Provent® Piping System Specification

PART 1: GENERAL

1.1 Summary

Furnish a complete polypropylene piping system including piping, related fittings, and associated pipe joining equipment and material for ventilation at low pressure or vacuum.

1.2 References

A. The following standards are referenced to products used within this section:

EN ISO 15494 Supplement B	Plastics piping systems for industrial applications – Polypropylene (PP) – Metric series for specifications for components and the system
DVS 2207-11	Welding of thermoplastic materials – Heated element welding of pipes, piping parts and panels made of PP
DIN 8077	Polypropylene (PP) - Dimensions
DIN 8078	Polypropylene (PP) Pipes - General quality requirements and testing
ASTM D4101	Standard specification for Polypropylene injection and extrusion materials
DVS 2205-1	Design calculations for containers and apparatus made from thermoplastics; characteristics values
ISO 9080	Determination of long-term hydrostatic pressure resistance of thermoplastics pipes
DVS 2207-3	Welding of thermoplastic materials – Hot-gas string-bead welding, hot-gas welding with torch separate from filler rod pipes
DVS 2207-4	Welding of thermoplastic materials – Extrusion welding of pipes, piping parts, fittings and panels
Safety Factor (Design coefficient)	A number greater than 1.00 which divides a base value which takes into consideration variables and degree of safety involved to provide a specific value for an application. The inverse of the Service Factor.
Service Factor (Design Factor)	A number less than 1.00 which multiplies a base value which takes into consideration variables and degree of safety involved to provide a specific value for an application. The inverse of the Safety Factor.

1.3 System Description and Pressure Rating

System shall be a piping system of material and pressure rating as specified below (See Section 2.2 and 2.3).

1.4 System Performance Requirements

System design performance requirements shall fall within the defined parameters within this specification

	Customer Parameters
Operating Pressure	
Operating Temperature	
Test Pressure	
Media	

1.5 Submittals

A. Product data for the piping system specified including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

B. Welder certificates certifying that welders have been trained by the manufacturer of the venting system and comply with the installation procedures as outlined by DVS 2207. All required training should be scheduled and completed at job start-up.

C. Qualifications of contracting firms supplying thermoplastic piping: Contracting firms must have the appropriate experience in installation (hot-air/extrusion welding) and operation of a thermoplastic venting system.

1.6 Quality Assurance

A. Obtain components from a single source having responsibility and accountability to answer and address questions regarding proper installation, compatibility, performance, and acceptance.

B. Design and install piping to meet customer's specified ventilation requirements and where applicable manufacturer shall provide thermal stress analysis demonstrating the ability of the venting system to handle the stated conditions.

1.7 Delivery and Handling

A. Care shall be taken to prevent damage to the supplied components. Avoid scraping, denting, and gouging the components. Surface damage deeper than 10% of the wall thickness shall be rejected.

B. Store products on elevated platforms in a dry location with protection from elements affecting product integrity. Utilize protective wrappings/coverings as necessary.

C. Lift, support, and transport ventilation piping per manufacturers recommendations. Pipe shall have adequate support at all times to prevent sagging or distortion.

1.8 Warranty

The warranty period is one year after date of substantial completion for job installations lasting no longer than one year. Asahi/America is not responsible for failures due to installation error or neglect.

PART 2: PRODUCTS

2.1 Manufacturers

Subject to compliance with requirements, products which may be incorporated in the work include: Provent® ventilation piping system as supplied by Asahi/America, Inc., of Lawrence, Massachusetts, 800-343-3618. No equal.

2.2 Materials

All pipe and fittings are manufactured per DIN8077 and DIN 8078.
Provent is made of polypropylene homopolymer (PPH) resin with the minimum classification of: ASTM D4101 Group 1, Class 1, Grade 0.

2.3 Pressure Rated Pipes

A. Components shall be pressure rated in accordance with ISO9080. Pressure rating is based on continuous service life of 25 years at 68°F (20°C) for air.

- PP-H (ProVent) shall be pressure rated to a minimum of .15 psi (vacuum) and 10.0 psi (positive pressure) at 68°F (20°C) for air for all diameter sizes 4" – 48" (110mm – 1200mm).

B. Components shall be pressure rated in accordance with ISO9080. Pressure rating is based on continuous service life of 25 years at 68°F (20°C) for chemical service.

- **(Consult Asahi/America Engineering staff for chemical recommendation)**

2.4 Pressure Rated Fittings

All pressure rated fittings will be per the piping SDR rating unless specifically identified on drawings or datasheet.

2.5 Non-pressure Rated Fittings

All fittings not meeting the piping SDR rating will be specifically identified on drawings and/or datasheets.

2.6 Unlisted Components

Any customer requiring non-standard components (non-standard geometry, welding or wall thickness) that are not supplied as part of our normal product offerings can request pressure testing for verification.

2.7 Valves

Pressure rated valves to be supplied rated for the service or specified lower pressure/temperature rating as pipe.

PART 3: EXECUTION

3.1 Installation

A. Install ventilation piping to comply with manufacturer's recommended procedures. All ventilation pipe and fitting joints shall be accomplished using couplings and either hot air welding or extrusion welding, or through the use of flanges.

B. Installers may be pre-qualified through sufficient training in hot air and/or extrusion welding according to AWS B2.4 and/or DVS 2207.

C. Manufacturer/manufacturer's representative shall provide on-site training in the assembly, installation, and operation of the Provent piping system.

3.2 Testing

A. Inspection

Prior to pressure testing, the system shall be examined for the following items:

1. Ventilation pipe shall be completed per drawing layout with all pipe and valve supports in place.

2. Ventilation pipe, valves, and equipment shall be supported as specified, without any concentrated loads on the system.

3. Ventilation pipe shall be in good conditions, void of any cracks, gouges or deformation.

4. Pipe flanges shall be properly aligned. All flange bolts should be checked for correct torques.

5. All joints should be reviewed for appropriate welding technique.
   a) Hot air welds: Plain end should be fully seated into coupling; weld bead should be consistent and 360° around the joint. Hot air welds should have a sufficient number of passes to ensure fully-rated bead formation.

   b) Extrusion welds: Plain end should be fully seated into coupling; weld bead should be consistent and 360° around the joint.

B. Pressure Test for Vacuum/Pressure Systems

1. Testing shall be conducted in accordance with manufacturer's recommendations. The owner shall be notified at the time of test and can choose to be present.

   a) Recommended testing would include a low pressure (.5" WC) pre-test, followed by a soap bubble test (6" WC), concluded with a pressure decay test (6" WC)

PART 4: APPENDICES

Disclaimer: This information is provided for convenience. Please consult Asahi/America's staff at 781-321-5409.

4.1 Material Properties

Table 1 - Material Properties PP

	Properties	Standards	Units	PP-H
Mechanical Properties	Specific density at 23°C	ISO 1183	g/cm^3	0.91
	Melt Flow Rate (MFR) 190/5	ISO 1133	g/10min	0.5
	Melt Flow Rate (MFR) 190/2.16			--
	Melt Flow Rate (MFR) 230/5			1.5
	Tensile stress at yield	ISO 527	MPa	30
	Elongation at yield		%	10
	Elongation at break			>300
	Impact strength unnotched at +23°C	ISO 179	kJ/m^2	no break
	Impact strength unnotched at -30°C			no break
	Impact strength notched at +23°C			8
	Impact strength notched at 0°C			2.8
	Impact strength notched at -30°C			2.2
	Shore-D Hardness (3 sec)	ISO 868	1	70.2
	Flexural strength (3.5% flexural stress)	ISO 178	MPa	28
	Modulus of elasticity	ISO 527	MPa	1300
Thermal Properties	Vicat-Softening point VST/B/50	ISO 306	°C	91
	Heat deflection temperature HDT/B	ISO 75	°C	96
	Linear coefficient of thermal expansion	ISO 11359-2	$K^{-1} \times 10^{-4}$	1.6
	Thermal conductivity at 20°C	DIN EN 12667	W/ (m x K)	0.22
	Flammability	UL94 EN	--	94-HB
		EN 13501	--	--
		DIN 4102	--	B2
Electrical Properties	Specific volume resistance	DIN EN 62631-3-1	Ω X cm	$>10^{16}$
	Specific surface resistance	DIN EN 62631-3-2	Ω	$>10^{13}$
	Relative dielectric constant at 1 MHz	DIN 53483	--	2.3
	Dielectric strength	DIN IEC 60243	kV/mm	75
General	Food Contact (FDA)	EU 10/2011	--	Yes
	UV stabilized	--	--	No
	Color	--	--	Ral 7032 Grey

4.2 Pressure Rating

Permissible operating pressure for Provent piping systems based on years of operation and temperature. These tables are for air, a safety correction factor shall be applied for chemical service. Consult Asahi/America Engineering staff for chemical recommendation. Typically for compatible chemicals; for PPH use a safety factor of 1.25 between 10°C and 39°C, 1.4 between 40°C and 59°C and 1.6 for 60°C and above. Additionally, a system reduction factor of 0.8 shall be used for influences such as welding, joints, flange, and bending loads for aboveground installations. This factor has already been included within Table 2.

Table 2 – Permissible Operating Pressures for Polypropylene Provent® (psi)

Pipe Dimension (OD x wall thickness) (mm)	10 Year				25 Year			
	Temp 20°C 68°F	Temp 30°C 86°F	Temp 40°C 104°F	Temp 50°C 122°F	Temp 20°C 68°F	Temp 30°C 86°F	Temp 40°C 104°F	Temp 50°C 122°F
75 x 1.9	19.1	16.2	13.6	11.3	18.1	15.4	12.8	10.6
90 x 2.2	19.1	16.2	13.6	11.3	18.1	15.4	12.8	10.6
110 x 2.7	19.1	16.2	13.6	11.3	18.1	15.4	12.8	10.6
125 x 3.1	19.1	16.2	13.6	11.3	18.1	15.4	12.8	10.6
160 x 3.0	14.6	12.4	10.4	8.2	13.9	11.7	9.8	8.1
200 x 3.0	11.6	9.9	8.3	6.9	11.0	9.4	7.8	6.5
250 x 3.5	10.9	9.2	7.7	6.4	10.3	8.7	7.3	6.1
315 x 5.0	12.3	10.4	8.8	7.3	11.7	9.9	8.3	6.8
355 x 5.0	10.9	9.2	7.8	6.5	10.4	8.8	7.3	6.1
400 x 8.0	15.6	13.3	11.1	9.2	14.8	12.5	10.5	8.6
450 x 8.0	13.8	11.8	9.8	8.2	13.1	11.1	9.3	7.7
500 x 10.0	15.6	13.3	11.1	9.2	14.8	12.5	10.5	8.6
560 x 10.0	13.9	11.8	9.9	8.2	13.2	11.2	9.4	7.7
630 x 10.0	12.3	10.4	8.8	7.3	11.7	9.9	8.3	6.8

***** Tensile creep welding factor of .6 applied, assuming continuous hot gas extrusion welding

Table 3 – Buckling Pressures for Polypropylene Provent® (psi)

Pipe Dimension (OD x wall thickness) (mm)	10 Year				25 Year			
	Temp 20°C 68°F	Temp 30°C 86°F	Temp 40°C 104°F	Temp 50°C 122°F	Temp 20°C 68°F	Temp 30°C	Temp 40°C	Temp 50°C
75 x 1.9	0.87	0.80	0.73	0.65	0.80	0.73	0.65	0.58
90 x 2.2	0.87	0.80	0.73	0.65	0.80	0.73	0.65	0.58
110 x 2.7	0.87	0.80	0.73	0.65	0.80	0.73	0.65	0.58
125 x 3.1	0.87	0.80	0.73	0.65	0.80	0.73	0.65	0.58
160 x 3.0	0.40	0.35	0.32	0.28	0.36	0.33	0.30	0.27
200 x 3.0	0.20	0.17	0.16	0.15	0.18	0.17	0.15	0.13
250 x 3.5	0.16	0.15	0.13	0.12	0.15	0.13	0.12	0.11
315 x 5.0	0.24	0.21	0.19	0.17	0.22	0.20	0.18	0.16
355 x 5.0	0.17	0.15	0.13	0.12	0.15	0.14	0.12	0.11
400 x 8.0	0.49	0.43	0.39	0.35	0.44	0.41	0.36	0.33
450 x 8.0	0.34	0.30	0.27	0.24	0.31	0.28	0.25	0.22
500 x 10.0	0.49	0.43	0.39	0.35	0.44	0.41	0.36	0.33
560 x 10.0	0.35	0.30	0.28	0.25	0.31	0.28	0.25	0.23
630 x 10.0	0.24	0.21	0.19	0.17	0.22	0.20	0.18	0.16

Table 4 –Support Distance for Polypropylene Provent® (ft)

Pipe Dimension (OD x wall thickness) (mm)	Weight (lb/ft)	Temp 20°C 68°F	Temp 30°C 86°F	Temp 40°C 104°F	Temp 50°C 122°F
75 x 1.9	**3.2**	6.1	5.9	5.8	5.6
90 x 2.2	**4.5**	6.9	6.7	6.5	6.4
110 x 2.7	**6.7**	7.9	7.7	7.5	7.3
125 x 3.1	**8.7**	8.6	8.4	8.2	7.9
160 x 3.0	**11.1**	10.0	9.7	9.5	9.3
200 x 3.0	**12.4**	10.8	10.5	10.3	10.0
250 x 3.5	**13.7**	11.6	11.3	11.0	10.7
315 x 5.0	**17.9**	12.6	12.2	11.9	11.6
355 x 5.0	**19.9**	13.4	13.1	12.8	12.4
400 x 8.0	**25.2**	14.5	14.1	13.8	13.4
450 x 8.0	**35.5**	15.7	15.3	15.0	14.6
500 x 10.0	**40.1**	17.0	16.5	16.1	15.7
560 x 10.0	**53.5**	18.5	18	17.6	17.1
630 x 10.0	**60.3**	19.9	19.4	18.9	18.4