1.850
200 mm	3.350	3.150	3.000	2.850	2.650	2.450	2.200	1.950
225 mm	3.550	3.350	3.200	3.000	2.800	2.600	2.350	2.100
250 mm	3.750	3.550	3.350	3.150	3.000	2.750	2.500	2.200
280 mm	3.950	3.750	3.550	3.350	3.150	2.900	2.650	2.350
315 mm	4.200	4.000	3.750	3.550	3.350	3.050	2.800	2.450
355 mm	4.450	4.250	4.000	3.800	3.550	3.250	2.950	2.650
400 mm	4.750	4.500	4.250	4.000	3.750	3.450	3.150	2.800

*Chart based on spacing for continuous spans and for uninsulated lines conveying fluids of density 1 g/cm³ (water and other fluids of equal intensity).

Schedule 80 (Astm F441) Prince Onefit Pipe Horizontal Hanger/Support Spacing (Feet)															
Temp °F	1/2”	3/4”	1”	1 1/4”	1 1/2”	2”	2 1/2”	3”	4”	6”	8”	10”	12”	14”	16”
73	5 1/2	5 1/2	6	6 1/2	7	7	8	8	9	10	11	11 1/2	12 1/2	15	16
100	5	5-1/2	6	6	6-1/2	7	7 1/2	8	9	9 1/2	10 1/2	11	12 1/2	13 1/2	15
120	4 1/2	5	5 1/2	6	6	6 1/2	7 1/2	7 1/2	8 1/2	9	10	10 1/2	11	12 1/2	13 1/2
140	4 1/2	4 1/2	5	5 1/2	5 1/2	6	6 1/2	7	7 1/2	8	9	9 1/2	10 1/2	11	12
160	3	3	3 1/2	3 1/2	3 1/2	4	4 1/2	4 1/2	5	5 1/2	6	6 1/2	7 1/2	9 1/2	10
180	2 1/2	2 1/2	3	3	3 1/2	3 1/2	4	4	4 1/2	5	5 1/2	6	6 1/2	8	8 1/2

*Chart based on spacing for continuous spans and for uninsulated lines conveying fluids of specific gravity up to 1.0. For specific gravities greater than 1.0, the support spacing from the table provided should be multiplied by the following correction factors.

Specific Gravity	1.0	1.1	1.2	1.4	1.6	2.0	2.5
Correction Fator	1.00	0.98	0.96	0.93	0.90	0.85	0.80

Schedule 40 Prince Onefit Pipe Horizontal Hanger/Support Spacing (Feet)															
Temp °F	1/2”	3/4”	1”	1 1/4”	1 1/2”	2”	2 1/2”	3”	4”	6”	8”	10”	12”	14”	16”
73	5 1/2	5 1/2	6	6 1/2	7	7	8	8	9	10	11	11 1/2	12 1/2	15	16
100	5	5-1/2	6	6	6-1/2	7	7 1/2	8	9	9 1/2	10 1/2	11	12 1/2	13 1/2	15
120	4 1/2	5	5 1/2	6	6	6 1/2	7 1/2	7 1/2	8 1/2	9	10	10 1/2	11	12 1/2	13 1/2
140	4 1/2	4 1/2	5	5 1/2	5 1/2	6	6 1/2	7	7 1/2	8	9	9 1/2	10 1/2	11	12
160	3	3	3 1/2	3 1/2	3 1/2	4	4 1/2	4 1/2	5	5 1/2	6	6 1/2	7 1/2	9 1/2	10
180	2 1/2	2 1/2	3	3	3 1/2	3 1/2	4	4	4 1/2	5	5 1/2	6	6 1/2	8	8 1/2

*Chart based on spacing for continuous spans and for uninsulated lines conveying fluids of specific gravity up to 1.0. For specific gravities greater than 1.0, the support spacing from the table provided should be multiplied by the following correction factors:

Specific Gravity	1.0	1.1	1.2	1.4	1.6	2.0	2.5
Correction Fator	1.00	0.98	0.96	0.93	0.90	0.85	0.80

THERMAL CONDUCTIVITY OF PRINCE ONEFIT CPVC

Corzan CPVC has a very low thermal conductivity value. A prudent practice to ensure worker safety is to insulate pipes which have exterior surface temperatures greater than 60°C. Because metal pipes have such a high thermal conductivity, the exterior surface temperature is approximately equal to the temperature of the fluid being conveyed. Therefore, pipes carrying fluids at temperatures of 60°C or more should be insulated if there is the possibility of worker contact. This generates more cost in the initial installation of a system and makes periodic inspections of the pipe more difficult.

Because CPVC has a much lower thermal conductivity, the surface temperature of CPVC pipe is significantly lower than the internal fluid temperature. Insulation is therefore often not needed on Corzan pipe. Figure 7 shows the approximate pipe surface temperature as a function of internal fluid temperature for a piping system and with 23°C (73°F) air circulating at 0,23 m per second. This figure is intended to demonstrate the significant difference between steel and CPVC pipe, but should not be used for system design. The actual surface temperature of pipe in a working system is dependent on many factors, including ambient temperature, air circulation velocity and direction, etc.

CPVC’s low thermal conductivity also means that energy in the process stream is conserved. The rate of heat transfer through CPVC piping is typically 50-60% that of steel piping.

Thermal conductivity comparison:	
Material	Thermal Conductivity - w/ mK
Insulation	0.04
CPVC	0.14 – 0.15
Steel	36-54
Copper	401

VALVES FOR USE WITH CPVC

A variety of valves are available for use with CPVC pipe. Valves made from Prince Onefit CPVC are utilized in many applications. Various connection methods (Solvent cement, threaded, flanged, etc.) can be utilized to transition from the pipe to the valve.

TRANSITION TO OTHER MATERIALS

Support: Additional support should be added at the metal side of a Prince Onefit CPVC to metal transition to support the weight of the metal system.

Threaded Connections: Numerous male and female transition fittings are available. Temperature and pressure limitations should comply with the recommendation of the manufacturer of the fitting. Care should be used not to over-torque CPVC threaded fittings.

Thread Sealants: TFE (Teflon®) thread tape is always safe for making CPVC threaded connections. Some paste-type sealants contain solvents that may be damaging to CPVC. If the use of a paste or pipe dope is preferred, only thread sealants that are included in the FGG/ BM® System Compatible Program should be used.Use of an improper paste or dope can result in failure of CPVC systems.

Flanged Connections: Flanging can be used to connection to valves, other devices, or to other materials. Refer to the Flanging of Prince Onefit Pipe section of this manual for additional flanging recommendations.

Painting: Water-based acrylic latex paint is the preferred and recommended paint to use on Prince Onefit pipe and fittings. Oil or solvent-based paints may be chemically incompatible. Priming of the piping is not necessary prior to painting.

Freeze Issues: CPVC is a ductile material, which expands and contracts more than metallic plumbing pipe. However, CPVC, like all other piping materials, needs to be protected from freezing. If water filled CPVC pipe becomes frozen, immediate action should be taken to eliminate the source of air causing the freeze condition. Then thaw the water line, if possible. When thawing a frozen CPVC water line, it is important to remember to limit the heat source to 180°F or less. If the frozen section of pipe is accessible, heated air can be blown directly onto the freeze area by using a low wattage heater/blower. A second option is to apply electrical heat tapes to the problem area.

Heat Tracing: It is acceptable to heat trace Prince Onefit CPVC pipe and fittings provided the temperature of the heat tracing material does not exceed 180°F. Steam heat tracing is not recommended. Chemical compatibility of the heat tracing material with CPVC should be confirmed.

System Stress: Any metal or non-metal piping system is subject to stress-induced corrosion. As a result, special attention should be given to minimizing stress throughout the system. The total stress on a piping system includes not only the known pressure stress, but also stresses from sources such as expansion or installation. Expansion stresses can be minimized with expansion joints or loops. Installational stresses are minimized with careful installation techniques. (See the Thermal Expansion and Contraction section of this manual for additional recommendations.) Pipe and fittings should be properly prepared when joints are made up. Hangers and supports should be properly spaced to prevent sagging and should not cut into the pipe or clamp it tightly, preventing movement. System components should not be forced into place.

PIPES DIMENSIONS AND WORKING PRESSURE

SCH 40

Nominal Pipe Size		Outside Diameter				Average Inside Diameter		Minimum Wall Thick-ness		Maximum Water Pressure	
inch	mm	inch		mm		inch	mm	inch	mm	KG/CM2	(PSI)
										@23°C	@73°F
1/2	15	0.84	±0.004	21.3	±0.10	0.602	15.25	0.109	2.77	42.18	600
3/4	20	1.05	±0.004	26.7	±0.10	0.804	20.45	0.113	2.87	33.75	480
1	25	1.315	±0.005	33.4	±0.13	1.029	26.13	0.133	3.38	31.64	450
1 1/4	32	1.66	±0.005	42.2	±0.13	1.36	34.57	0.14	3.56	26.01	370
1 1/2	40	1.9	±0.006	48.3	±0.15	1.59	40.43	0.145	3.68	23.2	330
2	50	2.375	±0.006	60.3	±0.15	2.047	51.97	0.154	3.91	19.69	280
2 1/2	65	2.875	±0.007	73	±0.18	2.445	62.07	0.203	5.16	21.09	300
3	80	3.5	±0.007	88.9	±0.18	3.042	77.26	0.216	5.49	18.28	260
4	100	4.5	±0.008	114.3	±0.20	3.998	101.55	0.237	6.02	15.47	220
6	150	6.625	±0.011	168.3	±0.28	6.031	153.2	0.28	7.11	12.66	180
8	200	8.625	±0.015	219.1	±0.38	7.942	201.75	0.322	8.18	11.25	160
10	250	10.75	±0.015	273.1	±0.38	9.976	253.44	0.365	9.27	9.84	140
12	300	12.75	±0.015	323.9	±0.38	11.889	302.04	0.406	10.31	9.14	130

SCH 80

Nominal Pipe Size		Outside Diameter				Average Inside Diameter		Minimum Wall Thick-ness		Maximum Water Pressure	
inch	mm	inch		mm		inch	mm	inch	mm	KG/CM2	(PSI)
										@23°C	@73°F
1/2	15	0.84	±0.004	21.3	±0.10	0.526	13.33	0.147	3.73	59.76	850
3/4	20	1.05	±0.004	26.7	±0.10	0.722	18.37	0.154	3.91	48.51	690
1	25	1.315	±0.005	33.4	±0.13	0.936	23.77	0.179	4.55	44.29	630
1 1/4	32	1.66	±0.005	42.2	±0.13	1.255	31.92	0.191	4.85	36.56	520
1 1/2	40	1.9	±0.006	48.3	±0.15	1.476	37.53	0.2	5.08	33.04	470
2	50	2.375	±0.006	60.3	±0.15	1.913	48.56	0.218	5.54	28.12	400
2 1/2	65	2.875	±0.007	73	±0.18	2.29	58.14	0.276	7.01	29.53	420
3	80	3.5	±0.007	88.9	±0.18	2.864	72.75	0.3	7.62	26.01	370
4	100	4.5	±0.008	114.3	±0.20	3.786	96.16	0.337	8.56	22.5	320
6	150	6.625	±0.011	168.3	±0.28	5.709	145.02	0.432	10.97	19.69	280
8	200	8.625	±0.015	219.1	±0.38	7.565	192.18	0.5	12.7	17.58	250
10	250	10.75	±0.015	273.1	±0.38	9.493	241.18	0.593	15.06	16.17	230
12	300	12.75	±0.015	323.9	±0.38	11.294	286.92	0.687	17.45	16.17	230

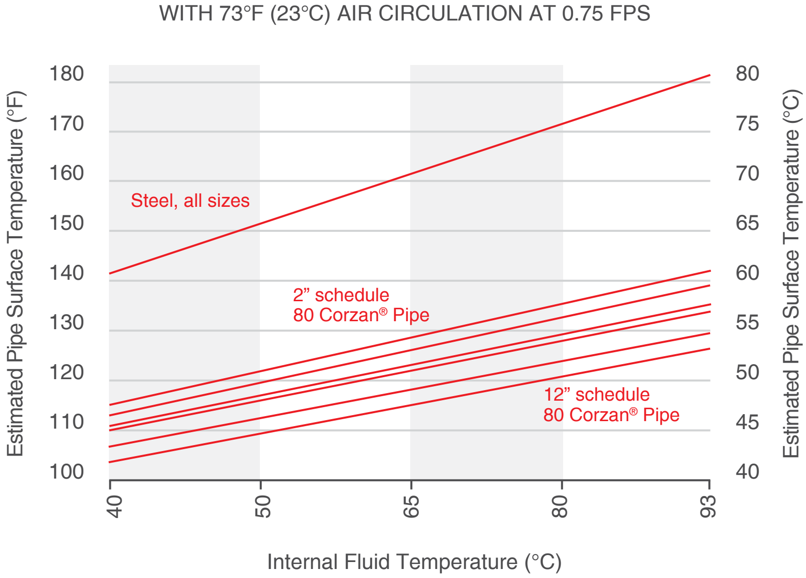
Mpa = Mega Pascal 1 Mpa = 10.19 kg/cm2 1 kg/cm2 = 14.2233343 PSI.

*Pressure rating applies for water at 23°C. For temperatures greater than 23°C see derating factors.
For fluids other than water the full pressure rating may not apply; see chemical resistance table.
**Schedule 40 pipe or Schedule 80 pipe 6” or larger should never be threaded. Schedule 80 pipe operating above 65°C should not be threaded. Use flanged joints, unions, or victaulic couplings where occasional disassembly is necessary.

QUALITY THAT SETS APART

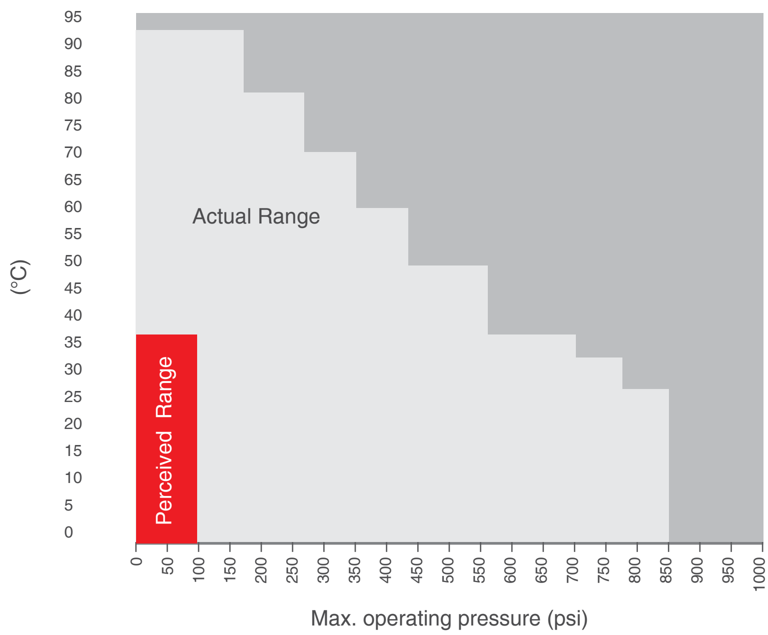
THERMAL CONDUCTIVITY

CPVC has very low thermal conductivity value. The heat transfer coefficient of Prince Onefit with Corzan® CPVC technology is approximately 1/300th that of steel, saving energy costs and offering a much cooler surface temperature. Not only does it reduce the need of costly insulation, it limits worker exposure to burn hazards.



PRINCE ONEFIT ACTUAL USABLE RANGE V/S PERCEIVED USABLE RANGE

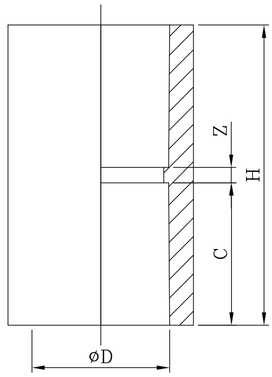
In the diagram is Prince Onefit with Corzan® CPVC technology's maximum operating temperature and pressure range as determined by ASTM D2837. The red area is what most engineer's perceive CPVC's capabilities to be. The light grey is Prince Onefit CPVC's full operating range.



FITTINGS DIMENSIONS

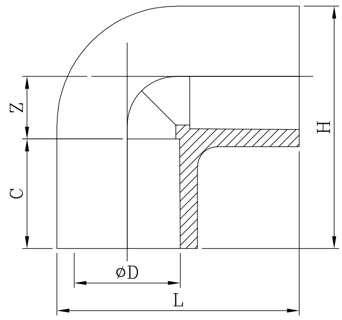
COUPLER
(SDR 80)

Size (mm)	Size (inch)	ØD	C	Z	H
15mm	1/2	21.34	22.25	2.4	46.9
20mm	3/4	26.67	25.4	2.4	53.2
25mm	1	33.4	28.6	2.4	59.6
32mm	1 1/4	42.16	31.75	2.4	65.9
40mm	1 1/2	48.26	34.95	2.4	72.3
50mm	2	60.32	38.1	2.4	78.6
65mm	2 1/2	73.02	44.45	4.8	93.7
80mm	3	89.9	47.65	4.8	100.1
100mm	4	114.3	57.15	4.8	100.1
200mm	8	219.1	95	30	220



ELBOW
(SDR 80)

Size (mm)	Size (inch)	ØD	C	Z	H	L
15mm	1/2	21.34	22.25	12.7	50.3	49.5
20mm	3/4	26.67	25.4	14.3	57.9	57.1
25mm	1	33.4	28.6	17.45	67.45	67.45
32mm	1 1/4	42.16	31.75	22.2	80	80
40mm	1 1/2	48.26	34.95	25.4	89.7	89.7
50mm	2	60.32	38.1	31.75	105.75	105.75
65mm	2 1/2	73.02	44.45	38.1	126.25	125.25
80mm	3	89.9	47.65	46.05	145.95	145.95
100mm	4	114.3	57.15	58.75	181.85	181.85
200mm	8	219.1	102.5	127.5	353.3	353.5

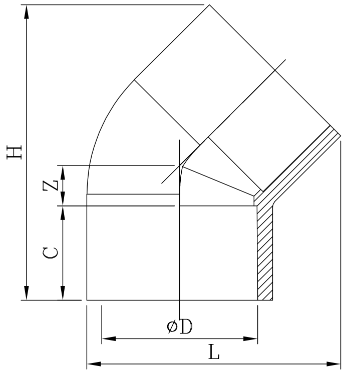


New Product
Upcoming Product

ELBOW 45°

(SDR 80)

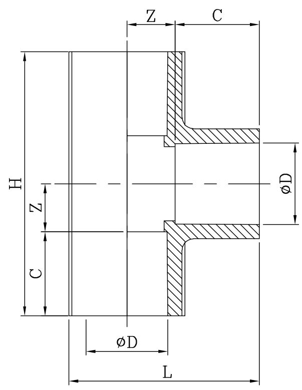
Size (mm)	Size (inch)	ØD	C	Z	H	L
15mm	1/2	21.34	22.25	6.4	59.2	45.05
20mm	3/4	26.67	25.4	8	69.3	53.3
25mm	1	33.4	28.6	8	77.6	62.35
32mm	1 1/4	42.16	31.75	9.7	89.2	73.8
40mm	1 1/2	48.26	34.95	11.2	99.55	82.8
50mm	2	60.32	38.1	16	117.7	99.5
65mm	2 1/2	73.02	47.45	18.35	142.8	121.2
80mm	3	89.9	50.65	21.85	160.2	140.5
100mm	4	114.3	60.15	27.55	195.9	174.4



EQUAL TEE

(SDR 80)

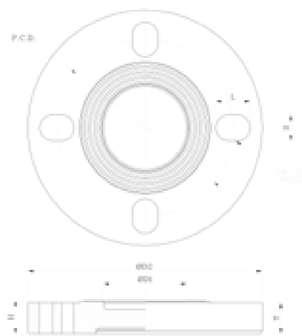
Size (mm)	Size (inch)	ØD	C	Z	H	L
15mm	1/2	21.34	22.25	12.7	69.9	50.25
20mm	3/4	26.67	25.4	14.3	79.4	57.9
25mm	1	33.4	28.6	17.5	92.2	68.3
32mm	1 1/4	42.16	31.75	22.4	108.3	80.2
40mm	1 1/2	48.26	34.95	25.4	120.7	89.7
50mm	2	60.32	38.1	31.75	139.7	105.75
65mm	2 1/2	73.02	44.45	38.1	165.1	126.25
80mm	3	89.9	47.65	46.05	187.4	145.95
100mm	4	114.3	57.15	58.75	231.8	181.85



BLIND FLANGE

(SDR 80)

Size (mm)	Size (inch)	øD1	øD2	H	P.C.D	No. of Hole	L x S	T
65mm	2 1/2	62.75	177	24.75	133	4	26 x 19.50	23
100mm	4	102.5	227	29	183	8	25 x 19	27.5



Upcoming Product

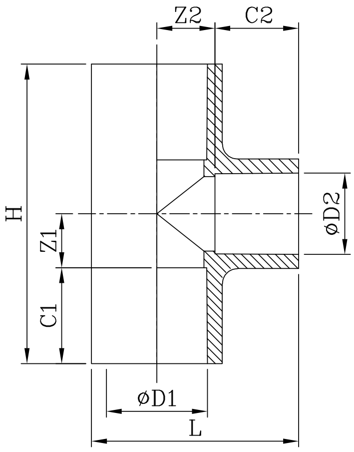
New Product

SUPER RESISTANCE TO CORROSIVE CHEMICALS, HIGH TEMPERATURE AT ELEVATED PRESSURES

REDUCING TEE

(SDR 80)

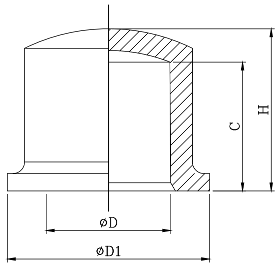
Size (mm)	Size (inch)	ØD1	ØD2	C1	C2	Z1	Z2	H	L
20mm x 15mm	3/4 x 1/2	26.67	21.34	27.4	24.2	15.6	18.8	86	60.8
25mm x 15mm	1 x 1/2	33.4	21.34	30.6	24.2	18	21.2	97.2	70.6
25mm x 20mm	1 x 3/4	33.4	26.67	30.6	27.4	18	29.8	97.2	70.6
32mm x 15mm	1 1/4 x 1/2	42.16	21.34	34.75	24.2	23	26.6	115.5	81
32mm x 20mm	1 1/4 x 3/4	42.16	26.67	34.75	27.4	23	23.4	115.5	81
32mm x 25mm	1 1/4 x 1	48.26	33.4	34.75	30.6	23	33.8	115.5	81
40mm x 15mm	1 1/2 x 1/2	48.26	21.34	37.95	24.2	26	30.6	127.9	88
40mm x 20mm	1 1/2 x 3/4	48.26	26.67	37.95	27.4	26	27.4	127.9	88
40mm x 25mm	1 1/2 x 1	48.26	33.4	37.95	30.6	26	25.3	127.9	88
40mm x 32mm	1 1/2 x 1 1/4	60.32	42.16	37.95	34.75	26	38.8	127.9	90
50mm x 15mm	2 x 1/2	60.32	21.34	41.1	24.2	32	35.6	146.2	99.5
50mm x 20mm	2 x 3/4	60.32	26.67	41.1	27.4	32	32.4	146.2	99.5
50mm x 25mm	2 x 1	60.32	33.4	41.1	30.6	32	27.8	146.2	99.5
50mm x 32mm	2 x 1 1/4	60.32	42.16	41.1	34.75	32	31.1	146.2	102
50mm x 40mm	2 x 1 1/2	60.32	48.26	41.1	37.95	32	39.6	146.2	105.5
65mm x 50mm	2 1/2 x 2	73.02	60.32	47.45	41.1	39.6	47	174.1	131.3
80mm x 50mm	3 x 2	89.9	60.32	50.65	42	31.9	47	165.1	141.8
80mm x 65mm	3 x 2 1/2	89.9	73.02	50.65	47.45	48.4	48.4	198.1	151.8
100mm x 50mm	4 x 2	114.3	60.32	60.15	41.1	33.4	60.9	187.1	168.5
100mm x 65mm	4 x 2 1/2	114.3	73.02	60.15	47.45	41.4	60.6	203.1	174.5
100mm x 80mm	4 x 3	114.3	89.9	60.15	50.65	61.9	61.9	244.1	188.5



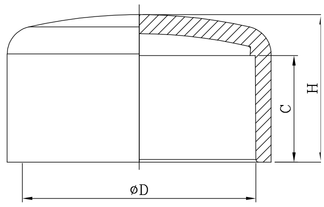
Upcoming Product | New Product

END CAP

Size (mm)	Size (inch)	øD	øD1	C	H	Figuer
15mm	1/2	21.34	35	22.25	28	A
20mm	3/4	26.67	41	25.4	32	A
25mm	1	33.4	49	28.6	37	A
32mm	1 1/4	42.16	58.1	31.75	41	A
40mm	1 1/2	48.26	64.75	34.95	45	A
50mm	2	60.32	77.75	38.1	50	A
65mm	2 1/2	73.02	91.6	44.45	55	A
80mm	3	89.9	108.1	47.65	60	A
100mm	4	114.3	136.65	57.15	71	A
150mm	6	168.3	-	80	110	B
200mm	8	219.1	-	95	125	B



Figuer A

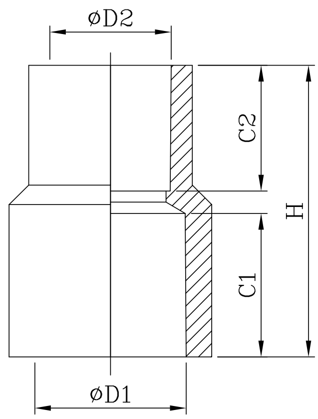


Figuer B

REDUCER

(SDR 80)

Size (mm)	Size (inch)	ØD1	ØD2	C1	C2	H
20mm x 15mm	3/4 x 1/2	26.67	21.34	28.5	24.2	60
25mm x 15mm	1 x 1/2	33.4	21.34	31.5	24.2	66
25mm x 20mm	1 x 3/4	33.4	26.67	31.5	27.4	67.5
32mm x 15mm	1 1/4 x 1/2	42.16	21.34	34.75	24.2	70
32mm x 20mm	1 1/4 x 3/4	42.16	26.67	34.75	27.4	73
32mm x 25mm	1 1/4 x 1	42.16	33.4	34.75	30.6	76.5
40mm x 15mm	1 1/2 x 1/2	48.26	21.34	37.95	24.2	78
40mm x 20mm	1 1/2 x 3/4	48.26	26.67	37.95	27.4	80
40mm x 25mm	1 1/2 x 1	48.26	33.4	37.95	30.6	82
40mm x 32mm	1 1/2 x 1 1/4	48.26	42.16	37.95	34.75	82.5
50mm x 15mm	2 x 1/2	60.32	21.34	41.1	24.2	85
50mm x 20mm	2 x 3/4	60.32	26.67	41.1	27.4	88
50mm x 25mm	2 x 1	60.32	33.4	41.1	30.6	91.5
50mm x 32mm	2 x 1 1/4	60.32	42.16	41.1	34.75	92
50mm x 40mm	2 x 1 1/2	73.02	48.26	41.1	37.95	92.5
65mm x 50mm	2 1/2 x 2	89.9	60.32	48	41.1	103
80mm x 50mm	3 x 1 1/2	89.9	48.26	50.65	37.95	116.5
80mm x 65mm	3 x 2	89.9	60.32	50.65	41.1	114
80mm x 65mm	3 x 2 1/2	89.9	73.02	50.65	47.45	113.5
100mm x 50mm	4 x 2	114.3	60.32	60.15	41.1	136
100mm x 65mm	4 x 2 1/2	114.3	73.02	60.15	47.45	136
100mm x 80mm	4 x 3	114.3	89.9	60.15	50.65	131



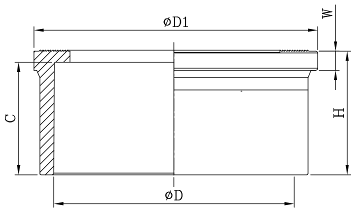
New Product

Upcoming Product

ADAPTOR FOR VAN STONE FLANGE

(SDR 80)

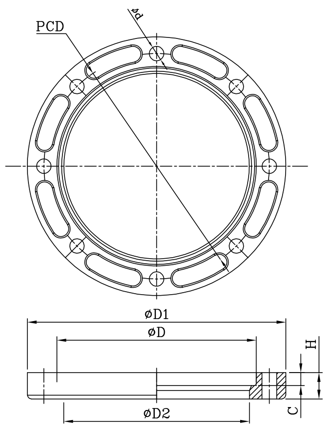
Size (mm)	Size inch)	øD	øD1	C	W	H
25mm	1	33.4	56	30.6	10.5	34.5
32mm	1 1/2	48.26	73	37.95	10.5	43
40mm	2	60.32	89	41.1	12	46.5
50mm	2 1/2	73.02	108	47.45	16	53
65mm	3	89.9	120	50.65	14	62.5
80mm	4	114.3	147	60.15	16	68.5
100mm	6	168.3	203.5	79.2	20	90.2
200mm	8	218.1	262.5	102	19	112



FLANGE FOR VAN STONE

(SDR 80)

Size (mm)	Size (inch)	ØD	ØD1	ØD2	C	H	P.C.D	Ød	No. of Hole
25mm	1	56.5	108	44	9	15	79.4	16	4
32mm	1 1/2	74.5	127	62	9	18	98.4	16	4
40mm	2	89.5	152.5	74	10.5	20	120.7	18	4
50mm	2 1/2	108	178	88.5	14.5	24	139.7	18	4
65mm	3	121	191	107	10	26	152.4	18	4
80mm	4	150.5	228	133.5	11	28	190.5	18	8
100mm	6	206.5	279	191	13	32	241.3	22	8
200mm	8	263.5	345	247.5	15	35	298.5	22	8



UNION

(SDR 80)

Size (mm)	Size (inch)	ØD	C	ØH	L	Figure
15mm	1/2	21.34	22.25	48.7	59.25	A
20mm	3/4	26.67	25.4	53.9	66.5	A
25mm	1	33.4	28.6	63.8	72.1	A
32mm	1 1/4	42.16	31.75	73.7	79.85	A
40mm	1 1/2	48.26	35	86.9	92.9	B
50mm	2	60.32	38.1	103.8	107.3	B

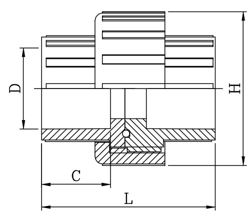


Figure-A

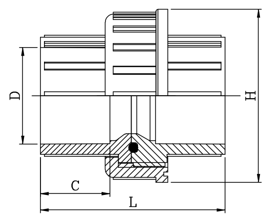


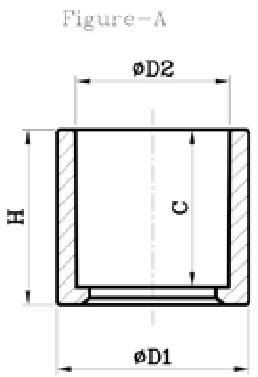
Figure-B

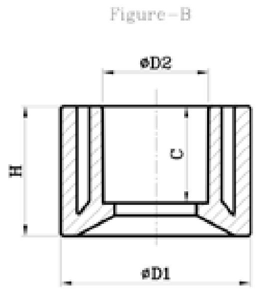
New Product
Upcoming Product

Reducing Bush

(SDR 80)

Size (mm)	Size (inch)	ØD1	ØD2	C	H	Figure
20mm x 15mm	3/4 x 1/2	26.67	21.34	24.2	27.4	Figure A
25mm x 15mm	1 x 1/2	33.4	21.34	24.2	30.6	Figure A
25mm x 20mm	1 x 3/4	33.4	26.67	27.4	30.6	Figure A
32mm x 15mm	1 1/4 x 1/2	42.16	21.34	24.2	34.75	Figure B
32mm x 20mm	1 1/4 x 3/4	42.16	26.67	27.4	34.75	Figure A
32mm x 25mm	1 1/4 x 1	42.16	33.4	30.3	34.75	Figure A
40mm x 15mm	1 1/2 x 1/2	48.26	21.34	24.2	37.95	Figure B
40mm x 20mm	1 1/2 x 3/4	48.26	26.67	27.4	37.95	Figure B
40mm x 25mm	1 1/2 x 1	48.26	33.4	30.6	37.95	Figure A
40mm x 32mm	1 1/2 x 1 1/4	48.26	42.16	34.75	37.95	Figure A
50mm x 15mm	2 x 1/2	60.32	21.34	24.2	41.1	Figure B
50mm x 20mm	2 x 3/4	60.32	26.67	27.4	41.1	Figure B
50mm x 25mm	2 x 1	60.32	33.4	30.6	41.1	Figure B
50mm x 32mm	2 x 1 1/4	60.32	42.16	34.75	41.1	Figure A
50mm x 40mm	2 x 1 1/2	60.32	48.26	37.95	41.1	Figure A
65mm x 32mm	2 1/2 x 1 1/4	73.02	42.16	34.75	47.45	Figure B
65mm x 40mm	2 1/2 x 1 1/2	73.02	48.26	37.95	47.45	Figure B
65mm x 50mm	2 1/2 x 2	73.02	60.32	41.1	47.45	Figure A
80mm x 50mm	3 x 2	89.9	60.32	41.1	50.65	Figure B
80mm x 65mm	3 x 2 1/2	89.9	73.02	47.45	50.65	Figure A
100mm x 50mm	4 x 2	114.3	60.32	41.1	60.15	Figure B
100mm x 65mm	4 x 2 1/2	114.3	73.02	47.45	60.15	Figure B
100mm x 80mm	4 x 3	114.3	89.9	50.65	60.15	Figure A
150mm x 80mm	6 x 3	168.3	89.9	50.65	79.2	Figure B
150mm x 100mm	6 x 4	168.3	114.3	60.15	79.2	Figure B

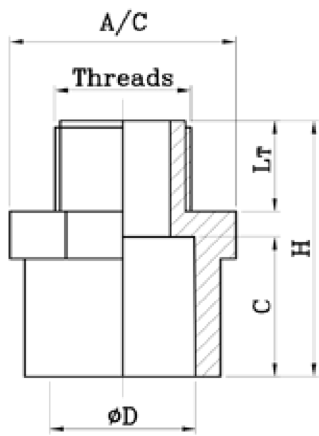




MALE THREADED ADAPTER

(SDR 80)

Size (mm)	Size (inch)	ØD	C	Threads	L_T	H	A/C
15mm	1/2	21.34	22.25	1/2 (14 TPI)	13.5	39.5	33.25
20mm	3/4	26.67	25.4	3/4 (14 TPI)	13	45.35	39.8
25mm	1	33.4	28.6	1 (11 TPI)	19	52.15	49.35
32mm	1 1/4	42.16	31.75	1 1/4 (BSPT)	19.1	60.25	-
40mm	1 1/2	48.26	34.95	1 1/2 (BSPT)	22.4	66.65	-
50mm	2	60.32	38.1	2 (BSPT)	23.2	72.1	-



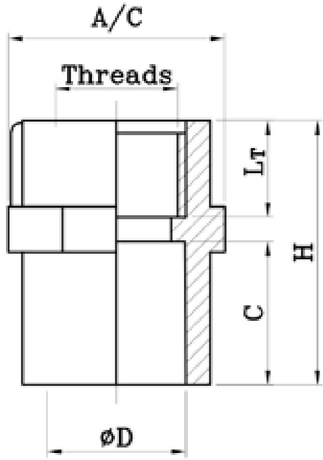
Upcoming Product
New Product

SUPER RESISTANCE TO CORROSIVE CHEMICALS, HIGH TEMPERATURE AT ELEVATED PRESSURES

FEMALE THREADED ADAPTER

(SDR 80)

Size (mm)	Size (inch)	ØD	C	Threads	LT	H	A/C
15mm	1/2	21.34	22.25	1/2 (14 TPI)	15	41	33.55
20mm	3/4	26.67	25.4	3/4 (14 TPI)	16	45.65	39.85
25mm	1	33.4	28.6	1 (11 TPI)	21.4	53	49.35
32mm	1 1/4	42.16	31.75	1 1/4 (11 TPI)	23.7	58.5	60.15
40mm	1 1/2	48.26	34.95	1 1/2 (11 TPI)	23.7	62	66.8
50mm	2	60.32	38.1	2 (11 TPI)	28	69.5	82.85



COMPARISON OF PRINCE ONEFIT WITH CORZAN® CPVC TECHNOLOGY V/S MSRL

S No.	Factor	MSRL	Prince Onefit
1	External Corrosion	It corrodes when comes in contact with acid fumes or even in normal atmospheric Condition.	Prince Onefit is resistant to acid fumes & even very harsh atmospheric conditions.
	Internal Corrosion	Rubber lining is inconsistent both in terms of rubber quality & workmanship. It results in localised corrosion which leads to leakage.	Prince Onefit has excellent chemical resistance to all mineral acids and bases.
2	Failure Detection	As a consequence of above, it's very difficult to predict the spread of corrosion.	Prince Onefit is impervious to both galvanic as well as chemical attack.
3	Jointing method	Flanged joints using bolts	Socket joints which helps in reducing the overall installation cost. Also it reduces the chances of failure of flange gaskets minimising overall downtime
4	Friction Loss	Rubber lined surface is very rough, hence high friction losses.	Very smooth internal surface results in minimum friction losses.
5	Biological Growth	Due to rough internal surface there is biological growth.	Prince Onefit has a smooth bore making it resistant to all kinds of bacterial growth.
6	Maintenance	Due to poor corrosion resistance frequent changing of pipes is required.	Superior resistance to most corrosive chemicals and also no scaling makes the system maintenance free.
7	Service Life	Very Less as compared to Prince Onefit	Prince Onefit has high life compared to MSRL

New Product
Upcoming Product

COMPARISON OF PRINCE ONEFIT WITH CORZAN® CPVC TECHNOLOGY V/S HDPE

S No.	Factor	HDPE	Prince Onefit
1	Physical poperties a) Specific gravity b) Tensile strength [PSO@26°C] c) Flexural Strength [PSI] d) Co-efficient of Thermal expansion [in./in/°F X 105] e) Thermal conductivity [BTU.hr/ft2 /°F/in]	0.95 g/cm3 3300 psi 3000 psi 7.8 in/in/°F 7.0 BTU in/hr/ft2/°F	1.52 g/cm3 7900 psi 13000 psi 3.8 in/in/°F 0.95 BTU in/hr/ft2/°F
2	Fire Properties	HDPE supports combustion.	It does not support combustion.
3	Support Structure	Supports have to be provided at frequent intervals or it has to be supported throughout by using cable trays.	Fewer supports are required in comparison with HDPE.
4	Service Temperature	Its not recommended to be used for temperature above 55 °C.	It is recommended for 93 °C for continuous operation.
5	Jointing Method	A) Its joined by butt-welding process which need special equipment & high skill. B) Butt welded joints form an internal protrusion which prevents smooth flow & hence higher friction losses. Also internal protrusion erodes with time and contaminates the fluid.	A) Joined by solvent cementing which requires no special tools and does not need high skill level. B) These joints do not pose such problems
6	Service Life	Very Less as compared to Prince Onefit	Prince Onefit has high life compared to HDPE

CHEMICAL RESISTANCE CHART

Chemical	Ambient Temp (23°C / 73°F)	Maximum Temp (°C / °F)
Acid	R	-
Carbon Dioxide	R2	93° C (200° F)
Carbon Disulfide	N	N
Carbon Monoxide	R2	93° C (200° F)
Carbon Tetrachloride	N	N
Carbonic Acid	R	93° C (200° F)
Castor Oil	E	82° C (E-180° F)
*Caustic Potash	R	82° C (180° F)
*Caustic Soda	R	82° C (180° F)
Cellosolve™, all types	N	N
Chloramine, aqueous	R	82° C (180° F)
Chloric Acid	R	82° C (180° F)
Chlorinated Water, (Hypo-chlorite)	R	93° C (200° F)
Chlorine, aqueous	S	S-82° C (180° F)
Chlorine, dry gas	S2	S
Chlorine, liquid	N	N
Chlorine, trace in air	R2	93° C (200° F)
Chlorine, wet gas	S2	S
Chlorine Dioxide, aqueous, sat'd	S	S-82° C (180° F)
Chloroacetic Acid	N	N
Chlorobenzene	N	N
Chloroform	N	N
Chromic Acid, 40% (Conc.)	R	82° C (180° F)
Chromium Nitrate	R	93° C (200° F)
Citric Acid	R	93° C (200° F)
Citrus Oils	N	N
Coconut Oil	E	82° C (E-180° F)
Coffee	-	-
Copper Acetate	R	93° C (200° F)
Copper Carbonate	R	93° C (200° F)
Copper Chloride	R	93° C (200° F)
Copper Cyanide	R	93° C (200° F)
Copper Fluoride	R	93° C (200° F)
Copper Nitrate	R	93° C (200° F)
Copper Sulfate	R	93° C (200° F)
Corn Oil	E	82° C (E-180° F)
Corn Syrup	R	93° C (200° F)
Cottonseed Oil	E	82° C (E-180° F)
Creosote	N	N
Cresol	N	N
Crotonaldehyde	N	N
Cumene	N	N
Cyclohexane	R	-

Chemical	Ambient Temp (23°C / 73°F)	Maximum Temp (°C / °F)
Cyclohexanol	E	-
Cyclohexanone	N	N
Decahydronaphthalene	R	-
Detergents	E	82° C (E-180° F)
Dextrin	R	93° C (200° F)
Dextrose	R	93° C (200° F)
Diacetone Alcohol	N	N
Dibutoxyethyl Phthalate	N	N
Dibutyl Phthalate	N	N
Dibutyl Ether	N	N
Dibutyl Sebacate	N	N
Dichlorobenzene	N	N
Dichloroethylene	N	N
Diesel Fuel	E	82° C (E-180° F)
Diethylamine	N	N
Diethyl Ether	N	N
Diglycolic Acid	R	R
Dill Oil	N	N
Dimethyl Hydrazine	N	N
Dimethyl Phthalate	N	N
Dimethylamine	N	N
Dimethylformamide	N	N
Dioctyl phthalate	N	N
Dioxane	N	N
Disodium Phosphate	R	93° C (200° F)
Distilled Water	R	93° C (200° F)
EDTA, Tetrasodium-	R	93° C (200° F)
Ethanol, up to 5%	R	82° C (180° F)
Ethanol, greater than 5%	E	82° C (E-180° F)
Ethanol, pure	E	82° C (E-180° F)
Ethyl Acetate	N	N
Ethyl Acetoacetate	N	N
Ethyl Acrylate	N	N
Ethyl Benzene	N	N
Ethyl Chloride	N	N
Ethyl Chloroacetate	N	N
Ethyl Ether	N	N
Ethyl Formate	N	N
Ethyl Mercaptan	N	N
Ethyl Oxalate	N	N
Ethylene Bromide	N	N
Ethylene Chloride	N	N
Ethylene Chlorohydrin	N	N
Ethylene Diamine	N	N
Ethylene Glycol, up to 50%	R	82° C (180° F)

CHEMICAL RESISTANCE CHART

Chemical	Ambient Temp (23°C / 73°F)	Maximum Temp (°C / °F)
Ethylene Glycol, greater than 50%	E	82° C (E-180° F)
Ethylene Oxide	N	N
2-Ethylhexanol	E	82° C (E-180° F)
Fatty Acids	E	82° C (E-180° F)
Ferric Chloride	R	93° C (200° F)
Ferric Hydroxide	R	93° C (200° F)
Ferric Nitrate	R	93° C (200° F)
Ferric Sulfate	R	93° C (200° F)
Ferrous Chloride	R	93° C (200° F)
Ferrous Hydroxide	R	93° C (200° F)
Ferrous Nitrate	R	93° C (200° F)
Ferrous Sulfate	R	93° C (200° F)
Fish Oil	E	82° C (E-180° F)
Fluoboric Acid	R	-
Fluorine Gas	N	N
Fluorosilicic Acid, 30%	R	82° C (180° F)
Fluosilicic Acid	R	82° C (180° F)
Formaldehyde	N	N
Formic Acid, up to 25%	R	82° C (180° F)
Formic Acid, greater than 25%	E	N
Formic Acid, pure	N	N
Freons	N	N
Fructose	R	93° C (200° F)
Furfural	N	N
Gallic Acid, aqueous	R	82° C (180° F)
Gasoline	N	N
Gelatine	R	93° C (200° F)
Glucose	R	93° C (200° F)
Glycerine	R	93° C (200° F)
Glycolic Acid	N	N
Glyoxal, aqueous	R	-
Green Liquor	R	93° C (200° F)
Halocarbon Oils	N	N
Heptane	R	-
Hexane	R	-
Hexanol	E	82° C (E-180° F)
Hydrazine	N	N
Hydrobromic Acid	R	-
Hydrochloric Acid	R	82° C (180° F)
Hydrocyanic Acid	R	-
*Hydrofluoric Acid, 3%	R3	82° C (180° F)
*Hydrofluoric Acid, 48%	S3	S-82° C (180° F)
Hydrofluosilicic Acid, 30%	R	82° C (180° F)

Chemical	Ambient Temp (23°C / 73°F)	Maximum Temp (°C / °F)
*Hydrogen Peroxide, 30%	R1	82° C (180° F)
*Hydrogen Peroxide, 50%	R1	120
Hydrogen Sulfide, Aqueous	R	82° C (180° F)
Hydroquinone, aqueous	R	-
Hydroxylamine Sulfate	-	-
Hypochlorous Acid	S	S-82° C (180° F)
Iodine, aqueous	R	-
Isobutyl Alcohol	E	82° C (E-180° F)
Isophorone	N	N
Isopropanol	E	82° C (E-180° F)
Isopropyl Acetate	N	N
Isopropyl Chloride	N	N
Isopropyl Ether	N	N
Kerosene	N	N
Ketchup	R	93° C (200° F)
Kraft Liquors	R	93° C (200° F)
Lactic Acid, 25%	R	93° C (200° F)
Lard Oil	E	82° C (E-180° F)
Lauryl Chloride	N	N
Lead Acetate	R	93° C (200° F)
Lead Chloride	R	93° C (200° F)
Lead Nitrate	R	93° C (200° F)
Lead Sulfate	R	93° C (200° F)
Lemon Oil	N	N
Ligroin	R	-
Limonene	N	N
Linoleic Acid	E	82° C (E-180° F)
Linseed Oil	E	82° C (E-180° F)
Lithium Bromide	R	93° C (200° F)
Lithium Chloride	R	93° C (200° F)
Lithium Hydroxide	R	-
Lithium Sulfate	R	93° C (200° F)
Magnesium Carbonate	R	93° C (200° F)
Magnesium Chloride	R	93° C (200° F)
Magnesium Citrate	R	93° C (200° F)
Magnesium Fluoride	R	93° C (200° F)
Magnesium Hydroxide	R	93° C (200° F)
Magnesium Nitrate	R	93° C (200° F)
Magnesium Oxide	R	93° C (200° F)
Magnesium Sulfate	R	93° C (200° F)
Maleic Acid, 50%	R	93° C (200° F)
Malic Acid	R	93° C (200° F)
Manganese Sulfate	R	93° C (200° F)
Mercuric Chloride	R	93° C (200° F)

CHEMICAL RESISTANCE CHART

Chemical	Ambient Temp (23°C / 73°F)	Maximum Temp (°C / °F)
Mercuric Cyanide	R	93° C (200° F)
Mercuric Sulfate	R	93° C (200° F)
Mercurous Nitrate	R	93° C (200° F)
Mercury	R	82° C (180° F)
Methane Sulfonic Acid	R	82° C (180° F)
Methanol, up to 10%	R	82° C (180° F)
Methanol, grater than 10%	E	82° C (E-180° F)
Methanol, Pure	N	N
Methyl Acetate	N	N
Methyl Chloride	N	N
Methyl Ethyl Ketone	N	N
Methyl Formate	N	N
Methyl Isobutyl Ketone	N	N
Methyl Isopropyl Ketone	N	N
Methyl Methacrylate	N	N
Methylamine	N	N
Methylene Bromide	N	N
Methylene Chloride	N	N
Methylene Chlorobromide	N	N
Methylene Iodide	N	N
Mineral Oil	R	-
Molasses	R	R
Monoethanolamine	N	N
Morpholine	N	N
Motor Oil	R	-
Muriatic Acid	R	82° C (180° F)
Naphtha	R	-
Naphthalene	R	-
Nickel Acetate	R	93° C (200° F)
Nickel Chloride	R	93° C (200° F)
Nickel Nitrate	R	93° C (200° F)
Nickel Sulfate	R	93° C (200° F)
*Nitric Acid, up to 25%	R[1]	65° C (150° F)
*Nitric Acid, 25-35%	R[1]	54° C (130° F)
*Nitric Acid, 70%	R[1]	40° C (105° F)
Nitrobenzene	N	N
Nitroethane	N	N
Nitroglycerine	N	N
Nitromethane	N	N
Nitrous Acid	R	-
Octane	R	-
1-Octanol	E	82° C (E-180° F)
Oils, Sour Crude	N	N
Oleum	N	N
Olive Oil	N	N

Chemical	Ambient Temp (23°C / 73°F)	Maximum Temp (°C / °F)
Oxalic Acid, Sat'd	R	76° C (170° F)
Oxygen	R2	82° C (180° F)
Ozonized Water	R	93° C (200° F)
Palm Oil	E	82° C (E-180° F)
Paraffin	R	82° C (180° F)
Peanut Oil	E	82° C (E-180° F)
Peracetic Acid	N	N
Perchloric Acid, 10%	R	-
Phenol	R	-
Phenylhydrazine	N	N
Phosphoric Acid	R	82° C (180° F)
Phosphorus Pentoxide	R	-
Phosphorus Trichloride	N	N
Photographic Solutions	R	82° C (180° F)
Phthalic Acid	N	N
Picric Acid	N	N
Pine Oil	N	N
Plating Solutions	R	82° C (180° F)
Polyethylene Glycol	E	82° C (E-180° F)
Polyvinyl Alcohol	R	82° C (180° F)
Potash	R	93° C (200° F)
Potassium Acetate	R	93° C (200° F)
Potassium Bicarbonate	R	93° C (200° F)
Potassium Bichromate	R	93° C (200° F)
Potassium Bisulfate	R	93° C (200° F)
Potassium Bisulfite	R	93° C (200° F)
Potassium Borate	R	93° C (200° F)
Potassium Bromate	R	93° C (200° F)
Potassium Bromide	R	93° C (200° F)
Potassium Carbonate	R	93° C (200° F)
Potassium Chlorate	R	93° C (200° F)
Potassium Chloride	R	93° C (200° F)
Potassium Chromate	R	93° C (200° F)
Potassium Cyanate	R	93° C (200° F)
Potassium Cyanide	R	93° C (200° F)
Potassium Dichromate	R	93° C (200° F)
Potassium Ferricyanide	R	93° C (200° F)
Potassium Ferrocyanide	R	93° C (200° F)
Potassium Fluoride	R	93° C (200° F)
*Potassium Hydroxide	R	82° C (180° F)
Potassium Hypochlorite	R[3,4]	93° C (200° F)
Potassium Iodide	R	93° C (200° F)
Potassium Nitrate	R	93° C (200° F)
Potassium Perborate	R	82° C (180° F)
Potassium Perchlorate, sat'd	R	82° C (180° F)

CHEMICAL RESISTANCE CHART

Chemical	Ambient Temp (23°C / 73°F)	Maximum Temp (°C / °F)
Potassium Permanganate, sat'd	R	82° C (180° F)
Potassium Persulfate, sat'd	R	-
Potassium Phosphate	R	82° C (180° F)
Potassium Sulfate	R	93° C (200° F)
Potassium Sulfide	R	93° C (200° F)
Potassium Sulfite	R	93° C (200° F)
Potassium Tripolyphosphate	R	93° C (200° F)
Propanol, up to 0.5%	R	82° C (180° F)
Propanol, greater than 0.5%	E	82° C (E-180° F)
Propanol, pure	E	82° C (E-180° F)
Propargyl Alcohol	E	82° C (E-180° F)
Propionic Acid, up to 2%	R	82° C (180° F)
Propionic Acid, greater than 2%	E	82° C (E-180° F)
Propionic Acid, pure	N	N
Propyl Acetate	N	N
Propyl Bromide	N	N
Propylene Dichloride	N	N
Propylene Gycol, up to 35%	R	82° C (180° F)
Propylene Gycol, greater than 35%	E	82° C (E-180° F)
Propylene Oxide	N	N
Pyridine	N	N
Pyrogallol	R	-
Pyrrole	N	N
Salicylaldehyde	N	N
Sea Water	R	93° C (200° F)
Silicic Acid	R	-
Silicone Oil	R	-
Silver Chloride	R	93° C (200° F)
Silver Cyanide	R	93° C (200° F)
Silver Nitrate	R	93° C (200° F)
Silver Sulfate	R	93° C (200° F)
Soaps	R	93° C (200° F)
Sodium Acetate	R	93° C (200° F)
Sodium Aluminate	R	93° C (200° F)
Sodium Arsenate	R	93° C (200° F)
Sodium Benzoate	R	93° C (200° F)
Sodium Bicarbonate	R	93° C (200° F)
Sodium Bichromate	R	93° C (200° F)
Sodium Bisulfate	R	93° C (200° F)
Sodium Bisulfite	R	93° C (201° F)
Sodium Borate	R	93° C (200° F)
Sodium Bromide	R	93° C (200° F)
Sodium Carbonate	R	93° C (200° F)

Chemical	Ambient Temp (23°C / 73°F)	Maximum Temp (°C / °F)
Sodium Chlorate	R	93° C (200° F)
Sodium Chloride	R	93° C (200° F)
Sodium Chlorite	R	93° C (200° F)
Sodium Chromate	R	93° C (200° F)
Sodium Cyanide	R	93° C (200° F)
Sodium Dichromate	R	93° C (200° F)
Sodium Ferricyanide	R	93° C (200° F)
Sodium Ferrocyanide	R	93° C (200° F)
Sodium Fluoride	R	93° C (200° F)
Sodium Fluorosilicate	R	82° C (180° F)
Sodium Formate	R	93° C (200° F)
Sodium Hexametaphosphate – Saturated	R	82° C (180° F)
*Sodium Hydroxide	R	82° C (180° F)
Sodium Hypobromite	R	93° C (200° F)
Sodium Hypochlorite	R3,4	93° C (200° F)
Sodium Iodide	R	93° C (200° F)
Sodium Metabisulfite – Saturated	R	82° C (180° F)
Sodium Metaphosphate	R	93° C (200° F)
Sodium Nitrate	R	93° C (200° F)
Sodium Nitrite	R	93° C (200° F)
Sodium Palmitate	R	93° C (200° F)
Sodium Perborate	R	82° C (180° F)
Sodium Percarbonate, 15%	R	82° C (180° F)
Sodium Perchlorate	R	82° C (180° F)
Sodium Permanganate, 25%	R	82° C (180° F)
Sodium Phosphate	R	93° C (200° F)
Sodium Silicate	R	93° C (200° F)
Sodium Sulfate	R	93° C (200° F)
Sodium Sulfide	R	93° C (200° F)
Sodium Sulfite	R	93° C (200° F)
Sodium Thiosulfate	R	93° C (200° F)
Sodium Tripolyphosphate	R	93° C (200° F)
Soybean Oil	E	82° C (E-180° F)
Stannic Chloride	R	93° C (200° F)
Stannous Chloride	R	93° C (200° F)
Stannous Sulfate	R	93° C (200° F)
Starch	R	93° C (200° F)
Stearic Acid	R	-
Strontium Chloride	R	93° C (200° F)
Styrene	N	N
Succinic Acid	-	-
Sugar	R	93° C (200° F)
Sulfamic Acid	R	82° C (180° F)
Sulfur	R	-

CHEMICAL RESISTANCE CHART

Chemical	Ambient Temp (23°C / 73°F)	Maximum Temp (°C / °F)
Sulfur Dioxide – Aqueous	R	-
*Sulfuric Acid, Fuming	N	N
*Sulfuric Acid, 98%	R1	51° C (125° F)
*Sulfuric Acid, 85%	R1	76° C (170° F)
*Sulfuric Acid, 80%	R	82° C (180° F)
*Sulfuric Acid, 50%	R	82° C (180° F)
*Sulfurous Acid	R	-
Tall Oil	E	82° C (E-180° F)
Tannic Acid, 30%	R	-
Tartaric Acid	R	-
Tetraacetyl Ethylene Di-amine, sat'd	R	82° C (180° F)
Tetrahydrofuran	N	N
Tetrahydronaphthalene	R	-
Tetrasodiumpyrophosphate	R	93° C (200° F)
Thionyl Chloride	N	N
Toluene	N	N
Tomato Juice	R	82° C (180° F)
Tributyl Citrate	N	N
Tributyl Phosphate	N	N
Trichloroacetic Acid	N	N
Trichloroethylene	N	N
Triethanolamine	N	N
Triethylamine	N	N
Trimethylpropane	R	-
Trisodium Phosphate	R	93° C (200° F)
Tung Oil	E	82° C (E-180° F)
Turpentine	N	N
Urea	N	N
Urine	R	93° C (200° F)
Vegetable Oil	E	82° C (E-180° F)
Vinegar	R	93° C (200° F)
Vinyl Acetate	N	N
Water, Deionized	R	93° C (200° F)
Water, Demineralized	R	93° C (200° F)
Water, Distilled	R	93° C (200° F)
Water, Salt	R	93° C (200° F)
Water	R	93° C (200° F)
Whiskey	R	93° C (200° F)
White Liquor	R	93° C (200° F)
Wine	R	93° C (200° F)
Xylene	N	N
Zinc Acetate	R	93° C (200° F)
Zinc Carbonate	R	93° C (200° F)
Zinc Chloride	R	93° C (200° F)

Chemical	Ambient Temp (23°C / 73°F)	Maximum Temp (°C / °F)
Zinc Nitrate	R	93° C (200° F)
Zinc Sulfate	R	93° C (200° F)

In the table the alphabet stands for below mentioned:

R - Recommended: Minimal or no swelling and/or loss in tensile strength, low or no potential for Environmental Stress Cracking (ESC)

N - Not Recommended: Significant softening or degradation with loss in material strength

S - Satisfactory Resistance: Low to moderate swelling or degradation above certain temperatures and/or concentrations

E - Possible ESC: Environmental stress cracking possible with mechanical stress on the material.

1. The temperature of grey CPVC installed in direct sunlight can reach 175°F. This should be considered when establishing the maximum operating temperature of the system.
2. CPVC is not recommended for gas under pressure.
3. A silica-free grade of cement must be used.
4. Do not allow chemical to decompose inside closed off sections of piping as a dangerous overpressure situation could occur.

NOTE

NOTE

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