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APPROVAL SUBMITTAL

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Purpose

This set of documents has been prepared to provide a concise overview of Spears® LabWaste™ CPVC Corrosive Waste Drainage System, its standards and approvals, and is authorized for presentation and submittal distribution in request for approval by State and Local Plumbing Authorities, Fire Marshals, or other Authorities Having Jurisdiction (AHJ) as deemed necessary for approval purposes. This document is to be used in its entirety and shall not be distributed in part. Unauthorized distribution is prohibited.

Model Plumbing Code Approval Category: Chemical Waste; Special Waste; Acid Waste

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Attachments:

Spears® Publication LW-4: *Spears® LabWaste™ CPVC Corrosive Waste Drainage System, Technical Information & Installation Guide*

Spears® Publication FPP-7, *Fire Performance Properties of Spears® CPVC Product*

Official NSF Listing Excerpts for Spears® LabWaste™ CPVC Corrosive Waste Drainage System

Spears® Manufacturing Company certifies that this document has been reviewed by the parties below for technical content and is believed to be accurate to the best of our knowledge at the time of authorization.

Administrative Review By:

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Vice President and General Manager

Technical Review By:

Steven H. Kerr
Corporate Quality Manager

Product Description:

Name: Spears® LabWaste™ CPVC Corrosive Waste Drainage System

The basic product line consists of fittings, pipe, solvent cement, with additional supplemental equipment (i.e., neutralization tanks), is substantially chemical and corrosion resistant, is produced to ASTM F 2618, *Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Fittings for Chemical Waste Drainage Systems,* in DWV drainage patterns, uses solvent cement welding as a joining method, is suitable for intermittent non-pressure drainage use to 220° F, and carries a 25/50 flame spread/smoke development rating when tested as a finished product.

Product Application & Use:

Spears® LabWaste™ CPVC Corrosive Waste Drainage System is for use in buildings and underground installations of chemical waste drainage in industrial, institutional, or medical applications as deemed suitable. Selection and suitability for use in any specific application is, as with all special wastes systems and materials, the responsibility of the specifying engineer or system designer. Acceptance of the specified system is normally at the discretion of the local Authority Having Jurisdiction (AHJ).

Laboratory Applications - These applications are best characterized as the routine disposal of a wide variety of hot and cold chemicals in relatively small quantities accompanied by water for the purpose of dilution and flushing. Due to the interactions potentially encountered in multi-chemical laboratory drainage disposal, Spears® recommends routine flushing of the system with water during disposal as a part of prudent laboratory practices. A properly designed and installed LabWaste™ CPVC system provides total dilution and disposal needs for years of dependable service.

Industrial & Commercial Special Waste Applications - Spears® LabWaste™ CPVC products can be used in a very broad variety of dedicated waste applications with proper evaluation of waste medium and service conditions. For non-laboratory applications, refer to CPVC pressure system resistance data for appropriate chemical resistance guidelines.

Material, Joining Method & System Integrity:

Chlorinated Polyvinyl Chloride (CPVC) is a chemical and corrosion resistant thermoplastic that is structurally stable, heat resistant, and joined by solvent cement welding as a method of pipe and fitting connection. CPVC is suitable for general use to 210°F and to 220°F in intermittent, non-pressure drainage applications (unlike Polyvinyl Chloride, PVC, which is limited to 140°F). The Spears® LabWaste™ *system* consists of CPVC thermoplastic pipe, fittings, and solvent cement that have been independently tested to the requirements of ASTM F 2618 , *Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Fittings for Chemical Waste Drainage Systems*, for use in CPVC chemical waste systems in. Interface of pipe, fittings and solvent cement has been engineered as an integral package to assure proper component compatibility and maximum system integrity. Spears® LabWaste™ LW-5 "One-Step" (primerless) CPVC solvent cement has been specially formulated and tested for use in chemical waste and harsh chemical service.

Independent Product Certifications, Plumbing Code Approvals & Evaluations

Spears® LabWaste™ CPVC Corrosive Waste Drainage System is a complete system of pipe, fittings and solvent cement. Manufactured to ASTM F 2618, *Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Fittings for Chemical Waste Drainage Systems.* Conformance of Spears® LabWaste™ CPVC pipe, fittings, and solvent cement to these requirements, to IAPMO Interim Guide Criteria (IGC 210/221), and the ICC-Evaluation Services Acceptance and Listing Criteria (AC252 and PMG LC1007) has been independently (3rd party) tested, evaluated and certified by NSF International (See Table 1). Each of these approvals is routinely monitored through an ongoing program of periodic inspection and testing by the certifying/approving agency.

• **ASTM F 2618 Performance Standard -** Certified for corrosive waste end use by NSF International in accordance with ASTM F 2618, *Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Fittings for Chemical Waste Drainage Systems* (NSF-cw). See Spears® NSF Official Listings at www.nsf.org.

• **Uniform Plumbing Code** - Certified for use in accordance with the Uniform Plumbing Code (UPC) by NSF International as specified in IAPMO Interim Guide Criteria for *Chlorinated Poly (Vinyl Chloride)(CPVC) Pipe and Fittings for Limited Chemical Waste Drainage Systems*, IGC 210 (NSF-U.P.Code) See Spears® NSF Official Listings at www.nsf.org. LabWaste™ LW-5 Solvent Cement is approved under IAPMO IGC 210 and also under IAPMO IGC 221, Interim Guide Criteria for *Solvent Cement for Chlorinated Poly (Vinyl Chloride)(CPVC) Pipe and Fittings for Limited Chemical Waste Drainage Systems.*

• **International Plumbing Code -** Approved for use in accordance with the International Plumbing Code (IPC) by the International Codes Council Evaluation Services (ICC-ES) in accordance with *Acceptance Criteria for CPVC Systems of Pipe, Fittings and Solvent Cement Used in Chemical Waste Systems*, AC252 (See Evaluation Report No. ESR-1214 at www.icc-es.org.); and *PMG Listing Criteria for Chlorinated Poly Vinyl Chloride (CPVC) System of Pipe Fittings and Solvent Cement Used in Chemical Waste Systems*, LC1007 (See PMG Listing No. PMG-1018 at www.icc-es-pmg.org).

• **Surface Burning Characteristics -** Evaluated for Flame Spread and Smoke Density by Underwriters Laboratories of Canada in accordance with *Standards Test Method for Surface Burning Characteristics of Floor Coverings, and Miscellaneous Materials and Assemblies*, CAN/ULC S102.2-M88 (ULC Listed). This evaluation has been made to finished product, as shown in Table 3.

Table 1: Summary of Applicable Conformance Standards

Conformance Criteria	Applicable Standard		Standard Specification or Criteria Title
Product Certification, Interim Guide Criteria, and Acceptance Criteria	Certification to ASTM F 2618 for corrosive waste end use.[1]		ASTM F 2618, *Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Fittings for Chemical Waste Drainage System,* NSF Standard14 Listed (NSF-cw).
	IAPMO Interim Guide Criteria, IGC 210		*Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Fittings for Limited Chemical Drainage Systems.*
	IAPMO Interim Guide Criteria, IGC 221		*Solvent Cement for Chlorinated Poly (Vinyl Chloride)(CPVC) Pipe and Fittings for Limited Chemical Waste Drainage Systems.*
	ICC Acceptance Criteria, AC252, Evaluation Report ESR-1214		Acceptance Criteria for CPVC Systems of Piping, Fittings and Solvent Cement Used in Chemical Waste Systems.
	ICC PMG Listing Criteria, LC1007, Listing Number PMG-1018		PMG Listing Criteria for Chlorinated Poly Vinyl Chloride (CPVC) System of Pipe Fittings and Solvent Cement Used in Chemical Waste Systems.
Product Performance Criteria:	ASTM Specifications[2]	Additional Specifications[2]	ASTM F 2618, *Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Fittings for Chemical Waste Drainage System NSF – 14 Certified - See above*
Dimensions of Pipe & Fittings	F 2618		
Flattening of Pipe	F 2618		D1784: *Standard Specification for Rigid Poly(Vinyl Chloride)(PVC) and Chlorinated Poly(Vinyl Chloride)(CPVC) Compounds*
Material	F 2618 & D 1784		
CPVC Chemical Resistance	F 2618		
Mechanical Joints Pull-Out Resistance	F 2618		
Solvent Cements & Chemical Resistance of Joints	F 2618 & F 493		F493: *Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride)(CPVC) Plastic Pipe and Fittings*
Impact Resistance Of Pipe & Fittings	F 2618		
		IAPMO IGC 210	*IAPMO IGC 210 – See above*
		IAPMO IGC 221	*IAPMO IGC 221 – See above*
		ICC-ES AC252	*ICC-ES AC 252 – See above*
		ICC-ES LC1007	*ICC-ES LC1007 – See above*

1 – See NSF Official Product Listing for Spears® LabWaste™ CPVC Corrosive Waste Drainage System
2 – Specification of performance requirements are detailed in each of the designated agency criteria listed.

Chemical Resistance Evaluation

Chemical resistance evaluation recommendations for a broad range of chemicals in Laboratory Applications are found in the attached Spears® publication LW-4, *Spears® LabWaste™ CPVC Corrosive Waste Drainage System, Technical Information & Installation Guide.* As previously noted, industrial and commercial systems intended for dedicated service and other non-laboratory applications should consult conventional CPVC pressure system resistance data for appropriate chemical resistance guidelines**.**

Each ASTM Standard for thermoplastic chemical or corrosive waste systems contains material Chemical Resistance test requirements to demonstrate resistance across a range of chemicals representative of the types of chemicals that might be encountered in service. While the ASTM testing is an indication of material capability, this testing is not a limitation on use. Rather, it is a demonstration of conformance to a minimum requirement to assure that all products manufactured from a given material type (i.e., CPVC) have met the same requirements. Chemical Resistance testing for Chlorinated Poly Vinyl Chloride (CPVC) in ASTM F 2618 has the broadest range of chemical resistance test requirements of any ASTM Standard for a thermoplastic chemical or corrosive waste system material and the only thermoplastic material test requirement demonstrating conformance at both 73°F and 180°F. ASTM Chemical Resistance testing is evaluated in accordance with ASTM D 543, *Standard Practice for Evaluating the Resistance of Plastics to Chemical Reagents,* requiring no more than a10% change in tensile strength and no more than a 2% weight change. The following table specifies chemicals and concentration by volume tested in the ASTM F 2618 Standard for CPVC.

Table 2: ASTM F 2618 Chemical Resistance Test

Chemical[1]	Concentrations
Acetic Acid	100%
Acetic Acid @ 180°F	50%
Acetone	30%
Acetone @180°F	20%
Methyl Alcohol	100%
Methyl Alcohol @ 180°F	50%
Ammonium Hydroxide[2]	15%
Nitric Acid	70%
Nitric Acid @ 180°F	30%
Sodium Hydroxide	60%
Sodium Hydroxide @ 180°F	30%
Sulfuric Acid	98%
Sulfuric Acid @ 180°F	85%
Hydrochloric Acid	36%
Hydrochloric Acid @ 180°F	36%
Hydrogen Peroxide	50%
Hydrogen Peroxide @ 180°F	50%
Sodium Hypochlorite[2]	15%

1 – All testing conducted at 73°F except as noted at 180°F.
2 – Chemical not tested at 180°F due to instability or inherent danger in test at elevated temperature.

Flammability & Surface Burning Characteristics

Spears® LabWaste™ CPVC Corrosive Waste Drainage System has been independently evaluated by UL/ULC for flammability of material and has received 3rd party evaluation of surface burning characteristics of flame spread and smoke development as a finished product, as shown below.

Table 3: Fire Performance Ratings

Performance Criteria	Applicable Standard	Standard Specification or Criteria Title
Flammability Material Rating	UL94, V-0	UL94: *Tests for Flammability of Plastic Materials for Parts in Devices and Appliances*
Surface Burning Characteristics Rating[1] Pipe Flame Spread: Smoke Developed: Fittings Flame Spread: Smoke Developed:	CAN/ULC S102.2 0 5 – 20 5 - 10 15 - 50	CAN/ULC S102.2: *Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials*

1 – Surface Burning Characteristics for flame spread and smoke development ratings based on tests of finished product, pipe and fittings solvent cement welded as assemblies.

Information Applicable to Approval for Use in Air Plenums

The responsibility for approval of a product for use in air plenums is generally that of the local Fire Marshall or equivalent AHJ. Typical regulations for plenum use require a rating of maximum flame spread 25 and maximum smoke development of 50. Spears® LabWaste™ CPVC Corrosive Waste Drainage System pipe and fittings have been Listed and rated based on *finished product and assemblies* tests, as opposed to only a sheet-material test, for surface burning characteristics of flame spread and smoke density developed by Underwriters Laboratories of Canada under standard test method CAN/ULC S102.2 (see preceding Table 3 and attached Spears® publication, *Fire Performance Properties of Spears® CPVC Products*, for additional detailed information). The ULC evaluated pipe and fitting components ratings are below a 25 maximum flame spread and 50 maximum smoke density developed and has been accepted by numerous authorities as suitable for use in return air plenums. Spears® product conformance to CAN/ULC S 102.2 ratings is routinely inspected by Underwriter's Laboratories, Inc. (US) under UL Follow-up Services (FUS) procedures.

Selection of CAN/ULC S102.2 Test Protocol

This standard was selected due to its provisions for testing physical assemblies of shapes, such as pipe valves and fittings. CAN/ULC S102, *Surface Burning Characteristics of Building Materials and Assemblies,* is technically comparable to ASTM E 84, *Surface Burning Characteristics of Building Materials,* UL 723, *Test for Surface Burning Characteristics of Building Materials,* and NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials* in terms of general method (flame chamber tunnel test, overhead sample), measurement, and resulting ratings criteria based on the test values of Fibrous Cement Board = 0 and Select Red Oak = 100 in a 10 minute flame test. The protocol of *CAN/ULC S102.2* differs in that it is a floor level test as opposed to an overhead mounted sample. This allows for testing of shapes such as physical product assemblies as opposed to only material sheet samples specified in the other test protocols referenced above. Moreover, the S102.2 test projects the flame directly onto the sample. This reduces the potential for loss of flame-front continuity in materials that melt or drip since the sample cannot escape the flame impingement. Loss of continuity in the flame-front can be experienced in overhead tests of plastic products, potentially resulting in relatively low flame-spread indices (ref., ASTM E 84, Section 1.4). However, since these are different tests, no direct comparison of their indices can be made and both CAN/ULC S102.2 and ASTM E 84 tests have been used for many years in evaluation of surface burning characteristics of numerous products.

Supplemental Equipment

Supplemental equipment such as neutralization tanks, holding tanks, etc. are custom built to specifications provided by the designing engineer responsible for conformance to applicable code requirements.

Manufacturer's Capability

Spears® Manufacturing Company is a leading producer of thermoplastic valves and pipe fittings with over 40-years experience in design and production of piping system components. Spears® manufactures a broad line of products conforming to ASTM Standards, including the LabWaste™ CPVC Corrosive Waste Drainage System. Spears® manufacturing facilities are routinely inspected by NSF International, Underwriters Laboratories, FM Global and Loss Prevention Certification Board for capability and product performance as a part of applicable product certification.

Spears® operates under a vertically integrated manufacturing system in which all product design, all mold design, all mold building and all molding process equipment development is conducted in-house. Spears® also maintains in-house testing facilities for validation and verification of all product requirements. Spears® manufacturing facilities are certified to ISO 9001 for the design and manufacture of injection molded thermoplastic valves and fittings by the Loss Prevention Certification Board, BRE Certification, Ltd., England, Certificate No. 293.

Summary of Provisions for Approval Under Model Plumbing Codes:

Spears® LabWaste™ CPVC Corrosive Waste Drainage System meets the requirements of major model plumbing codes under the category of *Special Wastes* or *Chemical Wastes* with applicable restrictions and conditions specified therein with respect to the following key elements:

1. The product is listed and certified by a recognized national testing laboratory, NSF International, to the requirements of ASTM F 2618, *Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Fittings for Chemical Waste Drainage Systems,* for corrosive waste end use (NSF-cw).

2. The product has been additionally independently certified to meet the requirements for CPVC chemical waste systems as specified in IAPMO Interim Guide Criteria, IGC 210, applicable to the Uniform Plumbing Code (UPC); in ICC-ES Acceptance Criteria, AC 252, and ICC-ES PMG Listing Criteria, LC1007, applicable to the International Plumbing Code (IPC).

3. The product meets the provisional requirements of major model plumbing codes for alternative methods and materials, complying with established provisions therein.

Please see specified submittal attachments for additional information on Spears® LabWaste™ CPVC Corrosive Waste Drainage System.