



Submittal - 024 Pump Station

Spears Sch-80 PVC Pipe and Fittings (Submittal on the following page(s), this sheet is the response page)

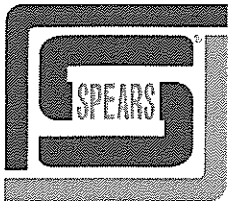
Response:

MKEC ENGINEERING, INC.
411 North Webb Road - Wichita, KS 67206

Reviewed Reviewed As Noted
 Revise and Resubmit Rejected
 Not Required by the Contract Documents

Reviewed for conformance with the design concept of the project and compliance with the information given in the contract documents. Contractor is responsible for: dimensions to be confirmed and correlated at the job site, information that pertains solely to the fabrication process or to techniques of construction, and coordination of work of all other trades. If "Resubmit" or "Rejected" are not checked resubmission is neither desired or required.

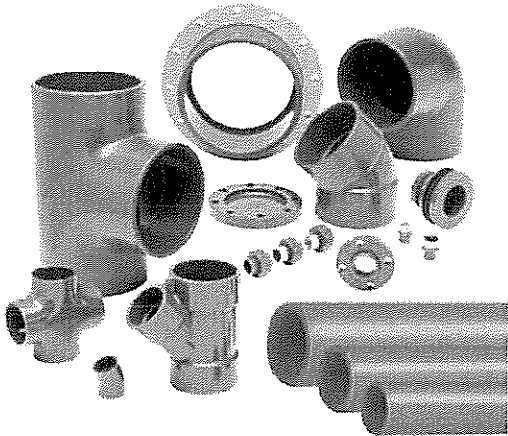
By: *Billy J. Huff* Date: *6-28-16*



PVC SCHEDULE 80 FITTINGS AND PIPE

80-2-0610

Performance Engineered & Tested



SPEARS® Schedule 80 PVC product designs combine years of proven experience with computer generated stress analysis to yield the optimum physical structure and performance for each fitting. Material reinforcement is uniformly placed in stress concentration areas for substantially improved pressure handling capability. Resulting products are subjected to numerous verification tests to assure obtaining the very best PVC fittings available.

Full 1/4" Through 12" Availability

Spears® comprehensive line of PVC injection molded fittings and extruded pipe offers a variety of configurations in sizes 1/4" through 12". Schedule 80 fittings are manufactured to ASTM D 2467 and pipe is produced to ASTM D 1785. Spears® exclusive CL150 Flanges are produced in sizes 1/2" - 18" with ANSI B16.5 bolt patterns, plus numerous Unions, Saddles, Transition and Specialty fittings in a variety of sizes.

Exceptional Chemical & Corrosion Resistance

Unlike metal, PVC fittings and pipe never rust, scale, or pit, and will provide many years of maintenance-free service and extended system life.

High Temperature Ratings

PVC thermoplastic can handle fluids at service temperatures up to 140° F (60° C), allowing a wide range of process applications, including corrosive fluids.

Lower Installation Costs

Substantially lower material costs than steel alloys or lined steel, combined with lighter weight and ease of installation, can reduce installation costs by as much as 60% over conventional metal systems.

Higher Flow Capacity

Smooth interior walls result in lower pressure loss and higher volume than conventional metal fittings.

Additional Fabricated Configurations through 36"

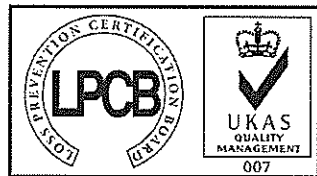
Extra large, hard-to-find, and custom configurations are fabricated from NSF Certified pipe. Fittings are engineered and tested to provide full pressure handling capabilities according to Spears® specifications.

Advanced Design Specialty Fittings

Spears® wide range of innovative, improved products include numerous metal-to-plastic transition fittings and unions with Spears® patented special reinforced (SR) plastic threads.

PVC Valves

SPEARS® PVC Valve products are available for total system compatibility and uniformity; see SPEARS® THERMOPLASTIC VALVES PRODUCT GUIDE & ENGINEERING SPECIFICATIONS (V-4).



Quality Systems Certificate No. 292
Corporate Facilities, Sylmar, CA
Assessed to ISO 9001: 2008

Sample Engineering Specifications
All PVC Schedule 80 pipe and fittings shall be produced by Spears® Manufacturing Company from PVC Type I, cell classification 12454, conforming to ASTM Standard D 1784. All PVC injection molded Schedule 80 fittings and extruded pipe shall be Certified for potable water service by NSF International. All Schedule 80 fittings shall be manufactured in strict compliance to ASTM D 2467 and Schedule 80 pipe shall be manufactured in strict compliance to ASTM D 1785. All fabricated fittings shall be produced in accordance with Spears® General Specifications for Fabricated Fittings. All PVC flanges shall be designed and manufactured to meet CL150 bolt pattern per ANSI Standard B16.5 and rated for a maximum internal pressure of 150 psi, non-shock at 73° F.

PVC Thermoplastic Pipe Temperature Pressure De-Rating

To determine the maximum internal pressure rating at an elevated temperature, simply multiply the pipe pressure rating at 73° F by the percentage specified for the desired temperature.

System Operating Temperature ° F (° C)	73 (23)	80 (27)	90 (32)	100 (38)	110 (43)	120 (49)	130 (54)	140 (60)
PVC	100%	90%	75%	62%	50%	40%	30%	22%

NOTE: Valves, Unions and Specialty Products have different elevated temperature ratings than pipe.

Typical Material Properties

Properties	ASTM Test Method	PVC
Mechanical Properties, 73°F		
Specific Gravity, g/cm ³	D 792	1.41
Tensile Strength, psi	D 638	7,200
Modulus of Elasticity, psi	D 638	440,000
Compressive Strength, psi	D 695	9,000
Flexural Strength, psi	D 790	13,200
Izod Impact, notched, ft-lb / in	D 256	.65
Thermal Properties		
Heat Deflection Temperature, ° F at 66 psi	D 648	165
Thermal Conductivity, BTU / hr / sq ft / ° F / in	C 177	1.2
Coefficient of Linear Expansion, in / in / ° F	D 696	3.1 x 10 ⁻⁵
Flammability		
Limited Oxygen Index, %	D 2863	43
UL 94 Rating	94V-0	
Other Properties		
Water Absorption, % 24 hr.	D 570	.05
Industry Standard Color	White / Dark Gray	
ASTM Cell Classification	D 1784	12454
NSF Potable Water Approved	YES	

PVC Chemical Resistance

PVC is generally inert to most mineral acids, bases, salts and paraffinic hydrocarbon solutions. For more information on PVC chemical resistance refer to the Chemical Resistance of Rigid Vinyls Based on Immersion Test, published by the GEON® company.

NOT FOR USE WITH COMPRESSED AIR OR GASES

Spears[®] Manufacturing Company DOES NOT RECOMMEND the use of thermoplastic piping products for systems to transport or store compressed air or gases, or the testing of thermoplastic piping systems with compressed air or gases in above and below ground locations. The use of our product in compressed air or gas systems automatically voids any warranty for such products, and its use against our recommendation is entirely the responsibility and liability of the installer.

WARNING: DO NOT USE COMPRESSED AIR OR GAS TO TEST ANY PVC OR CPVC THERMOPLASTIC PIPING PRODUCT OR SYSTEM, AND DO NOT USE DEVICES PROPELLED BY COMPRESSED AIR OR GAS TO CLEAR SYSTEMS. THESE PRACTICES MAY RESULT IN EXPLOSIVE FRAGMENTATION OF SYSTEM PIPING COMPONENTS CAUSING SERIOUS OR FATAL BODILY INJURY.



SPEARS® MANUFACTURING COMPANY • CORPORATE OFFICE

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1000 Lakeside Parkway
Flower Mound, TX 75028
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NORTHEAST

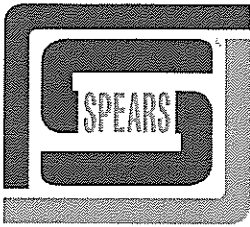
590 Industrial Dr., Suite 100
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INTERNATIONAL SALES

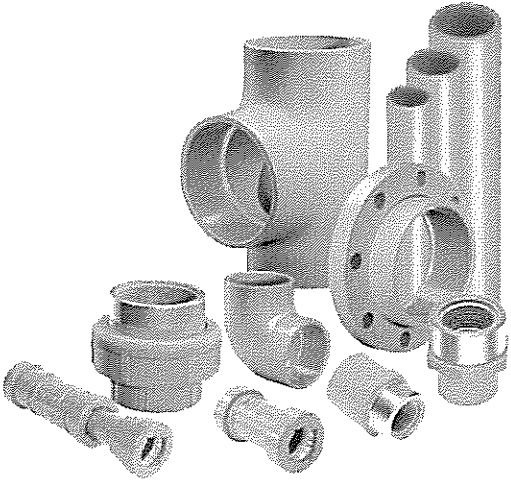
15853 Olden St.
Sylmar (Los Angeles), CA 91342
(818) 364-1611 • Fax (818) 898-3774



CPVC SCHEDULE 80 FITTINGS & PIPE

80C-2-0615

Performance Engineered and Tested



SPEARS® EverTUFF® Industrial Schedule 80 CPVC pipe and fitting designs combine years of proven experience with computer generated stress analysis to yield the optimum physical structure and performance for each fitting. Material reinforcement is uniformly placed in stress concentration areas for substantially improved pressure handling capability. Spears® EverTUFF® CPVC pipe, fittings and Spears® CPVC solvent cement are Certified lead-free by NSF® International (NSF®) in accordance with ANSI/NSF® 61 and NSF® 372 for compliance with all State & Federal Regulations. Approved by national, state and most municipal building codes and listed by ICC to ASTM E84 for Flame & Smoke Characteristics of less than 25/50 for use in return air plenums (See PMG Listing No. PMG-1278 at www.icc-es-pmg.org) Resulting products are subjected to numerous verification tests to assure the very best CPVC piping products available.

1/4" Through 24" Availability

Spears® comprehensive line of CPVC fittings offers a variety of configurations in Schedule 80 sizes 1/4" through 24".

Injection Molded Through 14"

Spears® Schedule 80 CPVC Fittings are injection molded through IPS size 14".

Exceptional Chemical & Corrosion Resistance

Unlike metal, CPVC fittings never rust, scale or pit, and will provide many years of maintenance-free service and extended system life.

Higher Temperature Ratings

High Temperature CPVC Thermoplastics can handle fluids at service temperatures up to 200°F, allowing a wide range of process applications, including hot corrosive liquids.

Higher Flow Capacity

Smooth interior walls result in lower pressure loss and higher volume than conventional metal fittings.

Lower Installation Costs

Substantially lower material costs than steel alloys or lined steel, combined with lighter weight and ease of installation, can reduce installation costs by as much as 60% over conventional metal systems.

CPVC Valves

SPEARS® CPVC Valve products are available for total system compatibility and uniformity; see VALVES & ACTUATED VALVES IN SPEARS® SUPER SOURCE BOOK LIST PRICE & TECHNICAL INFORMATION CATALOG (SSB-1).

SPEARS® Schedule 80 CPVC 14" Through 24" Fittings & Flanges

Schedule 80 CPVC 14" through 24" fittings are a special engineered product by Spears® Manufacturing Company, where no applicable ASTM specifications exist. Available in a variety of injection molded and fabricated configurations including Flanges, Couplings, Elbows, Bushings and Tees, plus custom fabrication to virtually any configuration.

1/4" Through 24" Industrial Pipe Availability

Spears® premium quality Industrial CPVC pipe is offered in Schedule 80 sizes 1/4" through 24". Schedule 40 CPVC pipe is also available.

American Bureau of Shipping (ABS) Type Approved Product

Spears® Schedule 40 and Schedule 80 CPVC pipe and fittings are ABS Type Approved for marine and offshore applications in nominal pipe sizes through 12". Type Approval details and restrictions are specified in ABS Certificate # 10-HS539421-1-PDA available on the ABS website at www.eagle.org.

A Flame & Smoke Rated Piping System

Spears® EverTUFF® Industrial pipe and fittings tested dry through 6" have been Listed by ICC-ES PMG 1278 for Compliance with ASTM E84/UL723 Tests for Surface Burning Characteristics having a flame spread of < 25 and a smoke developed index of < 50 meeting the requirements of the International Mechanical Code and Uniform Mechanical Code for use in return air plenums (See PMG Listing No. PMG-1278 at www.icc-es-pmg.org).

Progressive Products From Spears® Innovation & Technology
Visit our web site: www.spearsmfg.com

Sample Engineering Specifications

All CPVC Schedule 80 pipe and fittings shall be produced by Spears® Manufacturing Company from CPVC materials, minimum cell classification 23447 conforming to ASTM Standard D 1784. All injection molded fittings through 12" shall be manufactured in compliance to ASTM F 439 and all pipe through 24" shall be manufactured in compliance to ASTM F 441. Pipe and fittings shall be Certified by NSF® International for use with potable water service. All 14" through 24" fabricated fittings shall be produced in accordance with Spears® Specifications. All CPVC flanges shall be designed and manufactured to meet CL150 bolt pattern per ANSI Standard B16.5. Pipe and fittings through 6" shall be Listed by ICC for compliance with ASTM E84 Surface Burning Characteristic with flame spread/smoke development of less than 25/50 for use in return air plenums, as manufactured by Spears® Manufacturing Company.

CPVC Thermoplastic Material Temperature Pressure De-rating

Elevated temperature fluid mediums require a de-rating of thermoplastic pipe maximum internal pressure ratings at 73°F. To determine the maximum internal pressure rating at an elevated temperature, simply multiply the product pressure rating at 73°F by the percentage specified for the desired temperature.

System Operating Temperature °F (°C)	73-80 (23-27)	90 (32)	100 (38)	110 (43)	120 (49)	130 (54)	140 (60)	150 (66)	160 (71)	170 (77)	180 (82)	190 (88)	200 (93)	210 (99)
CPVC	100%	92%	82%	77%	65%	62%	50%	47%	40%	32%	25%	22%	20%	-0-

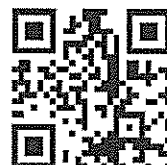
CPVC Typical Physical Properties

Properties	ASTM Test Method	CPVC
Mechanical Properties, 73°F		
Specific Gravity, g/cm ³	D 792	1.55
Tensile Strength, psi	D 638	8,000
Modulus of Elasticity, psi	D 638	360,000
Compressive Strength, psi	D 695	10,100
Flexural Strength, psi	D 790	15,100
Izod Impact, notched, ft-lb / in	D 256	2.9
Thermal Properties		
Heat Deflection Temperature, °F at 66 psi	D 648	217
Thermal Conductivity, BTU / hr / sq ft / °F / in	C 177	.95
Coefficient of Linear Expansion, in / in / °F	D 696	3.2 x 10 ⁻⁵
Flammability		
Limiting Oxygen Index, %	D 2863	60
UL 94 Rating		V-0, 5VB, 5VA
Other Properties		
Water Absorption, % 24 hr.	D 570	.03
Industry Standard Color		Medium Gray
ASTM Cell Classification	D 1784	23447/24448
NSF® Potable Water Approved		Yes

CPVC Chemical Resistance

Weak acids	Excellent
Strong acids	Excellent
Weak bases	Excellent
Strong bases	Excellent
Salts	Excellent
Aliphatic Solutions	Good
Halogens	Good-Fair
Strong Oxidants	Good-Fair

CPVC is not recommended for continuous or pressure use with chlorinated or aromatic hydrocarbons, esters, or polar solvents such as ketones.



NOT FOR DISTRIBUTION OF COMPRESSED AIR OR GASES



Assessed to ISO 9001: 2008
Certificate number 293



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