Quality People. Building Solutions.

Comfort Systems USA (Arkansas), Inc.
P.O. Box 16620
Little Rock, AR 72231
Phone 501-834-3320
Fax 501-834-5416

Date: 10/10/2023
Return Request: 10/16/2023
Project: ASU Mid-South RC & UC Chiller Replacement
Supplier: Control Heating & Cooling
Manufacturer: Various
Submittal: Air Duct Accessories
Submittal Number: 23 33 00-01
Drawing # and Installation: Mechanical Drawings

ARCHITECT
Witsell Evans Rasco
901 W. Third Street
Little Rock, AR 72201
501-374-5300

ENGINEER
Pettit & Pettit
201 E. Markham St. #400
Little Rock, AR 72201
501-374-3731

GENERAL CONTRACTOR
Baldwin & Shell
3725 Champion Hills Driver, Suite 1300
Memphis, TN 38125
901-755-2952

MECHANICAL SUBCONTRACTOR
Comfort Systems USA (Arkansas), Inc.
9924 Landers Rd.
N. Little Rock, AR 72117
501-834-3320

Notes:

CSUSA PROJECT NO.
23-1024
jon@comfortar.com

Control Heating & Cooling, Inc
6000 Krueger Drive
Jonesboro, AR 72401
Phone: (870) 935-3693
Fax: (870) 935-4031

Submittal Transmittal

TO: Comfort Systems, Inc.
PO Box 16620
Little Rock, AR 72231

Date:	8/28/2023
Project #	ASUMS 2321 - ASU Mid-South Chiller Replace
Submittal #	TWO
ATTN:	Jon Davis
RE:	Air Duct Accessories

We are sending you the following: ☐ Attached ☐ Under Separate Cover

Via: ☐ 1st Class Mail ☐ Overnight ☐ Facsimile ☐ Pick-Up/Hand Deliver

Copies	Spec No.	Description
1	23 3300 2.01	Manual Volume, Control Dampers: Greenheck
1	23 3300 2.02	Fire Dampers: Greenheck
1	23 3300 2.05	Duct Mounted Access Doors: Greenheck
1	23 3300 2.03	Turning Vanes: Ward
1	23 3300 2.06	Flexible Connector: Duro-Dyne
1	23 3300	Flexible Ducts: ATCO

Remarks: _____

_____

_____

SUBMITTAL

Job Name: **ASU Mid-South Chiller Replacement**

Architect: WER
Engineer: Pettit & Pettit
Contractor: Control Heating & Cooling
Elevation: (ft) 338
Date: 8/25/2023
Submitted By: Matt Miller

AIR COMPONENTS INC - 1977
5210 PLEASANT VIEW
STE 5
MEMPHIS, TN 38134
US
Phone: (901)382-1884
Fax: (901)382-7940
Email Address: mattm@aircompinc.com

SUBMITTAL NOTES:
Greenheck Manual and Motorized Dampers

MBD-15 Multi-blade Manual Balancing Damper

APPLICATION & DESIGN

Model MBD-15 is a manual balancing damper designed to regulate the flow of air in a HVAC system. They are not intended to be used in applications as a positive shut off or for automatic control. The design incorporates heavy gauge galvanized steel construction for durability and longevity. MBD-15 meets SMACNA's recommended construction requirements for manual balancing dampers.

DAMPER RATINGS

Pressure	4 in. wg - pressure differential
Velocity	Up to 2,000 ft/min
Temperature	180 F

PRODUCT DETAILS

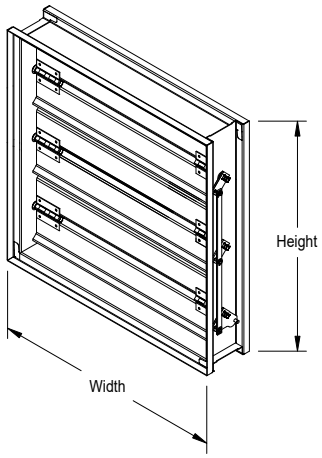
Frame Type	Channel
Frame Thickness	16 ga galvanized steel
Material	Galvanized Steel
Blade Action	Opposed
Linkage Material	Steel
Axle	Steel
Axle Bearings	Synthetic
Extension Pins	Polymer
Sizing	Nominal

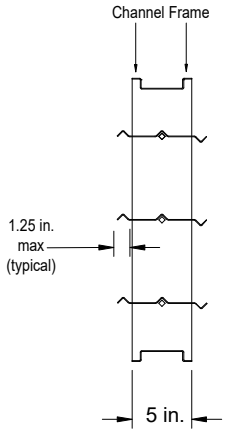
ACTUATOR INFORMATION

Actuator Type	Manual Quadrant

OPTIONS & ACCESSORIES

Clean Wrap	No
Transition	None
Standoff Bracket	1.5 in.
Flange	None
Union Label:	No Preference





• This drawing shows a general damper configuration and is not intended to depict the exact configuration of all dampers in this submittal.
• Width and height dimensions are undersize 0.250 in.
• Damper includes 0.500 in. locking manual quadrant with 0.500 in. diagonal reinforced pins that extend 3.500 in. beyond frame.
• Installation instructions available at www.greenheck.com

SUMMARY

ID #	Tag	Qty	W (in.)	H (in.)	Act Qty	Actuator Type	CONFIGURATION		
15-1		1	26.000	26.000	1	Manual Quadrant	Drive Arrg: 11-1FER-0	Sleeve: NONE	Flanges: NONE

VCD-23 Low Leakage 3V Blade Volume Control Damper

APPLICATION & DESIGN

The VCD-23 is a ruggedly built low leakage control damper intended for applications in low to medium pressure and velocity systems. A wide range of electric actuators are available.

DAMPER RATINGS

Pressure:	Up to 5 in. wg - pressure differential
Velocity:	Up to 3,000 ft/min
Leakage:	Class 1A @ 1 in. wg Class 1 @ up to 5 in. wg
Temperature:	Up to 250 F

PRODUCT DETAILS

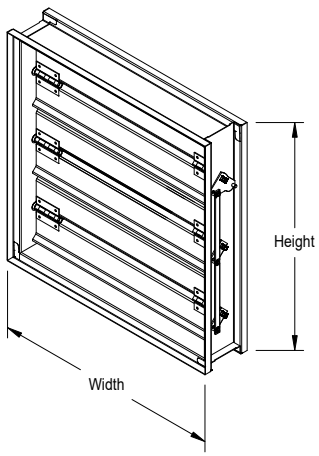
Frame Type:	Channel
Frame Thickness:	16 ga
Material:	Galvanized
Blade Type:	3V
Blade Action:	Opposed
Blade Seal Material:	TPE
Axle/Linkage Material:	Steel
Axle Bearings:	Synthetic
Jamb Seal Material:	Stainless Steel
Damper Temp. Rating:	180 F
Jackshafting:	No Preference
Actuator Sizing:	Default SqFt
Ext. Shaft Length:	Standard (6 in.)
Multi-Section Fastening:	Standard
Sizing:	Nominal

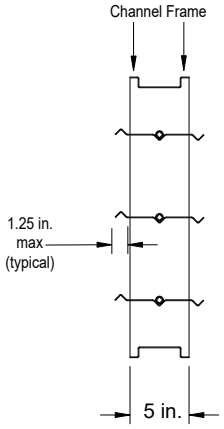
ACTUATOR INFORMATION

Actuator Type:	120 VAC
Actuator Mounting:	External
Actuator Location:	Right Side
Operating Mode:	TwoPosition
Actuator Operation:	Spring Return
Fail Position:	Closed
NEMA Enclosure:	Least Cost
Auxiliary Switches:	No
Spring Return Time:	Standard

OPTIONS & ACCESSORIES

Union Label:	No Preference





• This drawing shows a general damper configuration and is not intended to depict the exact configuration of all dampers in this submittal.
• Width and height furnished approximately 0.250 in. undersize.
• Factory supplied actuators are sized for 1,500 fpm and a fully-closed differential pressure of 2 in. wc. Contact factory for actuator sizing on applications exceeding those levels.
• Installation instructions available at www.greenheck.com.

CODES APPROVED

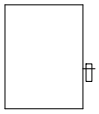
IECC (International Energy Conservation Code) compliant
The AMCA Certified Ratings Seal applies to Air Leakage and Air Performance ratings.

SUMMARY

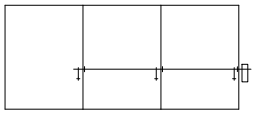
ID #	TAG	QTY	Width	Height	CONFIGURATION			
16-1		1	98.000 in.	32.000 in.	Drive Arrangement: Drive-CC-31-1FER-1	Actuator Mfr: Siemens	Actuator Model: GVD221.1U	Actuator Qty: 1
					Act. Orientation: Perp Down			
16-2		1	20.000 in.	32.000 in.	Drive Arrangement: Drive-CC-11-1FER-0	Actuator Mfr: Honeywell	Actuator Model: MS4103F1025	Actuator Qty: 1
					Act. Orientation: Perp Down	Standoff: 1.500 in.		

Damper Drive Arrangements Job Summary -Start-

Drive Arrangement: Drive-CC-11-1FER-0



Drive Arrangement: Drive-CC-31-1FER-1



Damper Drive Arrangements Job Summary -End-

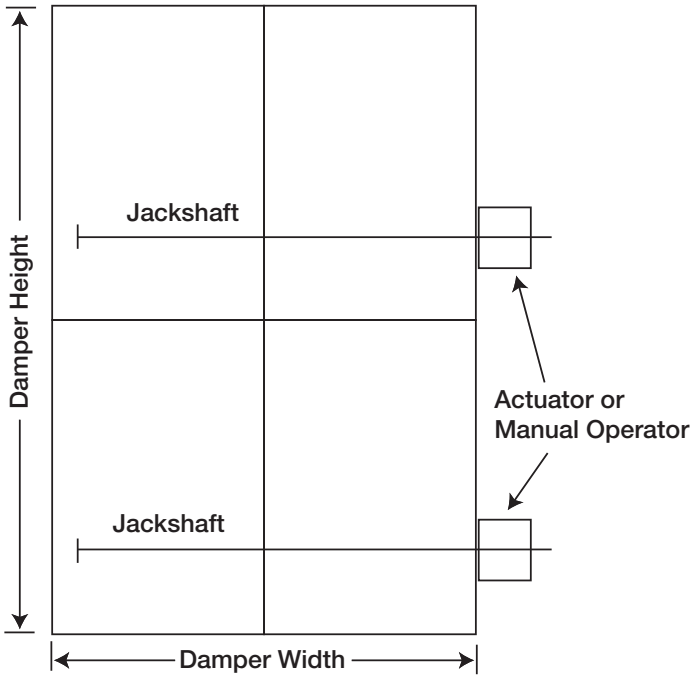
Drive Arrangement Definition

Actuator driven dampers are supplied with a drive arrangement code that helps describe the configuration of the damper. The following breaks down what each number and letter represents.

22-2FER-2

1 2 3 4 5 6 7

1. Number of sections wide
2. Number of sections high
3. Number of actuators or manual operators (such as quadrants, pull chain, etc.)
4. Who supplies the actuators or manual operators
   - F - Factory
   - C - Customer Supplied (field mounted)
5. Actuator or manual operators mounting
   - E - External
   - I - Internal
   - B - Both internal and external
6. Actuator or manual operators location
   - L - Left hand drive
   - R - Right hand drive
   - B - Both right and left
7. Number of jackshafts



Each damper is supplied with a Drive Arrangement Prefix to help describe its construction. See the following examples:

Model	Drive Arrangement Prefix
AMD series, AMD-TD series	AMD
FBH & FBV	FB
DFD-210; DFDAF-310, DFDAF-330; SEDFD-210 FSD, OFSD, CFSD, SMD, SEFSD, SSFSD, SESMD, SSSMD series (except vertical blade models)	MLS
ICD series, MBD-15 & VCD series (except vertical blade models)	CC
FSD-311V, SMD-301V, VCD-xxV	VB

SUBMITTAL

Job Name: **ASU Mid-South Chiller Replacement**

Architect: WER
Engineer: Pettit & Pettit
Contractor: Control Heating & Cooling
Elevation: (ft) 338
Date: 8/25/2023
Submitted By: Matt Miller

AIR COMPONENTS INC - 1977
5210 PLEASANT VIEW
STE 5
MEMPHIS, TN 38134
US
Phone: (901)382-1884
Fax: (901)382-7940
Email Address: mattm@aircompinc.com

SUBMITTAL NOTES:
Greenheck Fire Dampers and Access Doors

FD-150X12 1 1/2 hour static rated fire damper with 12.000 in. integral sleeve

APPLICATION & DESIGN

Model FD-150X12 is approved for use in walls, floors and partitions with fire resistance ratings less than 3 hours. UL 555 classifies static rated fire dampers for use in HVAC that automatically shut down in the event of a fire.

DAMPER RATINGS

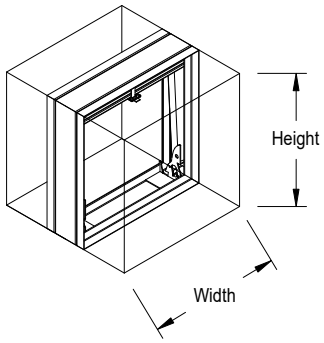
Fire Rating: 1 1/2 hours

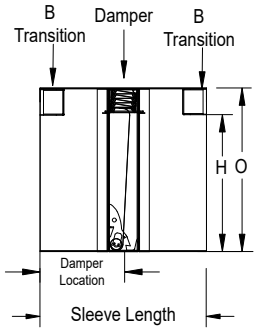
PRODUCT DETAILS

Frame: Galvanized Steel
Frame Depth: 3.688
Blade: Galvanized Steel
Closure Device: Fusible Link
Closure Temp: 165 F
Sizing: Nominal

OPTIONS & ACCESSORIES

Transition: B
Transition Location: Both Sides
Retaining Angle Mounting: Loose
Union Label: No Preference





• This drawing shows a general damper configuration and is not intended to depict the exact configuration of all dampers in this submittal.
• Damper is furnished approximately 0.250 in. undersize.
• Access doors that are smaller than 12.000 in. x 12.000 in. supplied on dampers with internal actuators or fusible links are intended for visual inspection.
• Installation instructions available at www.greenheck.com.

CODES APPROVED

This model meets the requirements for fire dampers established by:
• UL Classfied (U.S. and Canada)
Standard UL 555 (Listing #R13317)
• National Fire Protection Association
NFPA Standard 80,90A & 101
• IBC: International Building Codes
• California State Fire Marshal: CSFM listing # 3225-981:102

SUMMARY

ID #	TAG	QTY	WIDTH	HEIGHT	CONFIGURATION			
11-1		1	24.000 in.	16.000 in.	Sections Wide: 1	Sections High: 1	"O" Dim: 19.000 in.	Sleeve Length: 12.000 in.
					Sleeve Thickness: 22 ga	Damper Location: 6.000 in.	Mounting: Vertical	Ret. Angle Quantity: 1
					Ret. Angle Size: 1.5			
11-2		1	18.000 in.	12.000 in.	Sections Wide: 1	Sections High: 1	"O" Dim: 14.000 in.	Sleeve Length: 12.000 in.
					Sleeve Thickness: 22 ga	Damper Location: 6.000 in.	Mounting: Vertical	Ret. Angle Quantity: 1
					Ret. Angle Size: 1.5			
11-3		2	14.000 in.	10.000 in.	Sections Wide: 1	Sections High: 1	"O" Dim: 12.000 in.	Sleeve Length: 12.000 in.
					Sleeve Thickness: 22 ga	Damper Location: 6.000 in.	Mounting: Vertical	Ret. Angle Quantity: 1
					Ret. Angle Size: 1.5			

FD-150X12 1 1/2 hour static rated fire damper with 12.000 in. integral sleeve

APPLICATION & DESIGN

Model FD-150X12 is approved for use in walls, floors and partitions with fire resistance ratings less than 3 hours. UL 555 classifies static rated fire dampers for use in HVAC that automatically shut down in the event of a fire.

DAMPER RATINGS

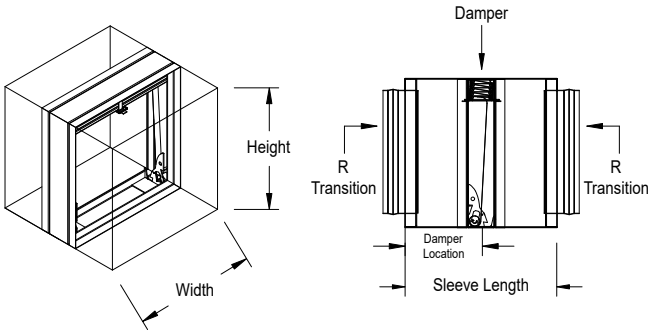
Fire Rating: 1 1/2 hours

PRODUCT DETAILS

Frame: Galvanized Steel
Frame Depth: 3.688
Blade: Galvanized Steel
Closure Device: Fusible Link
Closure Temp: 165 F
Sizing: Nominal

OPTIONS & ACCESSORIES

Transition: R
Transition Location: Both Sides
Transition Offset: 2.000 in.
Retaining Angle Mounting: Loose
Union Label: No Preference



2 in. Offset: Damper Width & Damper Height = Diameter + 2 in. or 5 in. minimum
1 in. Offset: Damper Width & Damper Height = Diameter + 1 in. or 5 in. minimum
0 in. Offset: Damper Width & Damper Height = Diameter

• This drawing shows a general damper configuration and is not intended to depict the exact configuration of all dampers in this submittal.
• Damper is furnished approximately 0.250 in. undersize.
• Access doors that are smaller than 12.000 in. x 12.000 in. supplied on dampers with internal actuators or fusible links are intended for visual inspection.
• Installation instructions available at www.greenheck.com.

CODES APPROVED

This model meets the requirements for fire dampers established by:
• UL Classfied (U.S. and Canada)
Standard UL 555 (Listing #R13317)
• National Fire Protection Association
NFPA Standard 80,90A & 101
• IBC: International Building Codes
• California State Fire Marshal: CSFM listing # 3225-981:102

SUMMARY

ID #	TAG	QTY	DIAMETER	CONFIGURATION			
12-1		2	8.000 in.	Sections Wide: 1	Sections High: 1	"O" Dim: 10.000 in.	Sleeve Length: 12.000 in.
				Sleeve Thickness: 22 ga	Damper Location: 6.000 in.	Mounting: Vertical	Ret. Angle Quantity: 1
				Ret. Angle Size: 1.5			
12-2		1	14.000 in.	Sections Wide: 1	Sections High: 1	"O" Dim: 16.000 in.	Sleeve Length: 12.000 in.
				Sleeve Thickness: 22 ga	Damper Location: 6.000 in.	Mounting: Vertical	Ret. Angle Quantity: 1
				Ret. Angle Size: 1.5			

HAD-10 Hinged Style Access Door

APPLICATION & DESIGN

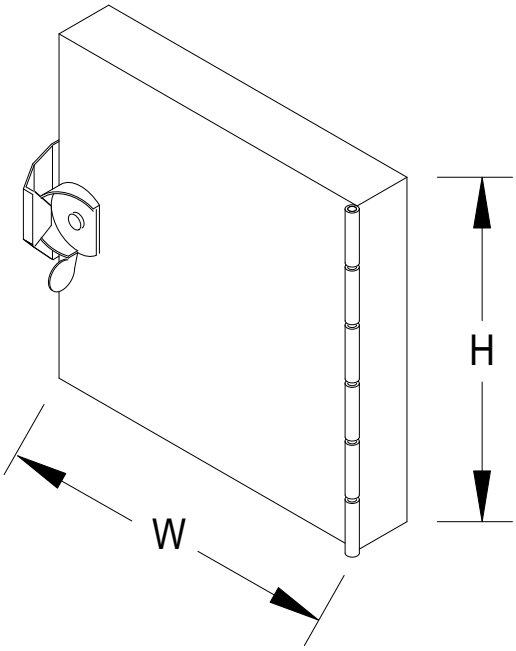
Greenheck duct access doors provide a durable, practical and inexpensive means of gaining access to components inside the ductwork. Recommended for use in low to medium pressure duct systems.

RATINGS

Max. Pressure: 4.5 in. wg - pressure differential
Pressure Setting: 2

PRODUCT DETAILS

Frame: Galvanized steel
24 ga: up to 12.000 in. x 12.000 in.
22 ga: 14.000 in. x 14.000 in. up to 24.000 in. x 24.000 in.
Door Panels: 24 ga galvanized steel (both sides of insulation)
Insulation: 1.000 in. fiberglass
Gasket: Door to frame and frame to duct
0.500 in. wide dual gasket (compressable synthetic type)
Hinges: Continuous piano style
Union Label: No Preference



• This drawing shows a general damper configuration and is not intended to depict the exact configuration of all dampers in this submittal.
• Installation instructions available at www.greenheck.com.

SUMMARY

ID #	TAG	QTY	W (in.)	H (in.)
13-1		1	12.000	12.000
13-2		1	10.000	10.000
13-3		2	8.000	8.000

RAD Round Access Door

APPLICATION & DESIGN

Greenheck's round duct access doors provide a durable, practical and inexpensive means of gaining access to components inside the ductwork. Round duct access doors provide a solid leakage proof door that is simple to install.

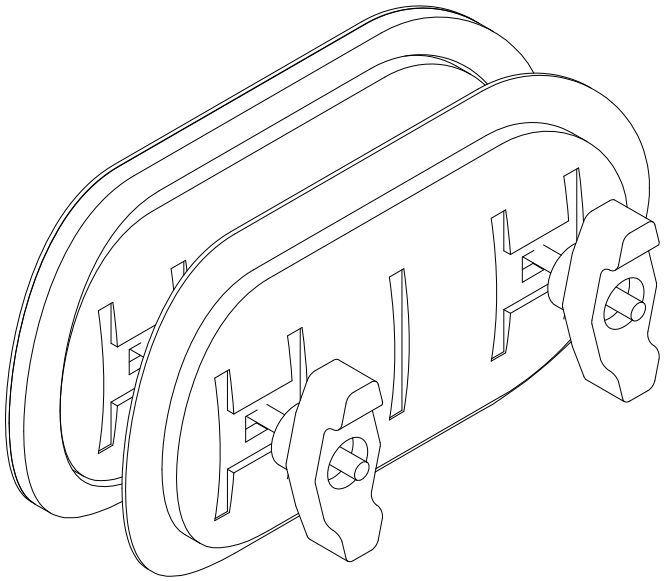
RATINGS

Pressure Setting: 2
Pressure: 20 in. wg and -10 in. wg

PRODUCT DETAILS

Panels: Three layers of precision stamped, hot dipped galvanized steel
Gasket: Cellular sponge EPDM, permanently bonded to inside of door
Springs: Conical springs between the two plates
Knobs: High impact plastic knobs
Insulation: No
Union Label: No Preference

Door Size	Duct Size Diameter
8.625 in. x 4.188 in.	6.000 in. - 7.000 in.
8.625 in. x 4.250 in.	8.000 in. - 9.000 in.
8.625 in. x 4.313 in.	10.000 in.
8.625 in. x 4.375 in.	12.000 in. - 14.000 in.
13.000 in. x 8.375 in.	16.000 in.
13.000 in. x 8.500 in.	18.000 in.
12.000 in. x 8.000 in.	19.000 in. - 22.000 in.
16.000 in. x 12.000 in.	23.000 in. - 24.000 in.



• This drawing shows a general damper configuration and is not intended to depict the exact configuration of all dampers in this submittal.
• Installation instructions available at www.greenheck.com.

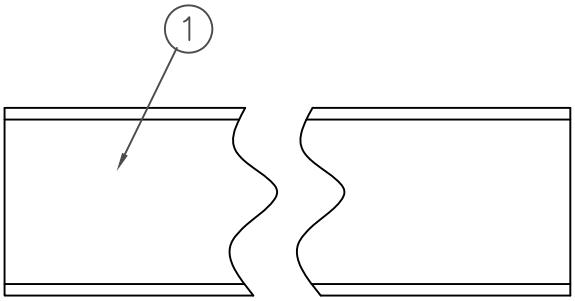
SUMMARY

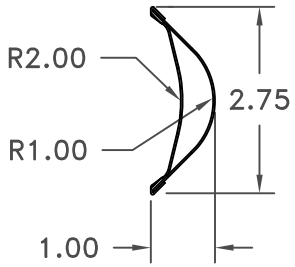
ID #	TAG	QTY	DUCT DIAMETER (in.)
14-1		2	8.000
14-2		1	14.000

WARD VANE

2" and 4" Standard Vane

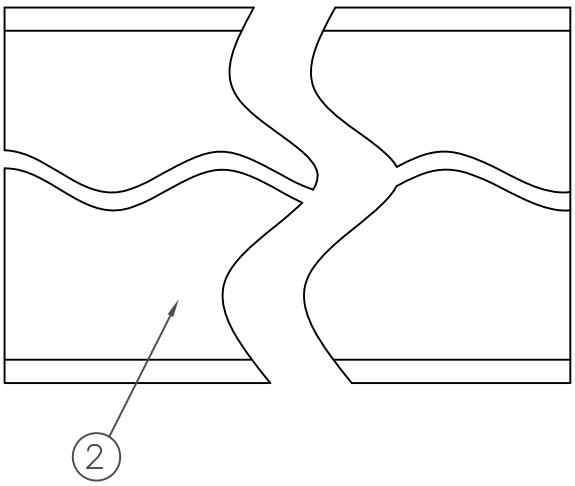
VNN

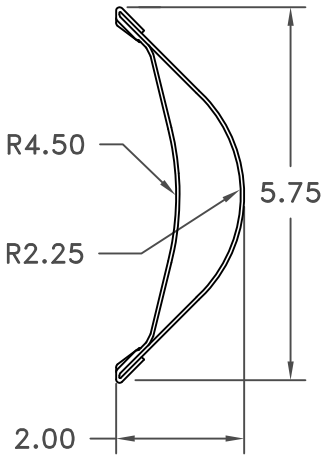




SPECIFICATIONS:

1. Rollformed 26 gauge 2" vane
2. Rollformed 24 gauge 4" vane





NOTES:

1. Available in the following materials:
   - Galvanized

   Contact factory for availability of other materials.
2. Available in 10' lengths. Contact factory for custom lengths.
3. Designed to minimize vibration.

JOB NAME: _____	SUBMITTED BY:
LOCATION: _____	
ARCHITECT: _____	
ENGINEER: _____	
CONTRACTOR: _____	

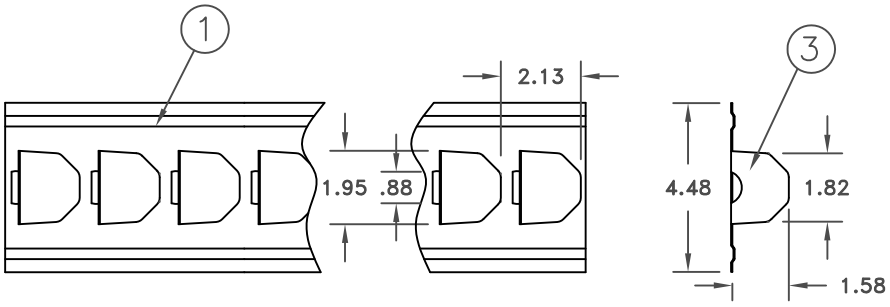
WARD™ INDUSTRIES

5030 Corporate Exchange Blvd SE • Grand Rapids MI 49512
T (800) 624-8642 • F (800) 972-1421 • www.wardind.com

WARD RAIL

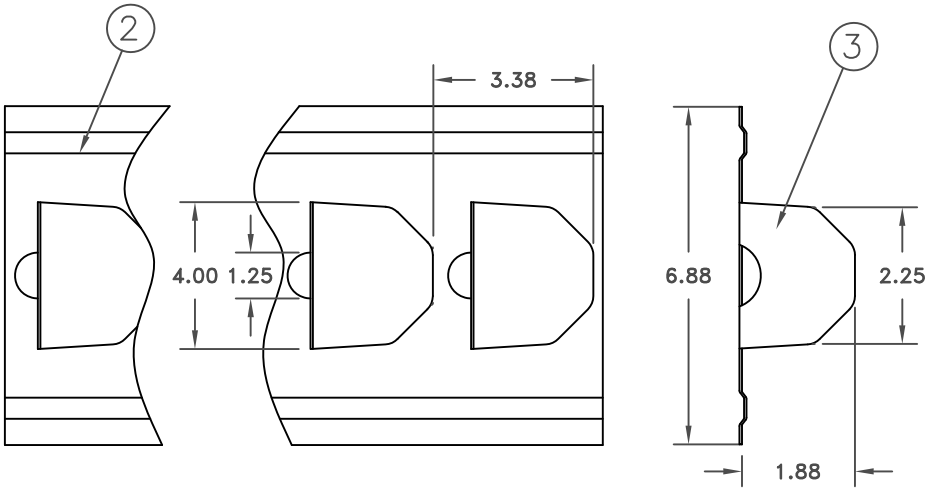
2" and 4" Rail

RAL



SPECIFICATIONS:

1. Rollformed 22 gauge 2" rail
2. Rollformed 22 gauge 4" rail
3. Rail installation tab



NOTES:

1. Available in the following materials:
   - Galvanized

   Contact factory for availability of other materials.
2. Available in 10' lengths. Contact factory for custom lengths.
3. Self-aligning tabs for easy vane installation.
4. Rail has extra wide margin for easy fastening.
5. Rail stacks to minimize shipping and storage space requirements.

JOB NAME: _____	SUBMITTED BY:
LOCATION: _____	
ARCHITECT: _____	
ENGINEER: _____	
CONTRACTOR: _____	

WARD™ INDUSTRIES

5030 Corporate Exchange Blvd SE • Grand Rapids MI 49512
T (800) 624-8642 • F (800) 972-1421 • www.wardind.com

Flexible Duct Systems

Atco. Working Together. Doing It Right.

Thermal Performance

25' Insulated
UL 181
Class 1 Air Duct

UPC #030	UPC #036	UPC #031
R-Value 4.2	R-Value 6.0	R-Value 8.0

All thermal performance (R-Values) are classified by Underwriters Laboratories in accordance with ADC Flexible Duct Performance and Installation Standard (1991) using ASTM C-518 (1991), at installed wall thickness, on flat insulation only.

Description

ATCO #030, 036, and 031 are UL 181, Class 1 Air Ducts and are manufactured with a tri-directional fiberglass scrim reinforced, metallized polyester outer jacket. The inner core of all three products is air-tight and designed for low-to-medium operating pressures in HVAC systems. ATCO #036 and 031 have increased insulation for superior thermal performance.

Construction

A double lamination of tough polyester which encapsulates a steel wire helix forms the air-tight inner core of the ATCO #030, 036, and 031. The double-layer core of each product is wrapped in multiple thicknesses of fiberglass insulation. All three products are sheathed in a rugged and durable tri-directionally reinforced, metallized polyester jacket.

FEATURES & BENEFITS

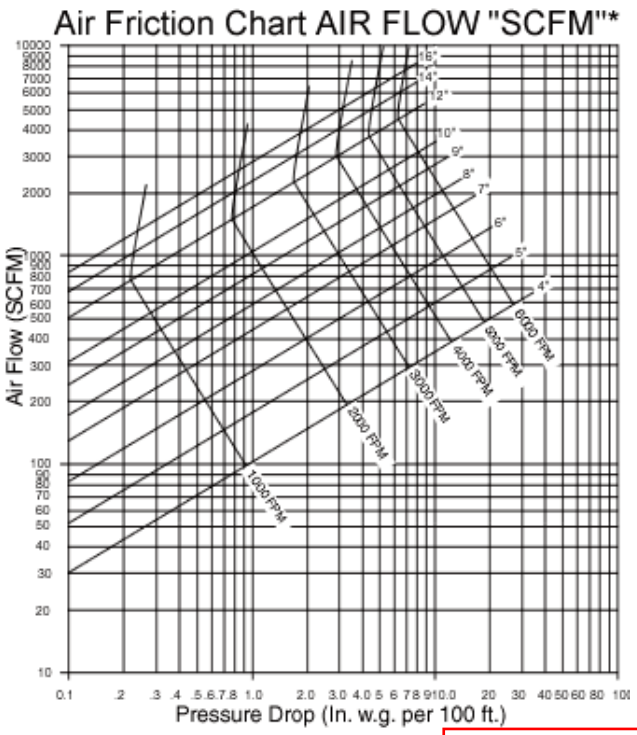
Air-tight Inner Core - Energy efficient / No fiberglass erosion into air stream.
Encapsulated Wire Helix - No unraveling when cut to length / Quick installation
Smooth Inner Core - Low friction loss / Low operating cost.
Thick Blanket of Fiberglass Insulation - Energy efficient / Excellent thermal characteristics
Tough Reinforced Metallized Polyester Jacket - Tear and puncture resistant / Low maintenance.
Lightweight Compact Carton - Reduces warehouse and Jobsite handling cost.

APPLICATIONS & CODE COMPLIANCES*

ATCO #030, 036, and 031 are designed for indoor use as a supply and return air duct in residential and commercial low-to-medium pressure heating and air conditioning systems. All three models can be used as a complete air duct system and/or a branch duct connecting to mixing boxes, diffusers, light troffers, room inlets, or other terminal devices. UL 181, NFPA 90A & 90B, IMC, IRC, UMC 10-1, HUD 515-2.1 (b), Cities of Chicago, New York, San Francisco, County of Dade (Florida), California State Fire Marshal.*

*ATCO recommends that you check with the local code body having jurisdiction in your area to determine applicable codes.

PRODUCT & PERFORMANCE DATA



PRODUCT DATA

- Length: 25', 50' (Other lengths available as special order)
- Diameter: 3", 4", 5", 6", 7", 8", 9", 10", 12", 14", 16", 18", 20", 22"
- Vapor Barrier: Tri-directional, scrim reinforced metallized polyester
- End Treatment: 25', 50' -plain ends
- Packaging: 1 piece per carton

INSTALLATION

Air duct connections and joints shall be made per installation instructions outlined by ATCO Rubber Products, Inc. and as required by the UL 181 listing procedure.

(Installation instructions are included inside each carton.)

STRAIGHT RUN

* FD 72-R1 Test Code of the Air Diffusion Council. Friction loss is computed in inches of water gauge per 100 ft. of duct. By using CFM or FPM values for a given duct dimension, the friction loss can be determined. Conversion of CFM to FPM also can be made.

PERFORMANCE DATA

UPC #030 R-Value 4.2	UPC #036 R-Value 6.0	UPC #031 R-Value 8.0

- Rated Positive Pressure: 10" w.g. per UL-181 (UL Listed pressure) ratings are determined in straight lengths @ ambient termperatures.)
- Recommended Operating Pressures: (Determined in a 90° bend at elevated temperatures in accordance with ADC FD 72-R1 Test Code.)

  Maximum Positive:

  6" w.g. - 4" thru 12" Dia.

  4" w.g. - 14" thru 20" Dia.

  (With factory installed metal collars, 2" w.g. - all diameters)

  Maximum Negative: 3/4" w.g. - all diameters

  Maximum Velocity: 5,000 FPM
- Vapor Transmission: .05 perms
- Maximum Operating Temperatures:

  -20°F to 140°F Continuous (@ maximum pressure)

  -20°F to 180°F Continuous (@ 2" pos. w.g. max.)

  -20°F to 250°F Intermittent (@ 1/2" pos. w.g. max.)
- Flame Spread: 25 max

  Smoke Developed: 50 max

Warranty - ATCO warrants that all flexible ducts will be free from defects in material and workmanship for a period of five years from the date of purchase only if the ducts are installed in accordance with ATCO's installation instructions and under conditions specified in ATCO's performance data. The buyer's exclusive remedies for any defect in the flexible ducts shall be replacement or refund of the purchase price, at ATCO's option. ATCO MAKES NO OTHER WARRANTIES, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE. IN PARTICULAR, ATCO MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ATCO SHALL HAVE NO LIABILITY TO THE BUYER OR ANY THIRD PARTY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND WHATSOEVER, INCLUDING, BUT NOT LIMITED TO, PERSONAL INJURY, PROPERTY DAMAGE, LOST PROFITS OR OTHER ECONOMIC INJURY DUE TO ANY DEFECT IN THE FLEXIBLE DUCTS. MATERIALS AND SPECIFICATIONS FOR THE FLEXIBLE DUCTS ARE SUBJECT TO CHANGE WITHOUT NOTICE.

Manufacturing & Shipping Locations

Albuquerque, NM • Baltimore, MD • Cartersville, GA • Fort Worth, TX
Greensboro, NC • Houston, TX • Indianapolis, IN • Phoenix, AZ
Plainville, GA • Plant City, FL • Riverside, CA• Wiggins, MS
Sacramento, CA • Springdale, AR • Vineland, NJ

ATCO RUBBER PRODUCTS, INC.

CORPORATE HEADQUARTERS
7101 ATCO DRIVE
FORT WORTH, TEXAS 76118-7098
PHONE:(817) 595-2894
1-800-USS-DUCT (1-800-877-3828)
FAX: 1-800-366-3539 TELEX: 758-510
www.atcoflex.com

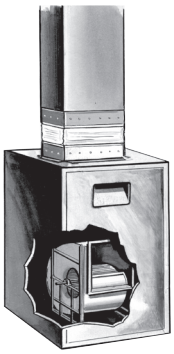
SUBMITTAL RECORD
JOB _____
LOCATION _____
SUBMITTED TO _____
SUBMITTAL PREPARED BY _____
APPROVED BY _____
DATE _____

Specification Form DDFDC Flexible Duct Connector

DESCRIPTION

All air duct installations for heating, cooling or ventilation are attached to mechanical equipment containing a fan or blower. Vibrations, noises and rattles resulting from operation of the fan or blower are transmitted into the metal ducts which carry the noises throughout the system.

In order to isolate the vibration and noises to the source, an air - tight flexible joint, consisting of a fabric which is attached to sheet metal on both side, must be inserted between the equipment and the ductwork. This vibration isolator is called a "Flexible Duct Connector".



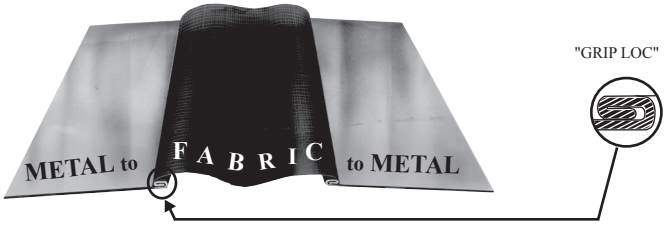
RELATED NFPA 90A & 90B STANDARDS

2-3.2.2 Vibration isolation connectors in duct systems shall be made of an approved flame-retardant fabric or shall consist of sleeve joints with packing of approved material, each having a maximum flame spread index of 25 and a maximum smoke developed index of 50. Exception: Approved flame-retardant fabric having a maximum length of 10 in. (45.4 cm) in the direction of airflow-**NFPA No. 90A 1999**

2-1.1.1 Exception No. 3: Vibration isolation connectors in duct systems shall be made of approved flame-retardant fabric or shall consist of sleeve joints with packing of approved noncombustible material. The fabric shall not exceed 10 in. (254 mm) in length in direction of airflow-**NFPA No. 90B 1999**

FABRIC COMPARISONS	Excelon[4]	Neoprene	Durolon	Insulflex*	Thermafab®	Envirofab	Teflon	Glasseal
Continuous Temp. Range	-40˚F. to 180˚F.	-40˚F. to 200˚F.	-40˚F. to 250˚F.	-40˚F. to 180˚F.	-65˚F. to 500˚F.	-40˚F. to 200˚F.	-150˚F. to 500˚F.	-40˚F. - 180˚F.
Color	Black or Spec Chek Orange	Black	White	Black	Grey	Black/White	Grey Outside/ Beige Inside	Grey & Black
Weight Per Square Yard	22	30	26	28 (composite weight)	17	18	16.5	16
Leakage Resistance[1]	350	595	250	125	400	350	650	120
Tear Strength[2]	100/100	12/12	12/12	8/11	50/40	60/80	50/30	8/9
Tensile Strength[3]	240/220	500/450	225/300	70/70	200/150	200/190	400/300	90/90
Base Fabric	Woven Nylon/ Polyester Blend	Woven Fiberglass	Woven Fiberglass	Polyester	Woven Fiberglass	Polyester	Fiberglass/ Satin Weave	Woven Fiberglass
Coating	Vinyl	Neoprene	Hypalon	Vinyl	Silicon Rubber	Proprietary Vinyl Blend	Teflon	Vinyl
Features	High Tear Strength High Abrasion Resistance	General Purpose	Excellent Ozone and Weathering Resistance Best Overall Acid Resistance	Low Smoke Emission Insulated 3-4-3 Configuration	Very Low Smoke Emission High Temperature Resistant	"Green" 10% Recycled Content UV Reflective Puncture Resistant	High Temperature Resistant High Corrosion Resistance Excellent Chemical Resistance	Resistant to Acids & Chemical Fumes Resistant to Grease & Alkalies Unaffected By Mildew
Codes								
Metal-Fab 3x3x3 Grip Loc+	MBX (#10159) MSPX (#10263)	MFN (#10003)	MFD (#10002)	IDC (#10173) *Gauge: 28 +Guard Loc	MFT (#10005)	MEV4-100 (#10301)	MCT333 (#10278)	MGL (#10004)
Super Metal-Fab 3x6x3 Grip Loc	MB6X (#10160) MSP6X (#10265)	MF6N (#10012)	MF6D (#10011)	Not Available	MF6T (#10013)	Not Available	Not Available	MF6G (#10016)
TDC/TDF 4x4x4 Grip Loc	MBX4x4x4 (#10210) MSPX4x4x4 (#10264) MBX4x6x4 (#10214)	MFN4x4x4 (#10211) MFN4x6x4 (#10246)	MFD4x4x4 (#10237) MFD4x6x4 (#10245)	Not Available	Not Available	MEV4x4x4 (#10300)	MCT444 (#10279)	Not Available

All Metal-Fab, Super Metal-Fab and TDC/TDF Flexible Duct Connectors are manufactured with 24 gauge galvanized steel.*
Other materials are available upon request.
Stainless Steel configurations utilize 304 or 316 grade material.



Notes:
1. Leakage resistance as per Federal Test Standard 191 Method #5512. Results in P.S.I. (To convert inches of water multiply P.S.I. x 27.176.).
2. Tear strength in tongue pounds as per Federal Test Standard 191 Method #5134.1 (warp/fill).
3. Tensile strength in grab pounds as per Federal Test Standard 191 Method #5100 (warp/fill).
4. Standard Excelon is not LA city approved. Use Excelon-LA when LA city approval is necessary. (See Specification Form Excelon-LA - 203)

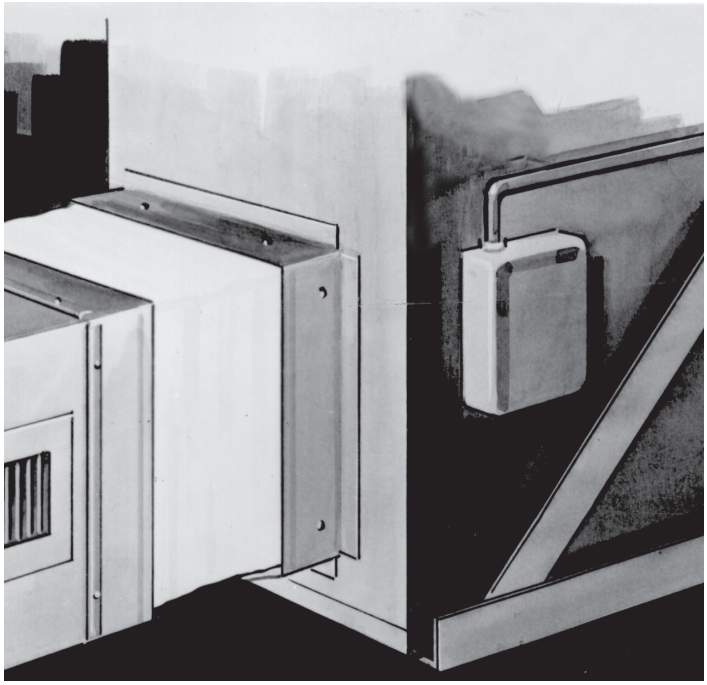
SUGGESTED SPECIFICATION

Vibration Isolating Flexible Duct Connector For Heating, Cooling & Exhaust Supplies & Returns.

At the inlet and discharge of all air handling equipment(unless otherwise noted) furnish and install vibration isolators. Vibration isolators shall be a coated woven fabric named _____ and shall be "Underwriters Laboratories Classified".

Vibration isolators shall have a tear strength of not less then _____, an abrasion resistance of not less than _____, and a continuous temperature range of _____ .Vibration isolators shall be preassembled metal to exposed fabric to metal. Fabric and metal shall be joined by means of a double lock seam.

Vibration isolators shall be code_____ (called Flexible Duct Connectors) as manufactured by Duro Dyne Corporation, Bay Shore, N.Y.



Specifications

All Listed Duro Dyne Flexible Duct Connector Fabrics are designed to meet the following specifications:

1. MIL-C-20696B Para. 4.4.3. (Oil Resistance).
2. MIL-C-20696B Para. 4.4.4. (Hydro Carbon Resistance).
3. NFPA 90A Installation of Air Conditioning and Ventilating Systems Para. 2-3.2.2 1999 Edition.
4. NFPA 90B Warm air heating and air conditioning systems. Para. 2-1.1.1 exc. no 3 1999 Edition.
5. NFPA701 Tests for Flame Propagation of Fabrics and film.
6. California State Fire Marshal Approved.
7. Los Angeles City Approved. (See note 1 below)
8. Denver City Approved.

All Duro Dyne Flexible Duct Connectors utilize galvanized steel meeting ASTM-A-525 G 60 or better.

Duro Dyne Flexible Duct Connectors are also available with 300 series stainless steel or 3003 aluminum upon request.

Note 1 - Standard Excelon is not LA city approved. Use Excelon-LA when LA city approval is necessary. (See Specification Form Excelon-LA - 203)

CHEMICAL RESISTANCE

(X = Extremely Resistant)
(~ = Not Recommended)
(O = No Data Available)

Chemical	Excelon	Neoprene	Durolon	Insulflex	Thermafab	Envirofab	Teflon	Glasseal
Acetic Acid	~	X	X	~	~	~	X	~
Aluminum Chloride	X	X	X	X	X	X	X	X
Aluminum Sulfate	X	X	X	X	X	X	X	X
Ammonia (Anhyd)	X	X	X	X	X	X	X	X
Ammonium Hydroxide	X	X	X	X	X	X	X	X
Ammonium Sulfate	X	X	X	X	X	X	X	X
Barium Sulfide	X	X	X	X	O	X	X	X
Black Sulfate Liquor	X	X	X	X	~	X	X	X
Boric Acid	X	X	X	X	X	X	X	X
Butyl Alcohol	~	X	X	~	~	~	X	~
Cadmium Plating Solution	X	~	~	~	O	X	O	X
Calcium Chloride	X	X	X	X	X	X	X	X
Calcium Hypochlorite	X	~	X	X	O	X	X	X
Chlorine Water	X	~	~	X	~	X	O	X
Chromic Acid	X	~	X	X	O	X	X	X
Chromium Plating Solution	X	O	O	~	O	X	O	X
Citric Acid	X	X	X	X	X	X	X	X
Copper Chloride	X	X	X	X	O	X	X	X
Copper Sulfate	X	X	X	X	O	X	X	X
Cottonseed Oil	X	X	X	X	X	X	O	X
Diacetone Alcohol	~	X	X	~	O	~	O	~
Disodium Phosphate	X	~	~	X	O	X	O	X
Ethyl Alcohol	~	X	X	~	~	~	X	~
Ethylene Glycol	~	X	X	~	X	~	X	~
Ferric Chloride	X	X	X	X	X	X	X	X
Ferric Sulfate	X	X	X	X	X	X	X	X
Fluroboric Acid	X	X	X	~	O	X	O	X
Formaldehyde (40%)	X	X	X	X	O	X	X	X
Formic Acid	X	X	X	X	O	X	X	X
Glucose	X	X	X	X	X	X	X	X
Glycerine	~	X	X	~	X	~	X	~
Heptane	~	X	X	~	O	~	X	~
Hexane	~	X	X	~	O	~	X	~
Hydrobromic Acid (40%)	~	X	X	~	O	~	X	~
Hydrochloric Acid (conc)	~	X	X	~	~	~	X	~

Chemical	Excelon	Neoprene	Durolon	Insulflex	Thermafab	Envirofab	Teflon	Glasseal
Hydrofluoric Acid (100%)	~	X	X	~	~	~	X	~
Hydrogen Peroxide	X	~	X	X	X	X	X	X
Hydrogen Sulfide	X	X	X	X	O	X	X	X
Lactic Acid	~	X	X	~	O	~	X	~
Linseed Oil	~	X	X	~	X	~	O	~
Magnesium Chloride	~	X	X	~	~	~	X	~
Maleic Acid	X	~	X	X	X	X	O	X
Methyl Alcohol	~	X	X	~	~	~	X	~
Methyl Cellosolve	~	X	X	~	~	~	O	~
Mineral Oil	X	X	X	X	~	X	X	X
Naptha	~	~	~	~	X	~	X	~
Nickel Chloride	X	X	X	X	O	X	X	X
Nickel Sulfate	X	X	X	X	X	X	X	X
Nitric Acid (40%)	X	~	X	X	~	X	X	X
Oleic Acid	X	~	~	X	~	X	X	X
Oleum	~	~	X	~	O	~	X	~
Oxalic Acid	X	X	X	X	X	X	X	X
Phosphoric Acid (85%)	~	X	X	~	X	~	X	~
Pickling Solution	X	~	X	X	O	X	O	X
Potassium Chloride	X	X	X	X	O	X	O	X
Potassium Cyanide	X	X	X	X	O	X	X	X
Potassium Dichromate	X	X	X	X	O	X	X	X
Potassium Hydroxide (40%)	X	X	X	~	X	X	X	X
Potassium Sulfate	X	X	X	X	O	X	X	X
Propyl Alcohol	~	X	X	~	~	~	O	~
Sodium Chloride	X	X	X	X	X	X	X	X
Sodium Hydroxide (40%)	~	X	X	~	X	~	X	~
Sodium Hypochlorite	~	~	X	~	~	~	X	~
Steam	~	X	~	~	O	~	X	~
Sulfur Dioxide (Liquid)	~	X	X	~	X	~	X	~
Sulfuric Acid (50%)	X	~	X	~	~	X	X	X
Sulfuric Acid (over 50%)	~	~	X	~	~	~	X	~
Tannic Acid	X	X	X	X	O	X	X	X
Vinegar	X	X	X	X	X	X	X	X

Duro Dyne East Division, Bay Shore, NY 631-249-9000 Fax: 631-249-8346
Duro Dyne Midwest Division, Fairfield, OH 513-870-6000 Fax: 513-870-6005
Duro Dyne West Division, Santa Fe Springs, CA 562-926-1774 Fax: 562-926-5778
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Printed in USA 7/11
BO010403