HARRISON

MACHINE & PLASTIC CORPORATION

HARRISON SUPERDUCT®

FUME EXHAUST SYSTEMS

PVC (POLY VINYL CHLORIDE)
PP (POLYPROPYLENE)
CPVC (CHLORINATED POLY VINYL CHLORIDE)

SPECIFICATIONS CATALOG

HARRISON

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Manufacturing & Sales Office:
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An Introduction to

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Harrison Machine and Plastic Corporation, currently has two major fabrication and distribution facilities: Garrettsville, OH, and Clover SC.

At these manufacturing plants, plastic materials in the form of pipe, duct, sheet and profile are cut, bent, drilled, machined, heat formed and welded into products for corrosion resistant fume and fluid handling systems. In the case of corrosive fume handling systems Harrison fabricates and supplies complete systems consisting of tanks, fume collection hoods, scrubbers, mist eliminators, fans and the duct and duct fittings required to interconnect these components.

For many years Harrison has also been a large supplier of fabricated fittings, both pressure and non-pressure for use in DWV (drain-waste-vent) water systems and in demanding chemical waste, service and process lines of industry. All Harrison facilities maintain significant inventories of PVC, CPVC and PP (Polypropylene) pipe and duct. Relative to PVC, Harrison specializes in furnishing immediate availability of large diameter pipe and fittings.

Harrison takes pride in its long term reputation as an innovator and service oriented manufacturer of quality plastic fabrications as well as its role as a distributor of plastic pipe, duct and fittings.

This catalog refers specifically to the HARRISON SUPERDUCT® product line (duct and duct fittings).

HARRISON SUPERDUCT®

HARRISON SUPERDUCT® offers a complete range of fittings for the installation of venting and fume scrubbing systems. The product line is comprised of process tanks, fume collectors and scrubbers, mist eliminators, duct and associated duct fittings (available with either socket (belled) ends of plain end).

While Harrison is the fabricator of these fittings, the intent of this catalog is to provide a basic understanding of the methods by which items are selected and assembled to provide a controlled pathway from fume collection to processing at the scrubber and on through to the exhaust rain cap.

Harrison can also provide PVC & CPVC rectangular duct systems, as well as those fabricated in Polypropylene which are considered “custom” systems. Please contact us for specific details. Fittings conforming to SMACNA thermoplastic construction specifications are also available on a custom basis.

HARRISON SUPERDUCT® is a time-proven system that requires fewer fittings and connections resulting in reduced installation cost and complexity. Most components are supplied from stock to speed delivery.

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SUPERDUCT®

PVC DUCT PHYSICAL PROPERTIES

Standard specifications for Harrison rigid PVC duct, pipe, fittings and fabrication.

PIPE/DUCT & FITTINGS: PVC ASTM-D-1784, Cell Class 12454-B

PROPERTY	VALUE	ASTM TEST METHOD
General		
Cell Classification	12454	ASTM D1784
Maximum Service Temp.	140°F	
Color	Dark Gray	
Specific Gravity, (g/cu.cm @73°F)	1.40 ±.02	ASTM D792
Water Absorption % Increase 24 hrs @ 25°C	0.05	ASTM D570
Hardness, Rockwell	110-120	ASTM D785
Poisson's Ratio @ 73°F	0.410	
Hazen-Williams Factor	C=150	
Mechanical		
Tensile Strength, psi @73°F	7,450	ASTM D638
Tensile Modulus of Elasticity, psi @ 73°F	420,000	ASTM D638
Flexural Strength, psi @ 73°F	14,450	ASTM D790
Flexural Modulus, psi @ 73°F	360,000	ASTM D790
Compressive Strength, psi @ 73°F	9,600	ASTM D695
Izod Impact, notched ft-lb/in @ 73°F	0.75	ASTM D256
Thermal		
Coefficient of Linear Expansion (in/in/°F)	2.9×10^{-5}	ASTM D696
Coefficient of Thermal Conductivity (Cal.)(cm)/(cm^2)(Sec.)(°C)	3.5×10^{-4}	
BTU/in/hr/ft^2/°F	1.02	ASTM C177
Watt/m/°K	0.147	
Heat Deflection Temp. Under Load (264 psi, annealed)	170	ASTM D648
Specific Heat, Cal./°C/gm	0.25	ASTM D2766

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Electrical

Dielectric Strength, volts/mil	1,413	ASTM D149
Dielectric Constant, 60HZ, 30°F	3.7	ASTM D150
Volume Resistivity, ohm/cm @ 95°C	1.2×10^{12}	ASTM D257
Pipe is non-electrolytic		

Fire Performance

Flammability Rating	V-0	UL-94
Flame Spread Index	<10	
Flame Spread	0-25	ULC
Smoke Generation	80-225	ULC
Flash Ignition Temp.	730°F	
Average Time of Burning (sec.)	<5	ASTM D635
Average Extent of Burning (mm)	<10	
Burning Rate (in/min)	Self Extinguishing	
Softening Starts (approx.)	250°F	
Material Becomes Viscous	350°F	
Material Carbonizes	425°F	

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PVC SHEET PHYSICAL PROPERTIES

Standard specifications for Harrison PVC duct, pipe, fittings, and fabrication.

FABRICATED DUCT & DUCT FITTINGS: PVC ASTM D1784, Cell Class 12454-B.
APPLIES TO SHEET IF USED.

PROPERTY	VALUE	ASTM TEST METHOD	UNITS
Physical			
Density	1.42	D 792	g/cm3
Water Absorption	0.06	D 570	%
Rockwell Hardness	115	D 785	R Scale
Shore Durometer	89	D 224	D
Cell Class	12454-B	1784	
Mechanical			
Tensile Modulus	411,000	D 638	psi
Yield Strength	7,500	D 790	psi
Flexural Modulus	481,000	D 790	psi
Flexural Yield Strength	12,800	D 790	psi
Izod Impact Strength	1.0	D 256	ft-lb/in
Thermal			
Vicat Softening Point	83/181	D1525	°C/°F
Heat Deflection Temp (66 psi)	82/179	D 648	°C/°F
Heat Deflection Temp (264 psi)	80/176	D 648	°C/°F
Coefficient of Linear Expansion	5.8×10^{-5}	D 696	in/in/°C
Coefficient of Linear Expansion	3.2×10^{-5}	D 696	in/in/°F
Flammability Ratings			
Flame Spread Index	20	E 84	
Flammability	0	UL 94V	
Flammability	Self-Extinguishing	D635	
Chemical			
Chemical Resistance	Class B	D 1784	
Electrical			
Electrical Volume Resistivity	5.4×10^{15}	D 257	Ohm/cm
Dielectric Constant	3.9	D 150	60 Hz
Dissipation Factor	0.0096	D 150	60 Hz
Loss Index	0.030	D 150	60 Hz
Dielectric Strength	544	D 149	Volts/mil

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CPVC DUCT PHYSICAL PROPERTIES

CPVC duct is extruded from Corzan ® CPVC compounds as provided by Noveon, Inc. Fittings are fabricated from Corzan ® CPVC duct and/or sheet stock material manufacured with Corzan ® compounds.

Standard specifications for Harrison rigid CPVC duct, pipe, fittings and fabrication.

PIPE/DUCT & FITTINGS: CPVC, ASTM-D-1784, Cell Class 23447

PROPERTY	VALUE	ASTM TEST METHOD
General		
Cell Classification	23447	ASTM D1784
Maximum Service Temp.	200°F	
Color	Medium Gray	
Specific Gravity, (g/cu.cm @73°F)	1.53 ±.02	ASTM D792
Water Absorption % Increase 24 hrs @ 25°C	0.03	ASTM D570
Hardness, Rockwell	117	ASTM D785
Poisson's Ratio @ 73°F	0.386	
Hazen-Williams Factor	C=150	
Mechanical		
Tensile Strength, psi @73°F	7,600	ASTM D638
Tensile Modulus of Elasticity, psi @ 73°F	370,000	ASTM D638
Flexural Strength, psi @ 73°F	12,500	ASTM D790
Flexural Modulus, psi @ 73°F	360,000	ASTM D790
Compressive Strength, psi @ 73°F	10,000	ASTM D695
Compressive Modulus, psi @ 73°F	196,000	ASTM D695
Izod Impact, notched ft-lb/in @ 73°F	2.6	ASTM D256
Thermal		
Coefficient of Linear Expansion (in/in/°F)	3.9×10^{-5}	ASTM D696
Coefficient of Thermal Conductivity (Cal.)(cm)/(cm^2)(Sec.)(°C)	3.27×10^{-4}	
BTU/in/hr/ft^2/°F	0.95	ASTM C177
Watt/m/°K	0.137	
Heat Deflection Temp. Under Load (264 psi, annealed)	228°F	ASTM D648

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Electrical

Dielectric Strength, volts/mil	1,250	ASTM D149
Dielectric Constant, 60HZ, 30°F	3.70	ASTM D150
Volume Resistivity, ohm/cm @ 73°F	3.4×10^{15}	ASTM D257
Power Factor, 1,000 Hz	0.007%	ASTM D150
Pipe is non-electrolytic		

Fire Performance

Flammability Rating	V-0, 5VB, 5VA	UL-94
Flame Spread Index	<10	
Flame Spread	<25	ASTM E-84/UL 723
	<25	ULC
Smoke Generation	≤50	ASTM E-84/UL 723
	<50	ULC
Burning Rate (in/min)	Self - Extinguishing	
Softening Starts (approx.)	295°F	
Material Becomes Viscous	395°F	
Material Carbonizes	450°F	
Limiting Oxygen Index (LOI)	60	ASTM D2863
Flash Ignition Temp.	900°F	
Average Time of Burning (sec.)	<5	ASTM D635
Average Extent of Burning (mm)	<10	

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CPVC SHEET PHYSICAL PROPERTIES

Standard specifications for Harrison CPVC duct, pipe, fittings, and fabrication.

FABRICATED DUCT & DUCT FITTINGS: CPVC ASTM D1784, Cell Class 24446-B.

APPLIES TO SHEET IF USED.

PROPERTY	VALUE	ASTM TEST METHOD	UNITS
Physical			
Density	1.47	D 792	g/cm3
Water Absorption	0.03	D 570	%
Rockwell Hardness	116	D 785	R Scale
Cell Class	24446-B	D1784	
Mechanical			
Tensile Strength	7,300	D 638	psi
Flexural Strength	14,300	D 790	psi
Flexural Modulus	361,000	D 790	psi
Compressive Strength	10,100	D 695	psi
Compressive Modulus	196,000	D 695	psi
Izod Impact (Notched)	9	D 256	Ft-/lb/ino.n
Thermal			
Heat Deflection Temp (264 psi)	198	D 648	°F
Coefficient of Linear Expansion	3.86×10^{-5}	D 696	in/in/°F
Thermal Conductivity	0.95	C 177	BTU/in/hr/ft^3/°F
Flammability Ratings			
Flammability	0.062"	UL 94	V-O, 5VB, 5VA
Flame Spread Index	15	E 84	
Limiting Oxygen Index	60	D 2863	%
Electrical			
Volume Resistivity	3.4×10^{15}	D 257	Ohm/cm
Dielectric Constant	3.7	D 150	60 Hz
Dielectric Strength	1250	D 147	Volt/MIL
Power Factor	0.007%	D 150	1000 HZ

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HARRISON SUPERDUCT ® INSTALLATION (PVC)

As fittings described in our catalog are built to Harrison specifications, Harrison can also provide systems to SMACNA specifications upon request. The SMACNA manual (Thermoplastics Duct (PVC) Construction Manual), is a good source of information for those involved in the specification and installation of PVC duct systems.

Another excellent information resource publication, used extensively by Harrison, is the "Industrial-Ventilation Manual of Recommended Practice". This book covers all phases of designing and sizing of an industrial ventilation system. It is an excellent educational tool.

Beyond these two resources, Harrison offers the following recommendations, relative to system installation, based on years of field experience.

HARRISON SUPERDUCT ® duct systems are easily assembled since they basically consist of fittings that are bell-end to receive plain-end duct, or in the case of plain-end fittings and pipe they are assembled using sleeve couplings.

In the case of square and rectangular HARRISON SUPERDUCT ® systems, these are always either welded together or connected by bolted flanges. Solvent cement is never used.

Reference Material
Thermoplastic Duct Construction Manual, Published by the Sheet Metal & Air Conditioning National Association, Inc.,4201 Lafayette Center Drive, Chantilly, VA 22021

Industrial Ventilation Manual, Published by the American Conference of Governmental Industrial Hygientists, Cincinnati, OH

GENERAL

In diameters thru 14", Harrison has found that HARRISON SUPERDUCT ® systems can be readily joined via the solvent cement method. Beyond 14", the actual cementing and drying times become so protracted that sections of large duct cannot be maneuvered into position quickly enough to
effect a good solvent fusion before the cement hardens and dries.

It is our experience that with systems above 14", they should be joined via the hot-air welding method, using PVC welding rod and welding guns available thru Harrison on either a rental or purchase basis.

SOLVENT CEMENT WELDING

Solvent cement welding is by far the most widely used process for joining PVC pipe & duct. Properly assembled, it is certainly the easiest way to make quality sealed joints.

To avoid the needless expense of repairing, perhaps back-welding a faulty joint, the following key points are emphasized to ensure quality joints:

1. Solvent cementing should not be attempted at temperatures below 40º F or much above 90º F. Joints should not be made in hot, direct sunlight.

2. Remove all burrs and chips from any duct that has been cut. With a clean, dry, cotton rag wipe away any surface contamination on the surfaces that are to be joined. If the surfaces are wet i.e. condensation, **DO NOT ATTEMPT TO JOIN THEM**- they will fail.

3. Using an applicator, approximately half the size of the duct diameter, apply **PRIMER.** The function of primer, in making quality joints, is to penetrate and soften the hard surfaces of

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SOLVENT CEMENT WELDING (CONT'D)

extruded PVC duct. This must be done on **BOTH** surfaces to be joined. A simple

rule of thumb, in checking the adequacy of surface priming, is the ability to scrape a few thousandths of the softened PVC surface.

4. **DO NOT ALLOW THE PRIMER TO DRY** before applying the solvent. Once the two surfaces to be joined have been fitted together, give the joint a quarter twist to thoroughly mix the two solvent reduced surfaces.

There are several sources of primer and PVC solvent cement on the market. Before starting an installation, consult with your supplier of primer and solvent cement for advice on the best product to use for your application and work environment.

HOT AIR WELDING

Above 14" diameters, it is Harrison's experience that duct and fitting connections should be hot-air welded using PVC welding rod and welding guns that are available from Harrison.

Harrison usually welds each joint using three passes of 5/32" PVC welding rod.

Before welding, each joint should be prepared by cleaning the duct & fitting surfaces of any dirt, oil or other contaminant. This will ensure good fusion conditions.

Once the duct and belled-end fitting or coupling are securely seated, the fit should be secured by "tacking" the joint with a hot-air welding gun. The process of "tacking" creates a PVC fusion between the two components, holding them in a position for the actual welding. Another benefit of "tacking" is that it seals the gap between the two components, so that during the actual hot-air welding, the PVC welding rod and the two

HOT AIR WELDING (CONT'D)

surfaces being joined are adequately heated to the point of a strong weld. If the joint were not

first tacked then the hot air from the welding gun would pass through the gap resulting in the surfaces to be welded receiving heat inadequate for fusion with the welding rod. This would result in "cold joints" that are brittle and subject to failure under stress.

HANGERS AND SUPPORTS

Duct Diameter	Min. Clamp	Rod Max. Center	Material Dia. Spacing
18" and below	1¼ x 1/8"	¼"	8 feet
19" thru 32"	1½ x 3/16"	3/8"	8 feet
33" and above	2 x 3/16"	3/8"	5 feet

Maximum distance between vertical supports should be no more than 16 feet.

APPLICATION GUIDELINES

The primary limitation of PVC material is the recommended environmental temperature limit of 140º F (60º C).

HARRISON SUPERDUCT® PVC & CPVC pipe and fittings are not intended for underground use.

Although Type I PVC can be satisfactorily used for many applications at temperatures of up to 140º F,

CPVC shall carry a maximum operating temperature of 200°F.

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SUGGESTED STANDARD PRODUCT SPECIFICATION FOR PVC and CPVC (CORZAN®) ROUND DUCTING

- PVC material compounds used in the manufacture of HARRISON SUPERDUCT ® pipe and the fabrication of HARRISON SUPERDUCT® fittings shall conform to Type 1 Grade 1 PVC, Cell Class 12454B, as described in ASTM D-1784.

- CPVC (Corzan®) material compounds used in the manufacture of duct pipe and the fabrication of fittings shall conform to Type IV, Grade 1 CPVC, Cell Class 23447, as described in ASTM D-1784.

- Duct diameters thru 20" & 24" will be extruded and of seamless construction. Sizes thru 18" will have a .187" wall thickness. 20" diameter will be @ 0.219" and 24" @ 0.250" thickness.

- Fabricated (heat formed) duct diameters 22" and 26" thru 30" will have a 0.187" wall while 32", 34" and 36" & larger diameters will have a 0.250" wall.

- Fabricated duct shall consist of a singular buttwelded seam, thermally fused under computer controlled temperature and pressure, without the use of PVC welding/filler rod.

- All extruded duct shall be furnished in 10 or 20 foot lengths, plain end; fabricated duct will be furnished in standard 4 foot lengths with coupling attached on one end.

- Three piece 90º elbows and two piece 45º elbows are considered standard and are furnished with a centerline radius of approximately 1½ times the duct diameter. Five piece 90º elbows and 3 piece 45º elbows, per SMACNA specifications, can be provided, on specific project requirements.

- All couplings will be "Sleeve" type style having an over-all length of 4½".

- All belled end sockets (5" and above) shall have a minimum socket depth of 2" or more. 2", 3" & 4" belled socket depths will be @ 1¾".

- Branch fittings are designed to enter the main duct, at an angle not exceeding 45º. Branch 90º tees are available where systems allow.

- Transition fittings shall have formed corners where practical. They will be of concentric design (unless otherwise requested) with a tapered cone-type body.

- Reducer couplings, having a size reduction greater than "two-step", shall be formed with cone-type body having an over-all length generally calculated @ 4" per 1" size reduction, where space allows. One-step and two-step reducers will have a smooth-flow concentric design.

- Blastgate Dampers shall be furnished with a 3- position locking pin. (open, half-open, closed)

- Butterfly (Balancing) Dampers shall be furnished with a locking quadrant, to permanently position. Motorized dampers are available on request.

- Rain Caps shall be of "Zero Pressure Loss" design, commonly known as Style "B". Style "A" Rain Caps are also available on request.

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