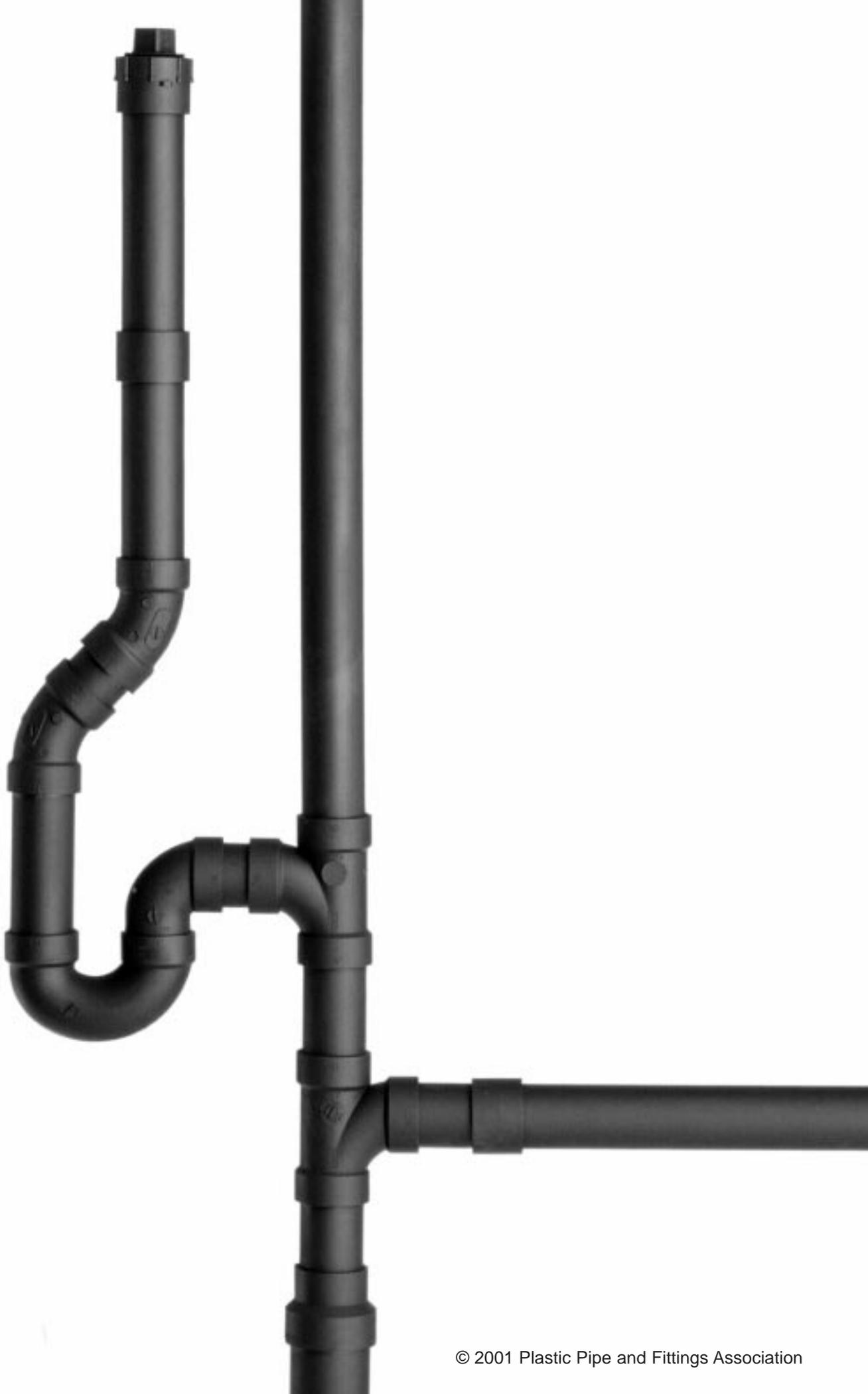




ABS

PLASTIC PIPE & FITTINGS

INFORMATIONAL & TECHNICAL
GUIDE



ABS PIPE OFFERS MANY ADVANTAGES FOR DWV APPLICATIONS

Today, ABS plastic pipe is the standard material for many types of DWV systems. Its properties make it ideal for residential homes, manufactured housing, commercial and industrial buildings, and recreational vehicles.

- **Ready availability.** Schedule 40 ABS pipe (ABS pipe with the same wall thickness as standard steel pipe) and fittings are readily available through plumbing supply distributors and other sources. ABS pipe is available in 1-1/2" diameter, 2", 3", 4" and 6" with solid wall or cellular core wall constructions, both of which can be used interchangeably. A full range of fittings (elbows, tees, wyes, couplings and traps) are available.
- **Lightweight.** A 3" diameter, 10-foot long section of ABS pipe weighs under 10 pounds making it easy to handle. Installers find that less physical effort is required in handling ABS pipe, making it easy and quick to assemble.
- **Easy installation.** Assembly involves a one-step solvent cementing process. No threading, no primer, no lead pot and torch required! (See pages 10 to 13 for complete installation guidelines.)
- **Lower cost than cast iron or steel pipe.** ABS pipe is less expensive, foot-for-foot, than metal pipe. In addition, easier installation means faster installation time which results in lower labor costs. A DWV installation in a typical two-bath home (with about 100 joints) can be completed two to six hours faster with ABS pipe than with other materials.
- **Toughness.** ABS pipe exhibits outstanding impact resistance which enables it to resist mechanical damage even at -40°F temperatures. ABS pipe has the strength to withstand the crushing loads of soil, slab foundations and high surface loads without collapse. It is also resistant to the impact of accidental abuse common to construction and plumbing operations.
- **High performance at extreme temperatures.** The slow rate with which heat or cold is absorbed enables ABS pipe to retain its toughness during temperature changes – an important quality in

a system that handles both hot and cold wastes. ABS pipe remains rigid during prolonged exposure to high heat such as that associated with a dishwasher discharging water at 140°F, yet retains its high impact characteristics at sub-freezing temperatures.

- **Resistance to chemicals and corrosion.** ABS pipe offers outstanding resistance to most household chemicals and many corrosive industrial liquids. (See pages 6 and 7 for details on specific chemicals.)
- **High self-ignition point.** With a self-ignition temperature of 871°F, ABS pipe is not a fire hazard in a building. If installed properly, it can be used in high-rise fire-resistive construction. (See pages 8 and 9 for details on ABS pipe and fire issues.)



ABS Pipe: The Standard for DWV Applications

ABS pipe and fittings are recognized by every major standards organization and regional code authority in the United States and Canada. In making the ABS resin itself, manufacturers must meet the ASTM requirements of Cell Classification 4-2-2-2 for pipe and 3-2-2-2 for fittings; a series of physical property testing on the resin.

ASTM Standards set strict specifications for the quality of ABS pipe and fittings. Schedule 40 ASTM F 628 and ASTM D 2661 Standards define the requirements which must be met to be eligible for certification by listing agencies.

With its light weight and unique properties, ABS piping is easy to install above or below ground. Even so, it's important that you follow some basic guidelines to ensure a successful installation. Always consult and adhere to local codes that regulate ABS pipe for DWV applications, and secure the necessary plumbing permits.

the two when connecting building drains to building sewers by using transition cement. Consult local codes and pipe manufacturers for specific instructions.

SPECIFICATION

Specifying ABS pipe is a relatively easy task as the pipe wall of Schedule 40 ABS DWV pipe is the same thickness as Schedule 40 (IPS) steel pipe.

When preparing specifications, it is important to note the type of materials to be used in DWV applications. Architects, mechanical engineers and builders should incorporate ABS pipe and fittings into their specifications by a reference similar to the following: "All soil lines, waste lines, vents, and building drains shall be installed with ABS pipe and fittings conforming to Schedule 40 ASTM F 628 or ASTM D 2661. All products shall bear the seal of a nationally-recognized listing or certifying agency."



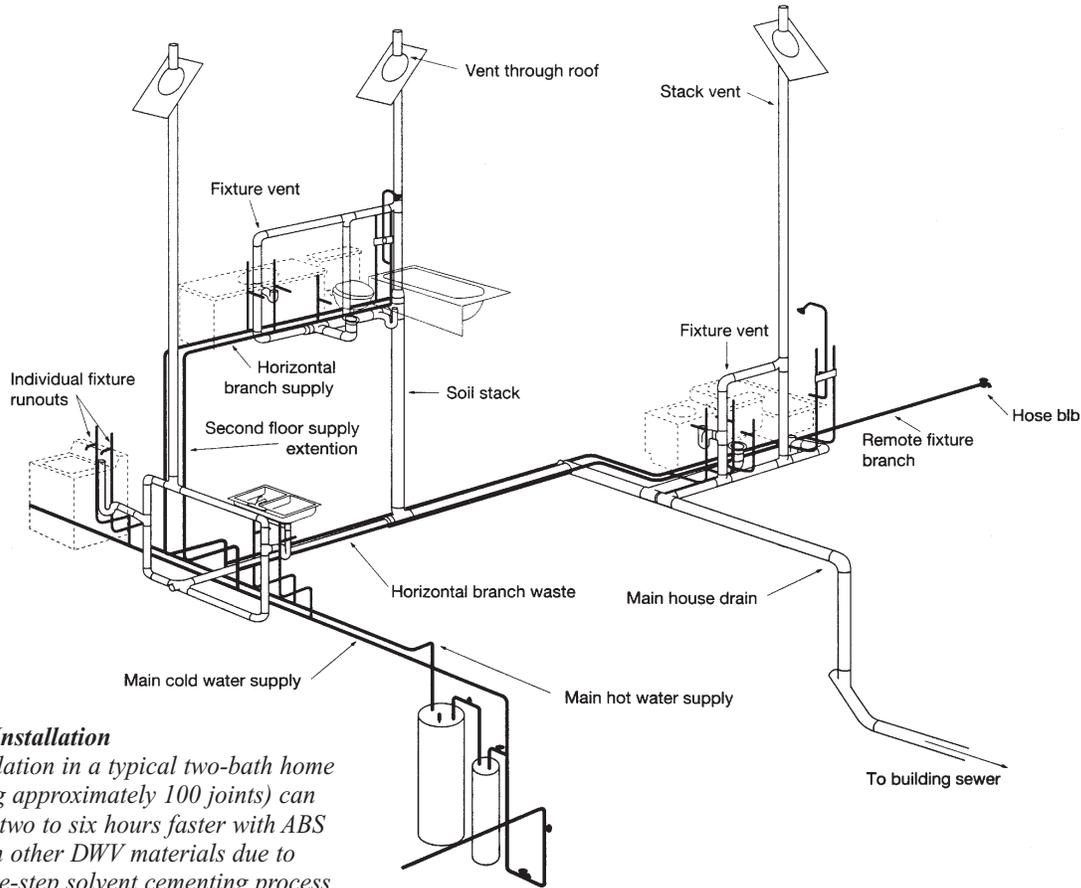
SELECTION

Selecting the proper ABS pipe and fittings is the first step to a successful installation. ABS pipe and fittings for DWV applications carry a variety of markings for easy identification: ASTM and/or CSA standards, manufacturer's name and trademark, nominal pipe size, the DWV symbol, production code, third-party certification, listing agency logo and any other markings required or permitted by local codes. Pipe is marked on both sides at two-foot intervals; fitting markings vary slightly because of space limitations.

When selecting ABS pipe, be sure to choose "Schedule 40 ABS DWV." Only Schedule 40 pipe and fittings that conform to nationally recognized standards may be marked "ABS DWV." Mixing of ABS and PVC pipe and fittings within the same system is not recommended. However, you can join

Schedule 40 ABS pipe carries a variety of informational markings. Cellular-core pipe is marked as shown here; solid pipe has the marking "ASTM D 2661 Schedule 40 ABS DWV." Both types also feature the manufacturer's code for resin manufacturer, lot number, and date of manufacture, as well as nominal pipe size and other markings required or permitted by local codes. Fitting markings vary slightly because of space limitations.

ABS Pipe and Fittings in Standards and Codes for DWV Applications



Home DWV Installation

A DWV installation in a typical two-bath home (incorporating approximately 100 joints) can be completed two to six hours faster with ABS pipe than with other DWV materials due to ABS pipe's one-step solvent cementing process.

PRODUCT STANDARDS:

- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
 - ASTM D 2661 (Schedule 40 solid pipe)
 - ASTM F 628 (Schedule 40 cellular core)
 - ASTM D 3311 (Specifies drainage pattern for fittings)
- Canadian Standards Association (CSA)
 - CSA CAN/CSA B181.1 Schedule 40
- National Sanitation Foundation International (NSF)
 - Standard NSF 14

ABS pipe and fittings are also listed by third party certifiers including CSA, NSF International and IAPMO.

MODEL PLUMBING CODES:

- Building Officials and Code Administrators (BOCAI)
 - National Plumbing Code
- International Association of Plumbing & Mechanical Officials (IAPMO)
 - Uniform Plumbing Code
- International Code Council (ICC)
 - BOCAI - SBCCI - ICBO
 - International Plumbing Code (IPC)
- Council of America Building Officials (CABO)
 - One and Two Family Dwelling Code
- National Association of Plumbing, Heating and Cooling Contractors (NAPHCC)
 - National Standard Plumbing Code
- Southern Building Code Congress International (SBCCI)
 - Standard Plumbing Code

ABS Pipe Offers Outstanding Chemical Resistance

ABS pipe offers excellent chemical resistance in many applications. It stands up to any solution of ammonium chloride, calcium chloride or sodium hydroxide, all of which are corrosive to many metals. ABS pipe is also unaffected by aqueous salt solutions, mineral acids and alkalis.

RESISTANCE TO HOUSEHOLD CHEMICALS

ABS pipe is preferred for residential DWV applications because of its resistance to the chemicals commonly used in bathrooms and kitchens. According to studies performed by the ABS Institute, ABS pipe was shown to be unaffected by commonly used household chemicals – including drain and bowl cleaners. Similarly, water has almost no effect. In a 24-hour immersion test, ABS pipe absorbed only 0.005% water by weight.



Resistance of ABS to Household Chemicals

Product	Comments	Effect
Tide detergent	10% concentration used was far greater than recommended. Solution was very viscous.	None
Soilax cleanser	Mostly trisodium phosphate with sodium carbonate, sodium tripolyphosphate and ammonium chloride. At 20% the solution was saturated and was far more concentrated than would be recommended for actual service.	None
Borax cleanser	Mixture of hydrated sodium borates. Saturated solution is about 2% concentration.	None
Calgon water softener	Sodium hexametaphosphate.	None
Clorox bleach	Sodium hypochlorite. It is never used at full strength as it was here.	None
Ammonia 5% solution	This concentration is about equal to household ammonia which is usually used in about 100 to 1 or greater dilutions.	None
Renuzit spot remover	Used as recommended.	None

Resistance of ABS to Drain & Bowl Cleaners

Product	Active Major Ingredients	"Normal"	"Excess"
Drano	Sodium hydroxide.	No effect	No effect
Liquid Sani-flush	Hydrogen chloride, oxalic acid, alkyl trimethylammonium chloride.	No effect	No effect
Sani-flush	Sodium bisulphate, monopotassium peroxy sulphate.	No effect	No effect
Liquid Plumber	Sodium hydroxide.	No effect	No effect
Lysol bowl cleaner	Hydrogen chloride, N-alkyl dimethyl benzyl ammonium chloride.	No effect	No effect
Vanish bowl cleaner	Sodium acid sulphate.	No effect	No effect
Liquid Vanish bowl cleaner	Hydrogen chloride, N-alkyl dimethyl benzyl ammonium chloride, N-alkyl dimethyl ethyl benzyl ammonium chloride, 1-(2-hydroxyethyl)-2-lepta decanyl imiazaolinium chloride).	No effect	No effect
Sno-Bol bowl cleaner	Hydrochloric acid.	No effect	No effect

Source: ABS Institute

CHEMICAL RESISTANCE FOR INDUSTRIAL APPLICATIONS

The chemical resistance of ABS pipe also makes it suitable for many industrial applications. Sewage treatment plants use ABS pipe because it stands up to the highly corrosive and abrasive liquids commonly found in such systems.

The accompanying chart provides a general guide to chemical resistance for specific chemicals. In any given application, however, resistance is a function of many factors (like temperature, stress and pressure), not just the chemical involved. For particular application specifications or to find out about any chemical not listed, contact an ABS pipe/fittings manufacturer.

Chemical Resistance of ABS Plastic Pipe

CHEMICAL (Concentration)	160°F (71.1°C)			CHEMICAL (Concentration)	160°F (71.1°C)			CHEMICAL (Concentration)	160°F (71.1°C)		
	120°F (48.9°C)				120°F (48.9°C)				120°F (48.9°C)		
	73°F (23°C)				73°F (23°C)				73°F (23°C)		
Acetamide (5%)	R	R	-	Copper sulphate aqueous all	R	R	-	Oils and Fats	R	-	N
Acetic acid (glacial) (100%)	N	N	N	Cottonseed oil	R	R	-	Oleic acid	R	C	N
Acetic acid (50%)	N	N	N	Cresol (100%)	N	-	N	Oleum	N	-	N
Acetic acid (5%)	R	R	-	Cyclohexane	R	C	-	Olive Oil	R	-	-
Acetic anhydride (100%)	N	N	-	Cyclohexanol	C	C	N	Oxalic acid, aq.	R	-	R
Acetone (100%)	N	N	N	Cyclohexanone	N	N	N	Palmitic acid (10%)	R	-	-
Acetophenone	N	N	-	Cyclohexylamine	N	-	-	Paraffin	R	-	-
Acetyl chloride	N	-	-	Dibutyl phthalate pure	-	N	-	Pentane	N	N	-
Alcohol, allyl	N	N	-	Dichlorobenzene	N	N	-	Perchloric acid, aq. (10%-70%)	R	-	N
Alcohol, amyl Tech. pure	N	N	-	Dichloroethane	N	N	-	Perchloroethylene	N	-	-
Alcohol, benzyl	N	N	-	Diethanolamine	R	R	-	Petroleum (super)	N	N	-
Alcohol butyl	N	N	-	Diethyl amine	N	-	-	Petroleum (sour, refined)	R	-	N
Alcohol, butyric	R	R	-	Diethylene glycol	R	R	-	Phenol (5%)	C	-	C
Alcohol, cetyl	R	-	-	Diethyl ether	N	N	-	Phenol	N	-	-
Alcohol, ethyl	R to N	N	N	Dimethyl formamide pure	N	N	-	Phosphoric acid (50%)	R	-	N
Alcohol, furfuryl	N	N	-	Diocetyl phthalate	N	-	N	Phthalic acid, aq.	R	R	-
Alcohol, isopropyl (2-propanol)	R	-	-	Diphenylamine	R	R	-	Picric acid, aq.	N	-	N
Alcohol, methyl	R to N	N	N	Esters	N	-	N	Potassium salts	R	-	R
Alcohol, propyl (1-propanol)	R	-	N	Ethers	N	-	N	Propyl alcohol	R	-	N
Aluminum salts (chloride, fluoride, hydroxide metaphosphate sulphate)	R	R	R	Ethylacetate pure	N	N	-	Sewage, residential	R	-	-
Ammonia, gas, dry	N	-	N	2-ethoxyethanol	-	N	-	Silver salts	R	-	R
Ammonia, aqueous	R	-	R	Fatty acids	R	-	R	Soap solutions	R	-	N
Ammonium salts (acetate, carbonate chloride, fluoride (10%-25%), hydrosulphide, hydroxide metaphosphate nitrate, phosphate sulphate, sulphide, thiocyanate)	R	R	-	Ferric chloride, aq. all	R	R	-	Sodium bromide	R	R	-
Amyl acetate Tech. pure	N	N	-	Ferric & ferrous salts, aq.	R	-	R	Sodium carbonate (25%)	R	R	-
Amyl chloride (100%)	N	-	N	Fluorine, wet gas	N	-	N	Sodium chloride aq. salt	R	R	-
Aniline all	N	N	N	Formaldehyde (to 40%)	R	R	R	Sodium chromate	R	R	-
Aqua Regia	N	-	N	Formic acid aq. (10%-50%)	R to N	R	N	Sodium fluoride	R	R	-
Barium salts all	R	-	C	Fruit juices & pulp all & fructose	R	-	N	Sodium hydrogen carbonate	R	R	-
Barium bromide	R	R	-	Furfural	N	-	N	Sodium hydrogen sulfite	R	R	-
Barium carbonate	R	R	-	Furfuryl alcohol	N	N	-	Sodium hydroxide	R	R	-
Barium chloride	N	N	-	Gas, natural, methane	R	-	-	Sodium hypochlorite	R to N	R	N
Beer	R	R	N	Gasoline	N	-	N	Sodium nitrate	R	R	-
Benzene pure	N	N	N	Glucose	-	R	-	Sodium perborate aq. all	R	R	-
Benzoic acid (aqueous) all	R	R	R	Glycerine (glycerol) aq. (to 100%)	R	R	-	Sodium phosphate aq. saturated	R	R	-
Benzoyl chloride	N	N	-	Green liquor	R	-	R	Sodium salts aq.	R	-	R
Benzyl chloride	N	N	-	Heptane	R	-	-	Sodium sulphate	R	R	-
Black liquor-paper	R	-	N	Hydrobromic acid, aq. (up to 20%)	R	-	N	Stannic salts aq.	R	-	R
Bleach liquor (12.5% active Cl.)	R	-	N	Hydrochloric acid (20%)	C	C	-	Stannous chloride	R	R	-
Borax	R	-	R	Hydrochloric acid (up to 36%)	C	N	-	Stearic acid	R	-	R
Boric acid (aqueous) all	R	-	R	Hydrogen chloride gas wet	N	N	-	Sulfite liquor	R	-	C
Bromine (aqueous)	R	-	N	Hydrocyanic acid	R	-	R	Sulfur dioxide, dry	N	-	N
Bromo ethane	N	N	-	Hydrofluoric acid (10%)	R	-	N	Sulfur dioxide, wet	R to N	-	R
Butanone	N	N	-	Hydrofluoric acid (50%)	N	N	-	Sulfuric acid (15%)	R	R	-
2-butoxyethanol	R	-	-	Hydrofluosilicic acid (25%)	-	N	-	Sulfuric acid (50%)	R	C	R
Butyric acetate	N	N	-	Hydrogen peroxide, aq. 10 vols	C	C	-	Sulfuric acid (70%)	C	-	N
Butyryl chloride	N	-	-	Hypochlorous acid	R	-	N	Sulfuric acid (>93%)	N	N	N
Butyric acid (aqueous) all	N	N	N	Iodine, aq.	N	-	N	Tannic acid	N	-	N
Calcium sales (aqueous)	R	-	R	Isobutyl alcohol	C	N	-	Tanning liquor	R	-	R
Calcium hydroxide	R	-	R	Isobutyronitrile	N	-	-	Tartaric acid, aq.	R	-	R
Calcium hypochlorite	R	R	R	Isopropyl acetate (100%)	N	-	-	Tetrahydrofurane	N	-	N
Calcium chloride	R	R	-	Kerosene	R	-	-	Toluene	N	-	N
Calcium bromide	R	R	-	Ketones	N	-	N	Trichloroethylene pure	N	-	N
Carbon disulfide	N	N	-	Kraft paper liquor	R	-	C	Trichlorobenzene	N	-	-
Carbon dioxide (wet or dry)	R	R	R	Lactic acid (25)	R	-	N	Triethanolamine	R to N	R	N
Carbon tetrachloride	N	N	N	Linseed oil	N	N	N	Triethylene glycol	R	-	-
Caustic potash (dry & solution)	R	-	R	Magnesium salts	R	-	R	Trisodium phosphate	R	-	-
Caustic soda (dry & solution)	R	-	R	Magnesium carbonate	R	R	-	Turpentine	N	-	N
Chloracetic acid	N	-	N	Magnesium chloride	R	R	-	Uric acid	R	-	-
Chlorine, gaseous, dry	N	-	N	Magnesium sulphate	R	R	-	Urine	R	-	R
Chlorine, gaseous, moist	N	-	N	Maleic acid aq. (up to 100%)	R	-	R	Vinegar	R	-	N
Chlorobenzene	N	N	N	Mesityl oxide	N	N	-	Water, distilled, fresh, mine, salt, tap	R	-	R
Chloroform pure	N	N	N	2-methoxy ethanol	C	N	-	White liquor	R	-	N
Chloropropane	N	N	-	Methyl acetate	N	N	-	Wines	R	-	N
Chromic acid (10%)	R	N	N	Methyl chloride	N	-	N	Xylene	N	N	N
Chromic acid (30%)	N	N	-	Methyl cyclohexanone	R	R	-	Zinc chloride	R	R	-
Chromic acid (50%)	N	-	N	Methyl butyl ketone	R	C	-	Zinc salts, aq. all	R	-	R
Citric acid, aqueous saturated	R	R	R	Methyl ethyl ketone	N	N	-	Zinc stearate	R	R	-
Cod-liver oil	R	R	-	Milk	R	R	R				
Copper salts, aqueous	R	-	R	Mineral oil	R	-	-				
Copper chloride	R	-	-	Nickel salts	R	-	R				
				Nitric acid (5%)	R to C	N	N				
				Nitric acid (20%)	C to N	N	N				
				Nitric acid (>70%)	N	N	N				
				Nitrobenzene	N	N	-				

LEGEND:
R = Satisfactory
C = Some Attack
N = Unsatisfactory

ABS Pipe Complies with Building and Fire Codes

Schedule 40 ABS pipe is primarily used in non-rated construction, such as single-family dwellings. When properly installed in compliance with building and fire codes, it can also be used in fire-rated construction, such as high-rise dwellings.

HIGH SELF-IGNITION POINT

Like many building materials, Schedule 40 ABS pipe will burn under certain conditions. It will not spontaneously combust, however heat and fire sources are essential. ABS pipe must be heated to over 871°F (465°C) before it will self-ignite. In comparison, the types of wood commonly used in home framing self-ignite around 500°F (260°C). In an out-of-control fire, temperatures reach well over 1,000°F (540°C), at which point all combustibles burn. ABS DWV pipe systems typically represent less than 1% of the total combustible products in wood-frame construction.

FLAME SPREAD RESISTANCE

Flame spread tests, such as the ASTM E-84 tunnel test, were designed to compare the flame spread characteristics of flat surface materials, such as draperies and finish materials. Since ABS DWV piping systems are installed behind walls, under floors and above ceilings, the test is not applicable. However, within a plumbing wall, ABS pipe starts to melt and collapse long before it burns, preventing flame spread up vertical stacks or along horizontal waste lines.



FIRE-RATED CONSTRUCTION

When properly installed, Schedule 40 ABS DWV systems are suitable for fire-rated wall, floor and ceiling assemblies. According to tests conducted by the National Bureau of Standards (NBS) and detailed in NBS Report Number 10342, ABS pipe that penetrates a non-combustible wall will not spread significant amounts of smoke or flame through the wall, provided that the pipe is installed correctly.

SMOKE AND TOXICITY

When installed as recommended, Schedule 40 ABS pipe produces little, if any smoke during the early stages of a fire. If the fire is large enough to destroy a building, ABS pipe will burn and produce black smoke.

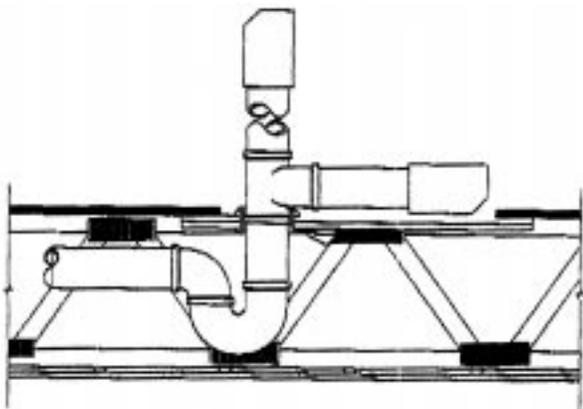
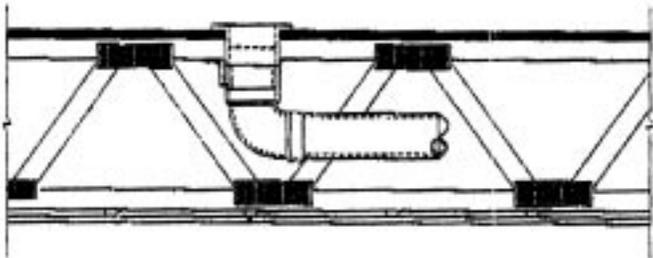
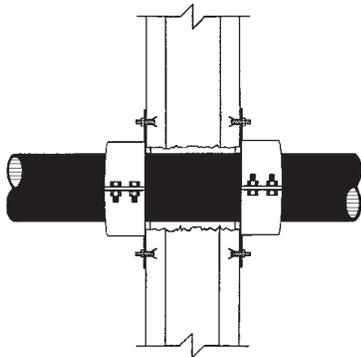
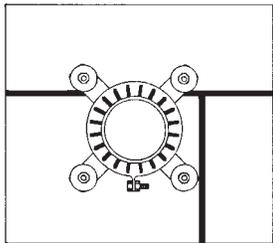
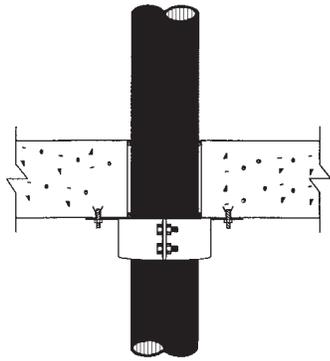
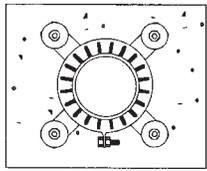
Like all combustible materials, Schedule 40 ABS pipe releases gaseous products when burned. Although no nationally recognized standard exists for measuring toxicity, testing indicates that gases released from burning styrene-based plastics, such as ABS, present no greater hazard than gases released from common building materials, such as the wood used in wall construction.

Most plumbing codes reinforce building codes provisions by requiring that all pipe penetrations be made in such a manner as to protect the integrity of fire-rated building walls, floors, and ceilings. Model building codes specify that ABS pipe must be protected at penetration of fire-rated assemblies by a through penetration protection assembly that has been tested and rated in accordance with ASTM E 814. The important rating is the “F” rating for the through penetration assembly. The “F” rating must be a minimum of the hourly rating of the fire resistance-rated assembly which the ABS pipe penetrates.

Various firestop devices and systems are commercially available. These products include: caulks, putties, wrap strips, restricting collars, and plastic pipe devices.

SAFE INSTALLATION

Two of the greatest fire dangers in plumbing come from the torch and lead pot, both of which are required to install metallic piping. ABS DWV systems don’t require either one – eliminating a significant fire hazard.

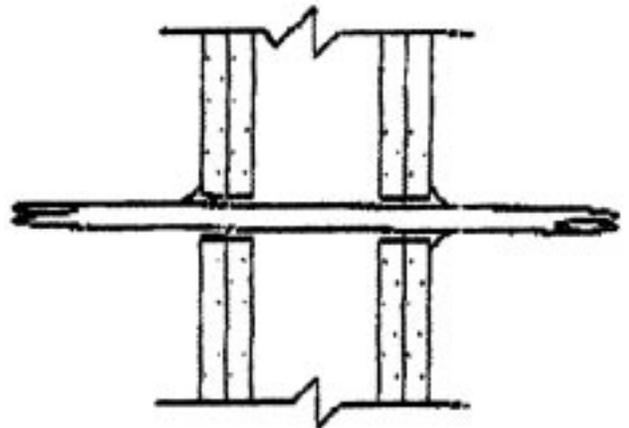


CONSULTANTS:

- **Fire Stop Systems, Inc.**
Nevada
702-262-5888
California
619-287-5888

MANUFACTURERS OF FIRESTOP SYSTEMS AND MATERIALS INCLUDE:

- **Specified Technologies**
200 Evans Way
Somerville, NJ 08876
1-800-992-1180
- **Hilti, Inc.**
5400 S 122nd E. Ave.
Tulsa, OK 74121
1-800-879-8000
- **3M Fire Protection Products**
3M Center, Bldg 207-1S
St. Paul, MN 55144-1000
1-800-328-1627
- **The Rectorseal Corporation**
2001 Spenwick Dr.
Houston, TX 77055
1-800-231-3345
- **Fire Stop Systems, Inc.**
1412 Derwent Way
Delta, British Columbia V3M6H9
1-800-810-1788



ABS Pipe Installation Guidelines

STORAGE AND HANDLING

You can store ABS pipe and fittings either inside or outside. Protect the material from direct sunlight as exposure to the sun can cause uneven expansion. Store ABS pipe on a level support to prevent sagging or bending.

Although ABS pipe is tough, resilient and easy to handle, it's softer than metals and more prone to abrasion. Therefore, do not drag it over rough ground.

MEASURING



Planning ahead is very important when installing ABS pipe and fittings in DWV systems. These “systems” have built-in “pitch” or “fall,” and require a high degree of accuracy in laying out and cutting pipe to exact lengths. Errors cannot be rectified with stress, heat or a hammer.

When measuring, be sure to allow for depth of joints. Do not take measurements with dry pipe inserted part way into the dry fitting socket. Rather, measure to the full depth of the socket.

Because of the fast set time of the solvent cement, it is often advisable to set up the installation dry and mark fittings for position or alignment, before making up the joint.

CUTTING

You can cut ABS pipe with appropriate pipe cutters, any crosscut saw or a power saw equipped with a carbide-tip or abrasive blade. Special plastic-pipe cutter wheels are available to fit standard cutters. You can also use lightweight, quick-adjusting cutters designed exclusively for plastic piping.

Do not use pipe cutters with dull wheels – especially wheels used previously to cut metal – as they will exert excessive pressure, causing larger shoulders and burrs that you will need to remove.

ABS pipe requires a square cut for good joint integrity. To ensure a square cut, use a power saw on large jobs and a miter box on small jobs. If these are not available, scribe the pipe and cut to the mark.

After cutting ABS pipe, ream it inside and chamfer it outside to remove burrs, shoulders and ragged edges.

PIPE FIT

ABS pipe is manufactured to close tolerances to ensure

a satisfactory “interference” fit between pipe and socket during assembly. Manufacturers design these interference fits right into the sockets of plastic fittings. Use only combinations of pipe and sockets that give interference fits, as loose connections between the two may not properly bond. ABS pipe should enter the dry fitting socket to between 1/3 and 3/4 of the fitting socket depth.

ABS pipe has a higher expansion and contraction rate than metallic pipe. Under normal circumstances (that is, relatively short runs), this is not an issue. For industrial applications, with longer runs and higher capacity, it may be necessary to plan for expansion. Various methods – including expansion joints, guides, clamped flexible connectors, hubless couplings and offset piping arrangements – can be employed to control expansion and contraction. Obtain specific information from ABS pipe and fitting manufacturers.

SUPPORTS



ABS pipe should be supported similarly to other piping systems using pipe hangers. Avoid hangers that may cut or compress pipe and tight clamps or straps which prevent pipe from moving or expanding.

Support piping at intervals of not more than four feet. In addition, support pipe at branches, at changes of direction, and when using large fittings to reduce stress. Although supports should provide free movement, they must restrict upward movement of lateral runs so a reverse grade, which could back up the system, is not created on branch piping. Holes made for pipe through framing members must be sized to allow for free movement.

Use supports for vertical piping at each floor level, or as required by expansion/ contraction design. Mid-story guides can provide greater stability.

EXPANSION AND CONTRACTION IN ABS PIPING SYSTEMS

Thermal expansion and movement should be allowed for in all piping installations. ABS piping generally has a larger coefficient of expansion than metal piping. However, this does not mean that expansion problems are a significant concern for ABS piping installations.

Design and installation factors in installed temper-

atures versus service temperatures and seasonal temperature changes which may cause temperature differences in the piping environment and the waste water. The linear expansion rate for ABS is approximately 1/2 in. for each 10° F temperature change for each 100 ft. of piping. Regardless of pipe size, the linear rate remains the same.

The majority of ABS pipe installations involve relatively short pipe segments where the absolute value of dimension change (with even large temperature change) is not great. In addition, especially for DWV, conditions are usually found that the complete run of piping is not warmed at the same time. That is, a volume of hot water enters the pipe and travels to the discharge end, warming the pipe in a moving wave.

Most installations operate in an environment that has minimal temperature change — piping in the soil or in air conditioned buildings being two major examples. Finally, piping carrying cold water will also see very little temperature change.

With good installation practices, the following methods can be employed to control expansion and contraction:

- 1) The use of expansion joints, properly adjusted to compensate for installation versus service temperatures, properly guided and properly anchored. Refer to expansion joint manufacturer's installation instructions and make sure that vertical travel will not create a negative slope in branch lines.
- 2) The use of guides (in most instances, proper sleeve sizing and alignment) at every other floor, with anchors at the alternate floors for applications involving small temperature changes. As a general rule, this method can be employed in buildings of five stories or less.
- 3) The use of properly designed offsets with piping properly guided through floors. Depending on operating temperatures encountered, offsets can be utilized as often as every other floor and as seldom as one per building.
- 4) Clamped flexible connectors or hubless couplings, where permitted by the plumbing code, have been used satisfactorily. For example, placed in risers between floors of tall buildings, expansion and contraction compensation has been achieved by leaving a 1/8 in. to 3/8 in. gap between the ends of the pipe within the flexible connector. This has been the standard method of installation in Europe for many years, where the "push-on" joining system is in universal use.

- 5) Structures of three stories or less generally do not require special provisions.
- 6) Dry DWV vents, installed with reasonable compensation for installation versus service temperatures, generally do not require special provisions.

It is important to remember that good installation practices must accompany all of the methods described above. Support but do not rigidly restrain piping at branches or changes in direction. Do not anchor pipes rigidly in walls except where controlling the direction of expansion/contraction. Holes through construction must be adequately sized to allow for free movement, except where otherwise designed for fire penetration protection. Hangers and straps must not compress, distort, cut, or abrade the piping and must allow free movement. Piping and joints must be properly installed, so as not to cause stress and strain.

Additional sources of information on expansion/contraction include the following:

- 1) Your local plumbing code. The Uniform Plumbing Code® (UPC) addresses expansion and contraction in Section 313.2 and Table 3-2, notes 3 & 6. In addition, it is addressed in the Installation Standard IS-5. IS-5 offers the following options:
 - a. Use offsets or changes in direction (24 inches 45 degree offset every 30 feet)
 - b. Use expansion joints in vertical straight runs in excess of 30 feet.
 - c. Support, but do not rigidly restrain piping at changes of direction
 - d. Do not anchor pipe rigidly in walls
 - e. Holes through framing members must be adequately sized to allow for free movement
- 2) CSA B181.1-96 BAS Drain, Waste and Vent Pipe and Fittings, Section 4.11 Expansion Joints.
- 3) The American Society of Plumbing Engineers (ASPE) Data Book, Chapter 5, "Thermal Expansion and Contraction."

REDUCING NOISE

To reduce ABS pipe noise in DWV systems, follow good plumbing practices. Carefully locate plumbing wall stacks to avoid critical areas, such as living rooms. Use a plumbing "wall" of adequate thickness to properly

accommodate the system without restriction. Support pipe properly and ensure that it doesn't touch plaster-board or panel walls to avoid setting up an echo chamber effect. Wrap stacks and piping in critical wall spaces with sound-deadening material, or pack the wall with insulation. Use long radius fittings and anchor risers between floors and ceilings to prevent noise.



JOINING

ABS DWV pipe and fittings are joined with solvent cement that temporarily softens the joining surfaces. This brief softening period enables you to seat the pipe into the socket's interference fit. The softened surfaces then fuse together and joint strength develops as the solvents evaporate. The resulting joint is stronger than the pipe itself. Because of the conditions involved, it's important to move quickly and efficiently when joining ABS pipe.

Before you cement a joint, make sure the pipe and fittings are free of dust, dirt, water and oil. To ensure proper alignment in the final assembly, carefully mark for position any fittings to be rolled or otherwise aligned.

When cementing, use only an ABS solvent cement that meets ASTM Standard D2235. (Be sure to seal cement cans when not in use, as the cement quickly thickens and hardens.) Applicators furnished with the cement are satisfactory, as are ordinary bristle paint-brushes. For fast application, the width of the applicator should be at least half the diameter of the pipe.

Apply a light, even coat in the socket of the fitting and on the pipe. Immediately insert the pipe all the way to the socket bottom and give the pipe a one-quarter turn. Hold the joint together until a tight set is attained. A proper joint normally shows a bead around its entire perimeter. After setting, wipe excess cement from the pipe.

Curing time depends on weather, application technique, the cement being used and the degree of interference fit between pipe and fitting.

JOINING TO OTHER MATERIALS



You can join ABS pipe to other sewer materials by using proper transition adapters or alternative methods, as approved by local plumbing codes.

Transition joints between ABS and PVC non-pressure piping components can be joined with solvent cement specified in ASTM D3138. This cement is for use only at the single transition joint; don't use it to mix ABS and PVC pipes and fittings within a system.

ABS pipe with transition fittings can be caulked with lead into cast iron without damage. ABS plastic absorbs heat so slowly that the lead cools before distorting the ABS adapter or pipe end. You can also connect ABS pipe to copper with transition fittings.

THREADED CONNECTIONS

Never thread or tap Schedule 40 ABS pipe or fittings; instead, use molded threaded adapters. Seal threads only with listed thread tape or thread lubricant. Never use pipe dope: some compounds may soften the pipe surface, and under compression, that softening can set up internal stress corrosion.

When installing, turn threads as tightly as possible by hand. Then, with a strap wrench, further tighten the joint one full turn. Do not overturn.



UNDERGROUND INSTALLATIONS

For underground installations such as building drains, branch lines and sewers, piping should be uniformly supported over its entire length on firm, stable material. Start by grading all trenches to eliminate stone and pockets. Then, fill holes with clean fill, and tamp it properly. Once you have installed the pipe, backfill along its sides with selected fill and tamp carefully to protect pipe alignment. Then backfill on top of the pipe with selected fill to a depth of 12 inches. The trench can then be filled to the top in the usual manner.

PROTECTION FROM FREEZING

When you need to protect traps and fixtures from freezing, do not use alcohol or petroleum products. Instead, use only one of the following solutions:

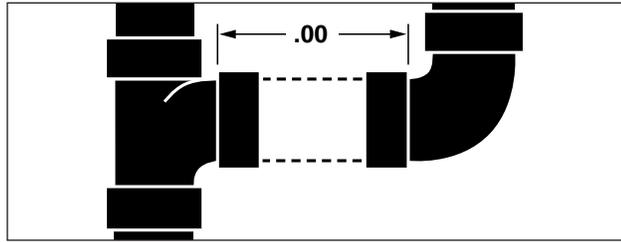
- Approved plastic pipe antifreeze packaged for this purpose
- Sixty percent, by mass, of glycerin in water
- Twenty-two percent, by mass, of magnesium chloride in water
- Strong solutions of common table salt (sodium chloride)

32°

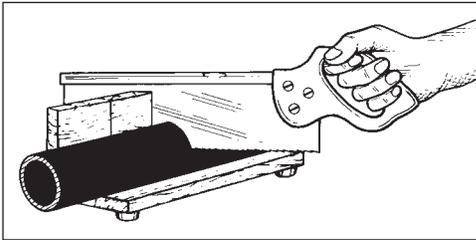
10 Quick Installation Steps

1

Measure pipe from bottom or shoulder of each socket into which pipe is to fit.



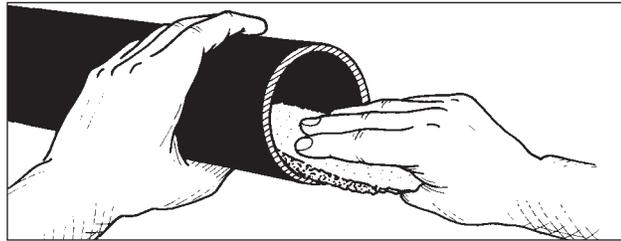
2



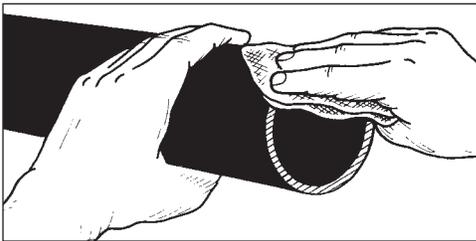
Cut pipe to required length, making sure cut is square. (See page 10 for a listing of proper tools.)

3

Ream inside and chamfer outside of pipe to eliminate all burrs. Sand lightly.



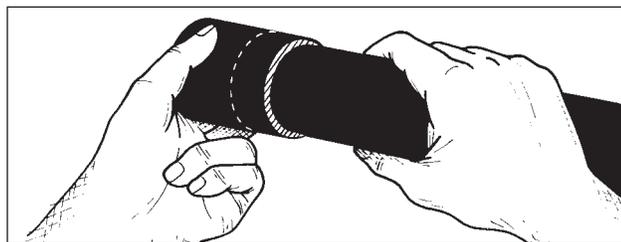
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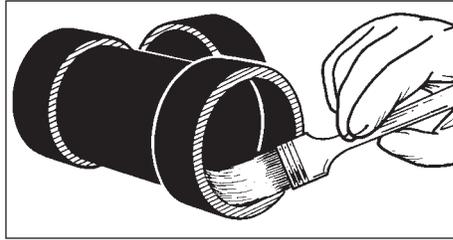
Clean all dirt, moisture, and grease from pipe and fitting socket, using a clean, dry cloth.

5

Check dry fit of pipe in fitting socket. Pipe should enter fitting socket to between 1/3 and 3/4 of the socket depth. Be sure to use only approved types of fittings and adapters.



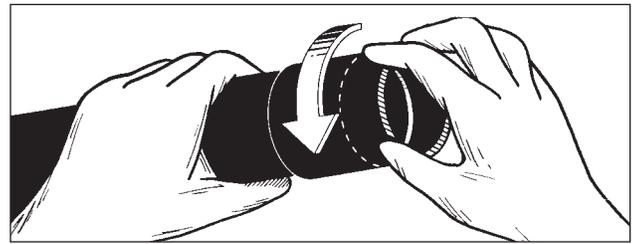
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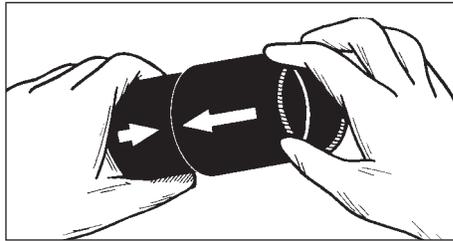
Using a brush or dauber-type device, apply a light coat of ASTM D2235 ABS solvent cement to the inside of the fitting socket, using straight, outward strokes. Apply solvent cement to the outside of the pipe in a similar manner. Time is important at this stage: apply cement quickly and do not allow it to set before the joint is put together. Be especially quick when the temperature is over 100°F (38°C) or humidity is over 60 percent. Always follow safe-handling practices when using solvent cements: use in a well-ventilated area, avoid skin contact (wear gloves) and do not use near heat, sparks or open flame.

7

Immediately insert pipe into fitting socket, giving the pipe a one-quarter turn and making sure it goes all the way to the socket bottom.



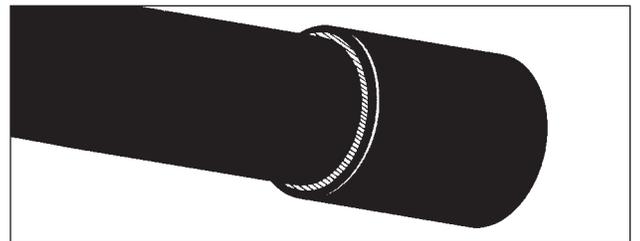
8



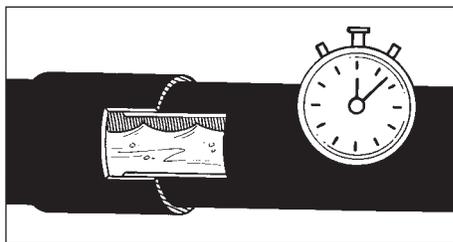
Hold the joint together until a tight set is attained.

9

Check cement bead around joint. A proper joint will normally show a bead around its entire perimeter. Any gaps may indicate insufficient cement or the use of light-bodied cement on larger diameters where heavy-bodied cement was required. After setting, wipe excess cement from the pipe.



10



Don't move the system until the joints have cured (set) at least as long as recommended by the solvent manufacturer. MEK-based solvent cement conforming to ASTM D2235 usually sets up in two minutes at about 70°F (21°C), with faster setting at higher temperatures and slower at lower temperatures. An ABS pipe stack can usually be tested within one hour after the last joint is completed. At this point, a water test can be done to test the integrity of each joint. Do not air test, as it is not recommended for ABS pipe systems. Check local code requirements for clarification.

Commonly Asked Questions About ABS Pipe

Q QUESTION:
WHAT IS THE FLAME SPREAD RATING FOR ABS PIPE?

A ANSWER:
Flame spread tests, such as the ASTM E-84 tunnel test, are primarily designed to test the flame spread characteristics of flat surface materials, such as draperies and finish materials. Since ABS DWV piping systems are installed behind walls, under floors and above ceilings, flame spread tests may not be as meaningful.

Q QUESTION:
CAN ABS DWV PIPE MEET CODE REQUIREMENTS FOR USE IN RETURN AIR PLENUMS?

A ANSWER:
Most codes require an ASTM E-84 (25/50) flame spread index (FSI)/smoke density index (SDI) ratings on materials exposed in return air plenums. ABS pipe like other commonly available plastic DWV pipe must be protected and shielded from heat and flame in order to pass the (25/50) FS/SD criteria.

There appear to be at least two solutions that a code official could approve:

- 1) Box out the piping with framing and gypsum wall board in order to exclude it from the plenum, or
- 2) Cover the piping with insulation that meets the 25/50 requirements and will protect the piping from a fire if one should occur.

Q QUESTION:
HAVE ABS PIPES COVERED WITH INSULATION MATERIALS BEEN TESTED IN THE ASTM E84 TUNNEL BURN TEST FOR FLAME SPREAD (FS) AND SMOKE DENSITY (SD)?

A ANSWER:
On August 25 and 26, 1999 Southwest Research Institute ran eleven ASTM E84 (Standard Test Method for Surface Burning Characteristics of Building Materials) tests on various types of plastic DWV pipe. The Plastic Pipe and Fittings Association retained R. Wilging to manage the project.

The purpose of these tests was to verify that plastic pipe shielded by 1 inch thick preformed pipe insulation (ASTM D-547 Type 1) can meet the building code FSI/SDI limits required for materials exposed in return air plenums. These requirements are a Flame Spread Index (FSI) of 25 or less and a Smoke Developed Index (SDI) of 50 or less based on the use of an ASTM E84 Test Method. These requirements are typically referred to as "25/50 results" in an E84 test.

Four samples of ABS plastic pipe passed with flame spread results ranging from 0.00 to 4.8 (maximum allow-

able is 25) and smoke developed ratings ranging from 20.9 to 24.9 (maximum allowable is 50). One sample, a 4" cellular core ABS specimen did not pass by a very narrow margin (53 to 50). The test was successfully repeated. The retest showed quite satisfactory results of 0.3 and 24.9.

For more information on these tests contact PFFA and ask for the article "Plastic Piping and the 25/50 Requirement" by R.C. Wilging.

Q QUESTION:
CAN YOU GIVE AN EXAMPLE OF ANOTHER TYPE OF INSULATION PRODUCT MARKETED FOR USE WITH PLASTIC PIPES IN AIR PLENUMS?

A ANSWER:
3M markets "Plenum Wrap*"— described in their sales literature as "A high temperature insulation blanket encapsulated with aluminum foil scrim, used as a fire-proof flexible enclosure for plastic pipe in fire-rated plenums. 3M FireMaster Plenum Wrap can be used to provide a non combustible rating for pipe applications in a plenum air space for one inch and larger plastic pipes and cables". Contact 3M for more information and availability in your area at 1-800-328 1687.

** Trademark 3M company*

Q QUESTION:
WHAT STANDARDS APPLY TO ABS PIPE AND FITTINGS?

A ANSWER:
A variety of standards published by the following organizations:

- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Canadian Standards Association (CSA)
- National Sanitation Foundation International (NSF)
- Building Officials and Code Administrators (BOCAI)
– National Plumbing Code
- International Association of Plumbing & Mechanical Officials (IAPMO)
– Uniform Plumbing Code
- International Plumbing Code (IPC)
- Council of America Building Officials (CABO)
– One and Two Family Dwelling Code
- National Association of Plumbing, Heating and Cooling Contractors (NAPHCC)
– National Standard Plumbing Code
- Southern Building Code Congress International (SBCCI)
– Standard Plumbing Code

ABS pipe and fittings are also accepted by model codes, including National Plumbing Code and listed by third party certifiers including CSA, NSF International and IAPMO.

Q QUESTION:
CAN ABS PIPING BE USED FOR UNDERGROUND DWV APPLICATIONS?

A ANSWER:
Yes. ABS pipe when properly installed, can withstand loads of soil, under slab foundations and high surface loads without collapse, cracking or denting.

Q QUESTION:
WHAT KIND OF CHEMICAL RESISTANCE DOES ABS PIPE PROVIDE?

A ANSWER:
ABS pipe offers excellent chemical resistance in many applications. It is resistant to any solution of ammonium chloride, calcium chloride or sodium hydroxide, all of which are corrosive to many metals. ABS pipe is also unaffected by water, aqueous salt solutions, mineral acids and alkalis.

Q QUESTION:
HOW DURABLE IS ABS PIPING?

A ANSWER:
Super-tough ABS pipe withstands earth loads and shipping damage. It has excellent resistance to breaking, scratching, chipping and wear, even at low temperatures.

Q QUESTION:
WILL HOT WATER DAMAGE ABS SYSTEMS?

A ANSWER:
ABS pipe performs in a wide range of temperatures, from -40°F (-40°C) to 160°F (71°C) (for applications outside this operational temperature range, consult specific manufacturer's instructions). In addition, it absorbs heat slowly and is unaffected by the high temperatures of water discharged from dishwashers and washing machines.

Q QUESTION:
WILL ABS PIPE RUST OR CORRODE?

A ANSWER:
ABS pipe does not rot, rust, corrode or collect waste. Its smooth interior finish ensures superior flow.

Q QUESTION:
ARE THERE COST ADVANTAGES IN USING ABS PIPE?

A ANSWER:
ABS pipe is not only less expensive than metal pipe, but also more economical to install, due to a one-step solvent cementing process. In addition, it takes less time to rough in a DWV system with ABS pipe than with any other DWV material.

Q QUESTION:
IS ABS PIPE EASY TO INSTALL?

A ANSWER:
Yes, even for the do-it-yourselfer. ABS pipe is so lightweight that one person can load and unload it. With a one-step solvent cementing process, ABS pipe is easy to join. It can also be cut with a variety of readily available tools.

Q QUESTION:
CAN ABS PIPE AND PVC PIPE AND FITTINGS BE USED WITHIN THE SAME SYSTEM?

A ANSWER:
It's not recommended. However, ABS pipe and PVC pipe and fittings can be joined when connecting building drain to building sewer materials, if you use proper transition cement and adapters or other methods as approved by local plumbing codes.

LONG-LASTING SCHEDULE 40 ABS PIPE

- Sets the standard for DWV applications
- Is easier and less expensive to install
- Features superior flow due to smooth interior finish
- Does not rot, rust, corrode or collect waste
- Withstands earth loads and shipping (with proper handling)
- Resists mechanical damage, even at low temperatures
- Performs at an operational temperature range of -40°F to 160°F (for applications outside this operational temperature range, consult specific manufacturer's instructions)
- Is lightweight (one person can load and unload)
- Takes less time to rough in than other DWV materials



PPFA

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