

Date: 1/15/2007

Revision:

Job: #2333

AMF – GW Bakeries, Inc.

Elkhart, IN

Model 2000 Depanner CAD-2-24-D-SS w/Delidder, Seed Containment Unit & Cyclone Separator Book 1 of 1



capway systems

BAKERY AUTOMATION AND PRODUCT HANDLING

725 Vogelsong Road

York, PA 17404-1765

Tel: 717.843.0003

Fax: 717.843.1654

email: sales@capwayusa.com

www.capwayusa.com

DEPANNER MANUAL



AMF – GW BAKERIES
Elkhart, IN

JOB #2333-406

MODEL 2000 DEPANNER CAD-2-24-D-SS
w/Delidder, Seed Containment Unit &
Cyclone Separator

INDEX

I. Book 1 of 1

Index

Section 1. System Data

- a. Layout
- b. Machine Data
- c. Motor/Sprocket Sheets
- d. Depanner Performance Data Sheet
- e. Bill of Materials
- f. General Description
- g. Description of Model 2000 Depanner
- h. Electrical Bill of Materials
- i. Electrical Drawings

Section 2. General Information

- a. Essential Information
- b. Safety Regulations
- c. Lockout/Tagout Procedures
- d. Important Hazard Labels
- e. Sanitation and Cleaning
- f. Personal and Food Hygiene
- g. Stainless Steel Corrosion Resistance Data
- h. Plastic Conveyor Chemical Resistance Guide
- i. Lubrication Table
- j. Component Literature Web Sites

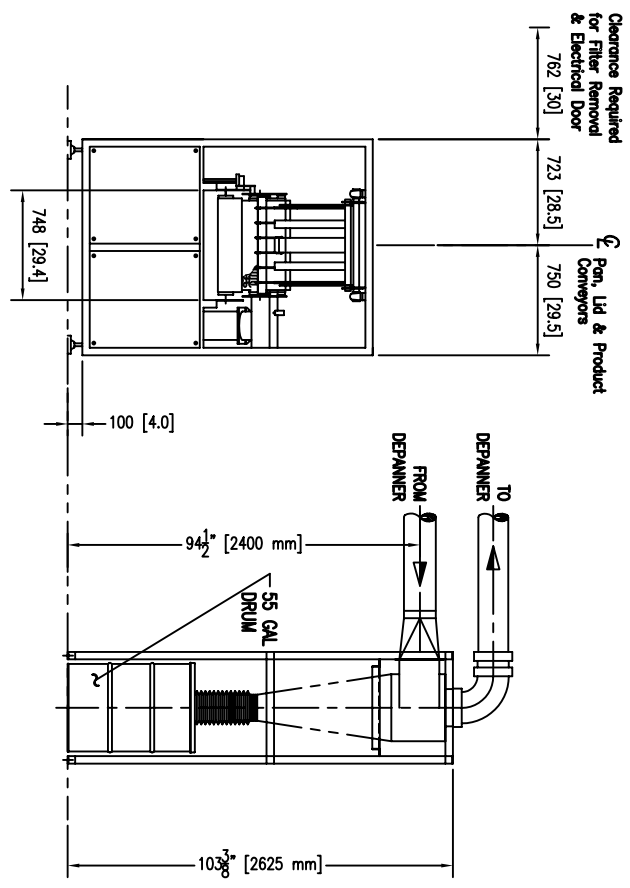
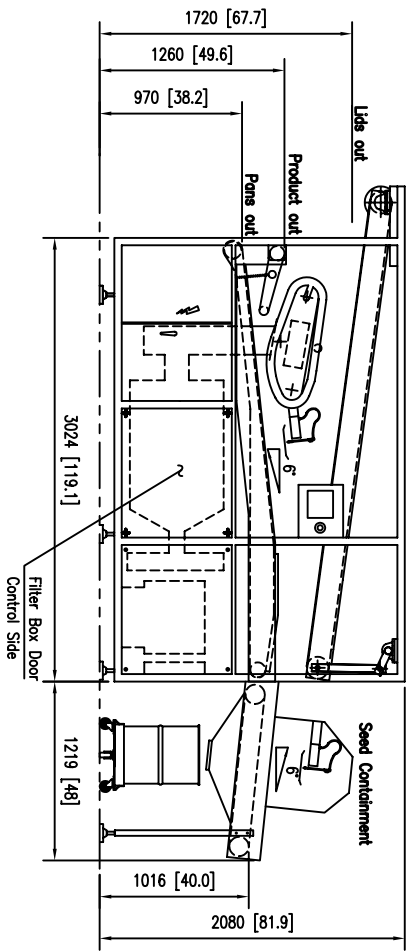
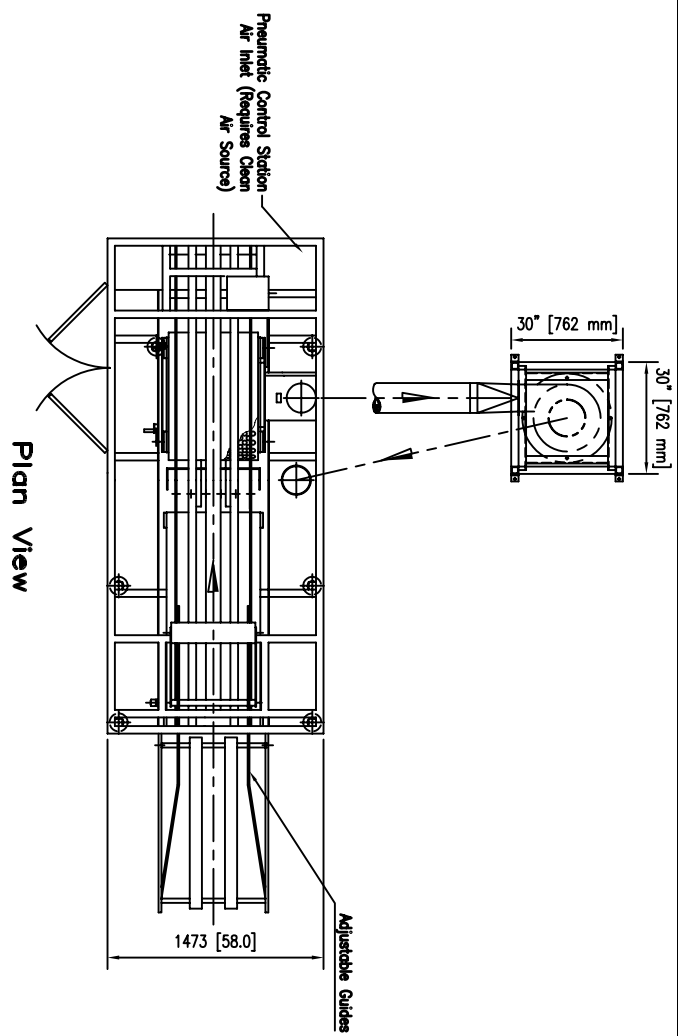
Section 3. Operations Manual

- a. Installation
- b. Preparation for Start-Up
- c. Commissioning
- d. Conveyor Safety
- e. Depanner Panel View Screens
- f. General Maintenance
- g. Maintenance Table - Depanner
- h. Maintenance Table - Belt Conveyors
- i. Maintenance Table - Pneumatics
- j. Maintenance Table - Crumb Catcher Filter
- k. Troubleshooting

Section 4. Spare Parts Manual

- a. Table of Contents
- b. Spare Parts List
- c. Lift and Tilt Assembly
- d. 4 Feet Infeed Conveyor

- e. Bread Conveyor
- f. Delidder Conveyor
- g. Delidder Height Adjustment
- h. Product Discharge Conveyor
- i. Vacuum Chamber Assembly
- j. Vacuum Ducts
- k. Vacuum Belt Cups & Retainers
- l. Seed Containment Unit w/Air Jets
- m. Air Jets Assembly
- n. Air Control
- o. Filter Assembly
- p. Blower Assembly
- q. Cyclone Separator



TECHNICAL DATA
CAPACITY: 1/2 TO 35 TONS PER HOUR (based on per shot)
MATERIALS: ALL STEEL, ALUMINUM, INCO, TITANIUM
CONSTRUCTION: STAINLESS STEEL

ENERGY REQUIREMENTS
ELECTRIC: 400, 3ph, 60hz 50 amps
COMPRESSED AIR: 10 CFM @ 100PSI, 1/2" NPT

CYCLONE SEPARATOR
CONSTRUCTION: ALL STAINLESS STEEL, EXTERIOR
ELECTRIC: NONE
NET WEIGHT: 500 LB
55 GAL WASTE DRUM

SHIPPING SPECIFICATIONS (Approx.)
 NET WEIGHT: 4000 LBS
 GROSS WEIGHT: 4900 LBS

NOTES:

1. DIMENSIONS ARE IN mm, INCHES ARE SHOWN IN []
2. LEFT HAND CONTROL, SIZE IS SHOWN
3. WEEED INSOLE MUST BE MADE TO MATCH INSOLE CONNECTORS
4. INTERCONNECTING DUCTWORK IS OF PVC
5. HANGER SUPPORTS FOR DUCTWORK - SUPPLIED BY CUSTOMER

REV	DESCRIPTION	DATE	BY
P/NAME: 5176LWDG			
			
carpentry systems inc. 725 Vespeneer Road, York, PA 17404			
ALLEN FOODS INLINE BREAD DEPANER			
MODEL CAD-2-24-D-SS W/ CYCLONE & SEED CONTAMINANT			
US-4035			
SCALE: 1/25	PROJECTION	DRAWN BY: ET	ORDER NUMBER
10 = 10.545 mm 10.0 = 10.502 mm		DATE: 22-NOV-2006	2333
		APPRO. BY:	C-400-3178
		DRAWING NUMBER:	REV

MACHINE DATA

MODEL #: CAD-2-24-D-SS

SERIAL #: D2121206

FACTORY ORDER: 2333-406

CUSTOMER INFORMATION

COMPANY: AMF – GW Bakeries

LOCATION: Elkhart, IN

DESCRIPTION

MODEL 2000 DEPANNER MANUAL

MODEL 2000 DEPANNER

YEAR OF PRODUCTION: 2006

SUBJECT TO ALTERATIONS

 capway systems				MOTOR/SPROCKET SHEET			
CUSTOMER: Allen Foods, Inc.					JOB NUMBER: 2333 – 406		
MACHINE: Model 2000 Depanner CAD-2-24-D-SS W/ Cycl.				VOLTS: 460	HZ: 60	PH: 3	PAGE 1 OF 2
SECTION #	CONVEYOR DESCRIPTION	BELT SPEED (FPM)	MOTOR DESCRIPTION	SPROCKETS			
				MOTOR	CONVEYOR		
	3 1/4" D.T.T. Pan Infeed Conveyor	101.5	Jumper drive from Pan Discharge Conveyor	D.T.T. Ø30 40B19	D.T.T. Ø30 40B22		
*	3 1/4" D.T.T. Pan Discharge Conveyor	117.6	1 HP 99 FPM KA37TDT80N4-MM07C-503 M – 2				
	Intralox 1100 Product Discharge Conveyor	123.8	Jumper drive from Pan Discharge Conveyor	D.T.T. Ø30 40B20	Intralox Ø30 40B16		
	Product Discharge Conveyor Tilt		Actuator P-TMD02-2906-4"Stroke 20PPR 24VDC Duff-Norton				
	Vacuum Belt	109.3	1 1/2 HP 59 RPM KA47TDT90S4-MM11C-503 M – 4				
	Vacuum Lift	.40" Sec.	1/2HP 588 RPM RX67DT71D4 – BMHR M – 1	Timing Pulley Ø25 19L100	Timing Pulley Ø25 19L100		
	Vacuum Chamber Tilt		Actuator P-TMD02-2906-4"Stroke 20PPR 24VDC Duff-Norton				
	Vacuum Damper Valve		Actuator P-TMD02-2906-4"Stroke 20PPR 24VDC Duff-Norton				
	Blower		20 HP				
	Pan Guides		1/3 HP 210 RPM W20DT71C4 M – 1				
			* Above Speed At 60 HZ.				
			PRODUCTION RATE				
			96.3 FPM (max.)				
			69.2 FPM (min.)				

DEPANNER PERFORMANCE DATA SHEET

Customer:	AMF/ALLEN FOODS			
Country:	ELKHART, IN. USA			
Job No.:	2333			
Model No.:	CAD-2-24-D-SS			
Serial No.:	D2121206			
1. Speed In Select Unit Speed per Minute				
A. Metering Belt:	Minimum	52.9	Maximum	101.4
B. Table Top:	Minimum	60.5	Maximum	120.1
C. Vacuum Belt:	Minimum	54.5	Maximum	111.0
D. Product Discharge:	Minimum	65.3	Maximum	129.0
E. Lid Conveyor:	Minimum	60.3	Maximum	120.1
2. Vacuum Measurement @ maximum Setting 30 (inches of Water)				
3. Electrical: 480 Volts, 60 Hertz, 3 Phase				
Amperage Reading:	Measured Reading:		Motor Nameplate:	
A. Pan Conveyor Motor:	Minimum Speed:	1.3A	1 HP 1.7 FLA	
	Maximum Speed:	1.6A		
B. Vacuum Belt Drive:	Minimum Speed:	1.5A	1.5 HP 2.1 FLA	
	Maximum Speed:	1.9A		
C. Blower:	Minimum Vacuum:	12A	20 HP 23.5 FLA	
	Maximum Vacuum:	20.8A		
D. Chamber Lift:	Down:	0.7A	1/2 HP 1.0 FLA	
	Up:	0.8A		
E. Lid Conveyor:	Minimum Speed:	1.4A	1 HP 1.7 FLA	
	Maximum Speed:	1.65A		
4. Air Jets Functional:	☐ N/A		☒ Yes	
5. Control Side:	☒ Left Hand		☐ Right Hand	
Inspected By: _____	Date: 20-Dec-06 08:55:00			

				PART	CAD – 2 – 24 – D – SS W/ CYCLONE SEPARATOR															
				MACHINE	MODEL 2000 DEPANNER															
DRAWN BY:				CRS - COLD ROLLED STEEL HRS - HOT ROLLED STEEL SS - STAINLESS STEEL PLTD - PLATED	PAGE 1 OF 3	REQ'D 1 X		ORDER NO.		DRAWING NUMBER										
DATE:						MODIF.		2333 – 406		400-0000										
POS	QTY	TOTAL	DWG/INVENTORY	DESCRIPTION		MAT'L	DIMENSION					S	P	A	L	M	D	H	F	W
1	1		D-400-2671-2	FRAME WELDMENT		M/L														
2	1		D-400-2873-24	PAN CONVEYOR ASSEMBLY		M/L														
3	1		D-400-2528	LIFT & TILT ASSEMBLY		M/L														
4	1		D-400-2548-24	VACUUM CHAMBER ASSEMBLY		M/L														
5	1		C-400-2517-24	PRODUCT DISCHARGE CONVEYOR		M/L														
6	1		D-400-2953	DELIDDER CONVEYOR		M/L														
7	1		D-400-2050-2	BLOWER ASSEMBLY		M/L														
8	1		400-0936	VACUUM DUCTS		M/L														
9																				
10																				
11	1		D-400-2516	ENCLOSURE PANELS		M/L														

				PART	CAD – 2 – 24 – D – SS W/ CYCLONE SEPARATOR																
				MACHINE	MODEL 2000 DEPANNER																
DRAWN BY:				CRS - COLD ROLLED STEEL HRS - HOT ROLLED STEEL SS - STAINLESS STEEL PLTD - PLATED	PAGE 2 OF 3	REQ'D 1 X		ORDER NO.		DRAWING NUMBER											
DATE:						MODIF.		2333 – 406		400-0000											
POS	QTY	TOTAL	DWG/INVENTORY	DESCRIPTION		MAT'L	DIMENSION						S	P	A	L	M	D	H	F	W
12	1		C-400-0567-2	SEPARATOR FRAME		M/L															
13	1			VACUUM TUBING		M/L															
14	1		C-400-2879-24	INFEED CONVEYOR		M/L															
15	1		400-0330	START – UP KIT		M/L															
16																					
17																					
18	1		B-400-2512-2	SOUND GUARD																	
	1		O18-16GA-PERF	PERFORATED SHEET		SS															
19	1		B-400-2663	COVER																	
	1		O18-16GA-0001	SHEET		SS															
20	1		B-400-2664	COVER																	
	1		O18-16GA-0001	SHEET		SS															
21	1		B-400-2515	COVER																	

				PART		CAD - 2 - 24 - D - SS W/ CYCLONE SEPARATOR													
				MACHINE		MODEL 2000 DEPANNER													
DRAWN BY:				CRS - COLD ROLLED STEEL HRS - HOT ROLLED STEEL SS - STAINLESS STEEL PLTD - PLATED		PAGE 3 OF 3		REQ'D 1 X				ORDER NO.				DRAWING NUMBER			
DATE:								MODIF.				2333 - 406				400-0000			
POS	QTY	TOTAL	DWG/INVENTORY	DESCRIPTION		MAT'L	DIMENSION				S	P	A	L	M	D	H	F	W
	1		O18-16GA-0001	SHEET		SS													
22	1		OOD-4000-1708	VENT															
23	1		OOD-4103-9205	NAMEPLATE															
24	1		OOD-4103-9216	NAMEPLATE															
25	1		B-400-2473	ELECTRICAL BOX FLASHING															
	2		O18-16GA-0001	SHEET		SS													
	2		O18-16GA-0001	SHEET		SS													
26	1		OOD-DP22-0000	SERIAL NUMBER PLATE															
27	3		A-400-2561	JUNCTION BOX MOUNTING ANGLE															
	3		O18-11GA-0001	SHEET		SS													

GENERAL DESCRIPTION

The baking pans with product(s) are transported on a buffer conveyor and a table top chain conveyor to the vacuum chamber. To ensure that the baking forms have a better hold on the conveyors, magnets have been placed between the chains.

By means of a vacuum belt, the products are lifted out of the baking forms and placed gently onto a product discharge belt conveyor for further transport. The empty baking form moves on the table top chain conveyor and is taken over by a discharge conveyor. The height of the product discharge can be adjusted by means of a hand wheel or switch.

Depending on the product, the vacuum force in the vacuum chamber can be adjusted with an electric control vacuum valve. The valve, controlled with a pushbutton, has an open-to-close time of 15 seconds. The valve is set at the factory.

ATTENTION: The valve must not be totally closed.

ADVICE: Note the height of each type of product. Write these heights down on a machine adjustment chart and keep this chart with the depanner. Doing this will save time adjusting the depanner when changing over from one product to another. This chart must be changed depending on the product and baking time requirements.

The Capway depanner is provided in a fully operational condition. Any modifications of any type to the equipment must be previously approved by Capway Systems, Inc. Capway Systems, Inc. takes no liability in itself for damage or accidents which are caused by the changing of the mechanical, pneumatic and/or electrical configuration of the equipment without the consultation of Capway Systems, Inc.

Please exercise caution and pay attention to warning stickers and/or labels! These are placed on the equipment for the safety of the personnel around the equipment. Failure to acknowledge the posted warnings can result in serious injury or perhaps death.

The equipment has been specified only suitable for the transporting of the products listed on the order confirmation. Application of other products can lead to equipment damage or failure.



Use of the equipment for other than what is specified can lead to dangerous situations.



The equipment is not suitable for transporting people.

DESCRIPTION OF MODEL 2000 DEPANNER

	APPLICATION	This depanner is suitable to depan most types of baked products from the baking forms/pans.
	CONSTRUCTION OF THE DEPANNER	The depanner consists of the following units: 1. Frame 2. Infeed/discharge conveyors 3. Product discharge conveyor with height adjustment 4. Lid conveyor (optional) 5. Vacuum chamber 6. Height adjustment vacuum chamber 7. Vacuum system 8. Drive motors 9. Vacuum valve 10. Electrical controls
	FRAME	Pertains to all units. The frame, precision cage construction is manufactured of tube profiles and stands on six heavy adjustable feet. By moving the adjustable feet in or out, any floor unevenness can be counteracted. The depanner must stand level. The sides of the depanner are completely closed by means of removable panels. The casing has been built out of insulated panels to prevent nuisance noise and is easy to clean.
	INFEED/DISCHARGE PAN CONVEYOR	The infeed conveyor can be designed in different combinations. A. As a belt conveyor (buffer conveyor) and/or as table top chain conveyor. B. Driven by the discharge conveyor or by its own motor. The pan discharge conveyor is always designed as a table top chain conveyor and driven by the central drive motor. The side guides are adjustable and kept at the required distance from each other by using adjustable handles. BELT CONVEYOR: The belt conveyor is supported by a stainless steel slide plate and driven by a drive pulley. This drive pulley is mounted on the drive shaft. The shaft is supported by bearing blocks with self-aligning ball bearings. A sprocket is mounted on one end of the shaft. This shaft is jumper-driven from the table top conveyor. Magnets are mounted under the slider bed. TABLE TOP CHAIN CONVEYOR, PAN DISCHARGE: The chains are supported by U-profiles, which are provided with plastic wear profiles. Magnets are fitted between the chains to ensure a better hold of the pans. This conveyor is jumper-driven from the product discharge conveyor.

	PRODUCT DISCHARGE CONVEYOR	The product discharge conveyor is a belt type. The belt is driven by a drive pulley. The discharge conveyor is driven by its own motor. The infeed side is adjustable in height by means of a hand wheel.
	LID CONVEYOR (Optional)	The lid conveyor is driven by its own gear motor. The conveyor utilizes 3 1/4" stainless steel table-top chain and is equipped with magnets. The infeed height of the lids can be adjusted with a hand wheel so that the lids can be picked up easily. ATTENTION: If the lid conveyor is not used, place it in the highest position.
	VACUUM CHAMBER	The vacuum chamber can be adjusted by means of a two-way switch located on the electrical panel pushbutton station. The upper and lower positions are limited by a proximity switch. The chamber is equipped with a vacuum belt on which the vacuum cups and retainers are mounted. The vacuum belt can be re-tensioned by means of the end drum.
	TILT ADJUSTMENT VACCUM CHAMBER	The tilt of the vacuum chamber can be adjusted manually by means of a hand wheel.
	VACUUM SYSTEM AND FAN	High efficiency fan and drive motor are mounted free of vibration on the machine frame. The pressure in the vacuum chamber is generated by the fan. An electric adjustable vacuum valve controls the vacuum force. The vacuum intake is connected to the filter casing, which houses a removable filter. The vacuum force is indicated by a manometer.
	DRIVE MOTORS	All conveyors are driven by their own motors except for the pan conveyor. It is jumper driven from the product discharge belt
	VACUUM VALVE	The vacuum valve is set at the factory. Altering the limit switch settings can cause damage to the blower motor.
	ELECTRICAL	The controls box is fitted on the front side (discharge) of the depanner. The control station is mounted on the long side of the feed direction. The depanner is completely pre-wired.

**BILL OF MATERIALS
FOR ELECTRICAL PARTS**

capway® systems inc.

Bakery Automation and Product Handling

DRAWING NO.: D-10526
PAGE 1 OF 4
JOB NAME: AMF/ALLEN FOODS, INC.
JOB NO.: 2333
JOB LOCATION: ELKHART, IN.
TITLE: 480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER

ITEM #	QTY	S	P	NUMBER	PART DESCRIPTION	MANUFACTURER	ID CODE
1	1			OO5 5005 2350	30 x 42 x 10 S.S. ENCLOSURE W/ PANEL		
2	1			OO5 5005 2351	GLOSS WHITE BACK PANEL		
3	1			OO5 194R J060	FUSED DISCONNECT		
4	3			..	FUSES MAIN		
5	1			OO5 1492 3141	POWER DISTRIBUTION BLOCK		
6	1			OO5 1492 PBC9	POWER BLOCK COVER		
7	1			OO5 T153 0006	150VA CONTROL TRANSFORMER		
8							
9	3			OO5 WCB3 P210	3-POLE 10 AMP CIRCUIT BREAKER		
10	1			OO5 WCB3 P205	3-POLE 5 AMP CIRCUIT BREAKER		
11	1			OO5 WCB2 P202	2-POLE 2 AMP CIRCUIT BREAKER		
12	1			OO5 WCB1 P205	1-POLE 5 AMP CIRCUIT BREAKER		
13	7			OO5 USCC 1LDC	1-POLE FUSE BLOCK		
14	1			..	1 AMP BRANCH FUSE		
15	6			..	5 AMP BRANCH FUSE		
16							
17	1			OO5 0700 400D	MASTER CONTROL RELAY		
18	1			OO5 0140 CA11	AUXILIARY CONTACT		
19	1			OO5 0100 C37D	CONTACTOR		
20	2			OO5 0100 C09D	CONTACTOR		
21	3			OO5 0104 C09D	CONTACTOR REVERSING		
22	1			OO5 0193 AB40	MOTOR OVERLOAD		
23	2			OO5 0193 AB24	MOTOR OVERLOAD		
24	1			OO5 0140-4000	MTR STARTER PROTECT		
25	1			OO5 0193 AB16	MOTOR OVERLOAD		
26	2			OO5 0193 AB10	MOTOR OVERLOAD		
27	6			OO5 0193 TAPM	DIN RAIL ADAPTER		
28	1			OO5 5005 1412	ENCLOSURE 14 X 12 X 6 S.S.		
29	1			OO5 5003 1412	PANEL		
30	1			OO5 5004 1008	ENCLOSURE		
31	1			OO5 5004 1009	PANEL		
32	5			OO5 5003 0402	SCREW COVER BOX		

**BILL OF MATERIALS
FOR ELECTRICAL PARTS**

capway® systems inc.

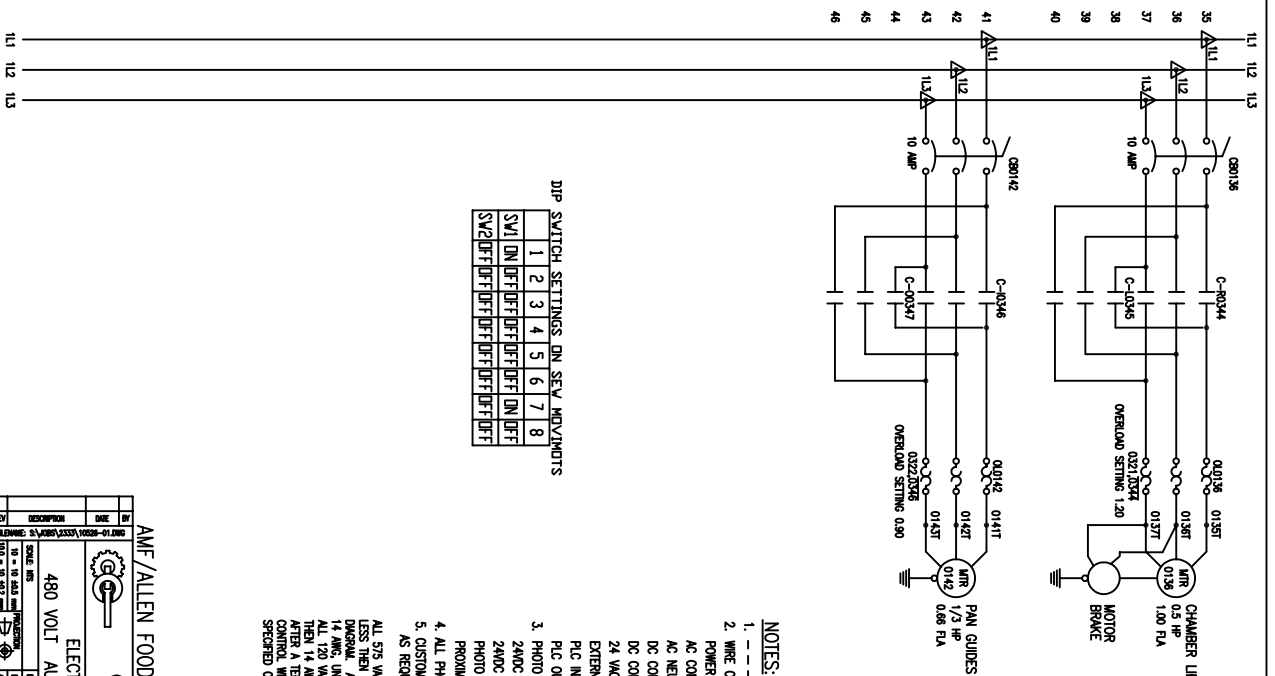
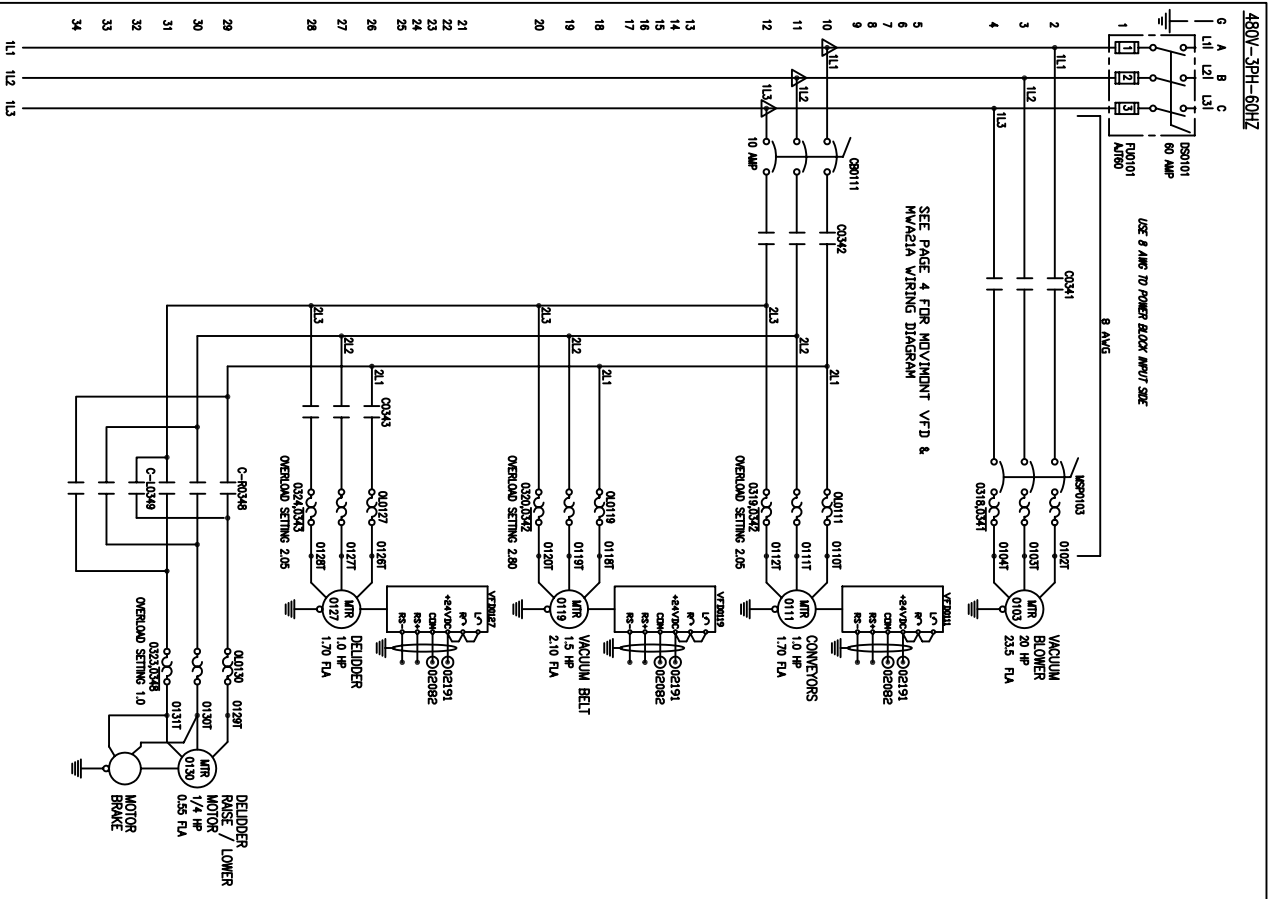
Bakery Automation and Product Handling

DRAWING NO.: D-10526
PAGE 2 OF 4
JOB NAME: AMF/ALLEN FOODS, INC.
JOB NO.: 2333
JOB LOCATION: ELKHART, IN.
TITLE: 480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER

ITEM #	QTY	S	P	NUMBER	PART DESCRIPTION	MANUFACTURER	ID CODE
33							
34	1			OO5 2004 AB03	ILLUM. MUSHROOM P.B.		
35	1			OO5 2009 OOX A	1NO / 1NC CONTACT BLOCK		
36	1			OO5 209X 0504	EMERG. STOP LEGEND PLATE		
37	1			OO5 1500 0009	7-SLOT SLC 500 CHASSIS		
38	1			OO5 1500 0012	PLC POWER SUPPLY		
39	1			OO5 1500 0013	SLC 5/05 PLC PROCESSOR		
40	1			OO5 1500 0019	ANALOG OUTPUT MODULE		
41	2			OO5 1500 0015	16 IN INPUT MODULE		
42	1			OO5 1500 0017	16 OUT OUTPUT MODULE		
43	1			OO5 1500 0018	16 OUT AC/DC RELAY OUTPUT MOD.		
44	1			OO5 1500 0023	CARD SLOT FILLER		
45							
46	1				PANEL VIEW 600 PLUS		
47					ETHERNET CABLE		
48	1			OO5 304T X004	N-TRON		
49							
50	1			OO5 Q293 8727	20 AMP 24VDC POWER SUPPLY		
51							
52	6			OO5 3001 872C	PROXIMITY SWITCH		
53	2			OO5 3001 871L	PROXIMITY SWITCH		
54	6			OO5 3001 CB05	PROXIMITY SWITCH CABLE		
55	2			OO5 3001 CB02	PROXIMITY SWITCH CABLE		
56							
57	3			OO5 5014 0000	OPTO COUPLER MODULE		
58	3			OO5 RS48 5000	RS-485 CONVERTER		
59							
60	2			OO5 PU20 E000	24VDC 10 PPR ENCODER		
61	1			OO5 0421 1000	24VDC 1000 PPR ENCODER		
62	1			REF	1.2KΩ RESISTOR		
63							
64	1			OO5 2200 0002	ALARM HORN		

BILL OF MATERIALS FOR ELECTRICAL PARTS				 capway[®] systems inc. Bakery Automation and Product Handling		DRAWING NO.: D-10526 PAGE 3 OF 4	
JOB NAME: AMF/ALLEN FOODS, INC.				JOB NO.: 2333			
JOB LOCATION: ELKHART, IN.				TITLE: 480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER			
ITEM #	QTY	S	P	NUMBER	PART DESCRIPTION	MANUFACTURER	ID CODE
65	1			005 2200 0004	HORN GASKET		
66							
67	1			005 8025 0001	EXHAUST FAN		
68	1			005 8025 0002	EXHAUST GRILL		
69							
70	2			005 700H 1Z24	RELAY 1-POLE SPDT		
71							
72	2'			..	WIREWAY 1"X3"X6'		
73	2'			..	WIREWAY COVER 1"X6'		
74	12'			..	WIREWAY 1-1/2"X3"X6'		
75	12'			..	WIREWAY COVER 1-1/2"X6'		
76							
77							
78	9'				PERFORATED DIN RAIL		
79	1				WHITE TERMINAL BLOCK		
80	2				RED TERMINAL BLOCK		
81	17				GRAY TERMINAL BLOCK		
82	39				BLUE TERMINAL BLOCK		
83	6				YELLOW TERMINAL BLOCK		
84	52				ORANGE TERMINAL BLOCK		
85	21				BROWN TERMINAL BLOCK		
86	1				GREEN TERMINAL BLOCK		
87	4				GROUND BLOCK		
88	5				END COVER		
89	13				END CLAMP		
90	274				STRIP MARKER		
91	1				GROUND LUG		
92	1				GROUND BAR		
93							
94	1			005 7322 0219	26AWG 5C SPIREX DATA CABLE		
95	1			005 7322 0152	16AWG SPIREX 540P 5COND RETRACTABLE CORD		

BILL OF MATERIALS FOR ELECTRICAL PARTS					 capway[®] systems inc. Bakery Automation and Product Handling		DRAWING NO.: D-10526	
							PAGE 4 OF 4	
JOB NAME: AMF/ALLEN FOODS, INC.					JOB NO.: 2333			
JOB LOCATION: ELKHART, IN.					TITLE: 480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER			
ITEM #	QTY	S	P	NUMBER	PART DESCRIPTION	MANUFACTURER	ID CODE	
96								
97	1				GFI			
98								
99								
100								
101								



- NOTES:**
1. DASHED LINES INDICATE WIRING BY OTHERS
 2. WIRE COLORS:
 - AC CONTROL — BLACK
 - AC NEUTRAL — RED
 - DC CONTROL (24VDC) — WHITE
 - DC CONTROL (24VDC COM) — BLUE
 - 24 VAC — VIOLET
 - EXTERNAL SOURCES — YELLOW
 - PLC INPUT — ORANGE
 - PLC OUTPUT — BROWN
 - 3. PHOTO EYE AND PROXIMITY SWITCH WIRE COLORS (NOC):
 - 24VDC COM — BROWN
 - 24VDC CON — BLUE
 - PHOTO EYE SIGNAL — WHITE
 - PROXIMITY SWITCH SIGNAL — BLACK
 - 4. ALL PHOTO EYES ARE DARK OPERATED. ALL PROX SW'S N.O.
 - 5. CUSTOMER TO FINISH AND INSTALL DISCONNECTS AT MOTORS AS REQUIRED BY THE NEC, AND ANY STATE OR LOCAL CODES.

ALL 575 VAC, 480 VAC, AND 230 VAC POWER WIRING MUST BE NO LESS THAN 14 AWG, UNLESS SPECIFIED OTHERWISE ON THE WIRING DIAGRAM. ALL 120VAC CONTROL WIRING MUST BE NO SMALLER THAN 14 AWG, UNLESS OTHERWISE SPECIFIED ON THE WIRING DIAGRAM. ALL 120 VAC AND 24VDC CONTROL WIRING MUST BE NO SMALLER THAN 14 AWG, UNLESS OTHERWISE SPECIFIED ON THE WIRING DIAGRAM. ALL 24VDC CONTROL WIRING MUST BE NO SMALLER THAN 14 AWG, UNLESS OTHERWISE SPECIFIED ON THE WIRING DIAGRAM.

AMF/ALLEN FOODS, INC. ELKHART, IN.

capway systems

7200 Westinghouse Blvd., York, PA 17404

ELECTRICAL WIRING DIAGRAM FOR 480 VOLT AUTO ADJUST DEPAWNER W/ DELIDDER

REV	DESCRIPTION	DATE	BY
01	ISSUED FOR CONSTRUCTION	11/17/00	2333
02	REVISED	11/17/00	2333

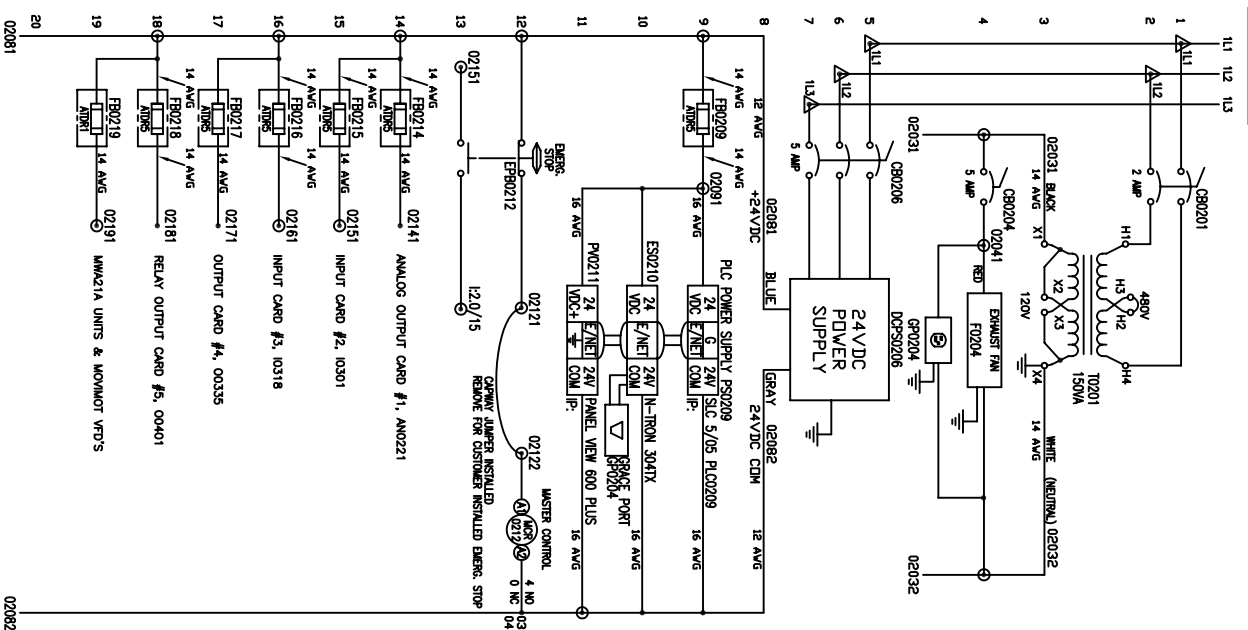
SCALE: 1" = 8' 0" (SEE NOTE 1)

DATE: 11/17/00

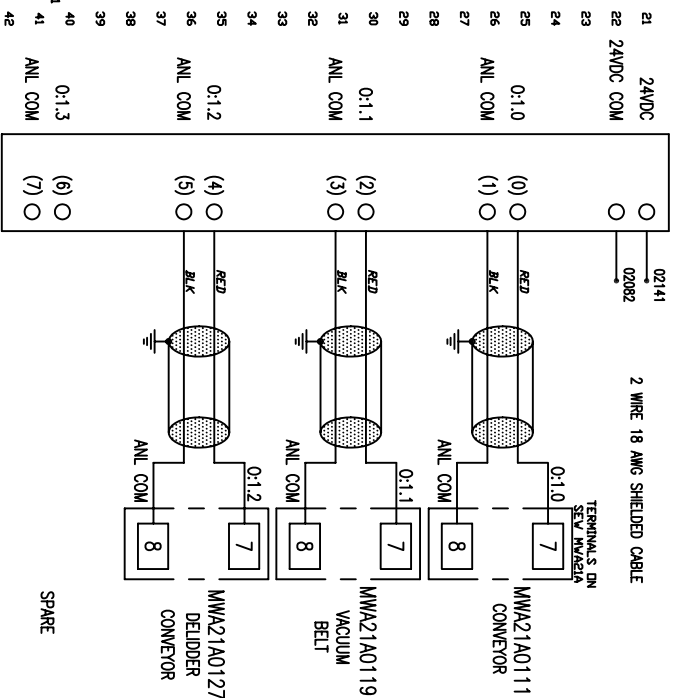
PROJECT: 480 VOLT AUTO ADJUST DEPAWNER W/ DELIDDER

PAGE: 1

480V-3PH-60HZ



ANALOG OUTPUT MODULE SLOT 1
1746-NO4V
AN0221



ALL 575 VAC, 480 VAC, AND 230 VAC POWER WIRING MUST BE NO LESS THAN 14 AWG, UNLESS SPECIFIED OTHERWISE ON THE WIRING DIAGRAM. ALL 120VAC CONTROL WIRING MUST BE NO SMALLER THAN 14 AWG, UNLESS OTHERWISE SPECIFIED ON THE WIRING DIAGRAM. ALL 120 VAC AND 240VDC CONTROL WIRING MUST BE NO SMALLER THAN 14 AWG ON THE INPUT AND LOAD SIDES OF A FUSE BLOCK. AFTER A TERMINAL BLOCK OR POWER DISTRIBUTION BLOCK ALL 240VDC CONTROL WIRING MUST NO SMALLER THAN 16 AWG, UNLESS OTHERWISE SPECIFIED ON THE WIRING DIAGRAM.

AMF/ALLEN FOODS, INC. ELKHART, IN.

approved systems

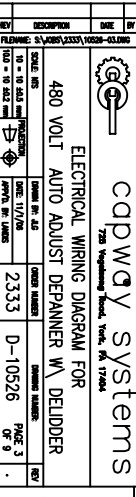
ELECTRICAL WIRING DIAGRAM FOR 480 VOLT AUTO ADJUST DEPAVNER W/ DELIDDER

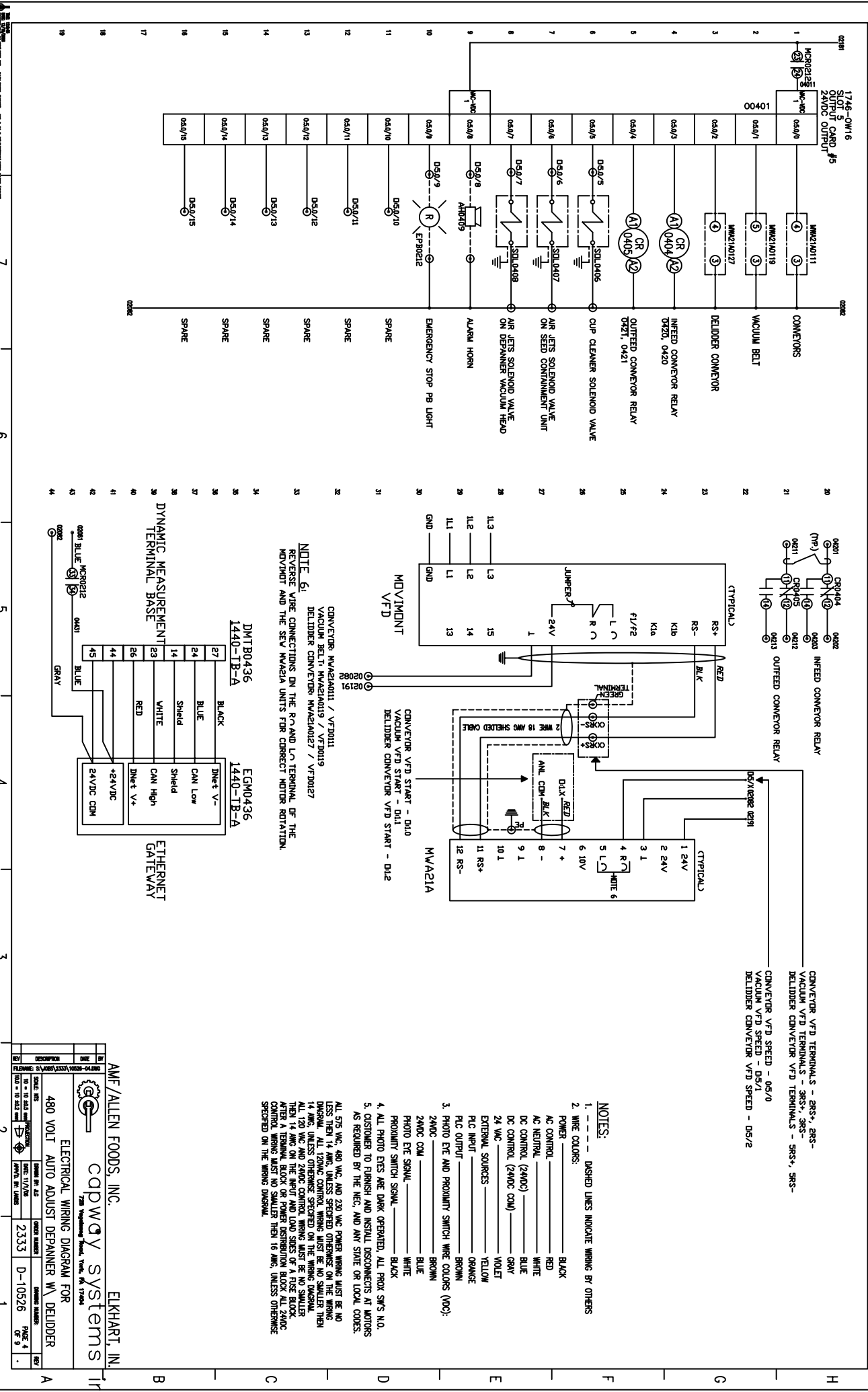
720 Westphalen Road, York, PA 17404

REV	DESCRIPTION	DATE	BY
01	ISSUED	11/17/00	2333
02	REVISED	11/17/00	2333

1

- NOTES:
1. --- DASHED LINES INDICATE WIRING BY OTHERS
 2. WIRE COLORS:
 - POWER _____ BLACK
 - AC CONTROL _____ RED
 - AC NEUTRAL _____ WHITE
 - DC CONTROL (240V) _____ BLUE
 - DC CONTROL (24VDC COM) _____ GRAY
 - 24 VAC _____ VIOLET
 - EXTERNAL SOURCES _____ YELLOW
 - PLC INPUT _____ ORANGE
 - PLC OUTPUT _____ BROWN
 - 3. PHOTO EYE AND PROXIMITY SWITCH WIRE COLORS (VOC):
 - 24VDC _____ BROWN
 - 24VDC COM _____ BLUE
 - PHOTO EYE SIGNAL _____ WHITE
 - PROXIMITY SWITCH SIGNAL _____ BLACK
 - 4. ALL PHOTO EYES ARE DARK OPERATED. ALL PROX SW'S N.O.
 - 5. CUSTOMER TO FURNISH AND INSTALL DISCONNECTS AT MOTORS AS REQUIRED BY THE NEC, AND ANY STATE OR LOCAL CODES.
- ALL 575 VAC, 480 VAC, AND 230 VAC POWER WIRING MUST BE NO LESS THAN 14 AWG, UNLESS SPECIFIED OTHERWISE ON THE WIRING DIAGRAM. ALL 120VAC CONTROL WIRING MUST BE NO SMALLER THAN 14 AWG, UNLESS OTHERWISE SPECIFIED ON THE WIRING DIAGRAM. ALL 120 VAC AND 240VDC CONTROL WIRING MUST BE NO SMALLER THAN 14 AWG ON THE INPUT AND LOAD SIDES OF A FUSE BLOCK. AFTER A TERMINAL BLOCK OR POWER DISTRIBUTION BLOCK ALL 240VDC CONTROL WIRING MUST NO SMALLER THAN 16 AWG, UNLESS OTHERWISE SPECIFIED ON THE WIRING DIAGRAM.





CONVERTER VFD TERMINALS - 2RS+, 2RS-
VACUUM VFD TERMINALS - 3RS+, 3RS-
DELLIDER CONVERTER VFD TERMINALS - 5RS+, 5RS-
CONVERTER VFD SPEED - 05/0
VACUUM VFD SPEED - 05/1
DELLIDER CONVERTER VFD SPEED - 05/2

- NOTES:
1. DASHED LINES INDICATE WIRING BY OTHERS
 2. WIRE COLORS:
POWER _____ BLACK
AC CONTROL _____ RED
AC NEUTRAL _____ WHITE
DC CONTROL (24VDC) _____ BLUE
DC CONTROL (24VDC COM) _____ GRAY
24 VAC _____ VIOLET
EXTERNAL SOURCES _____ YELLOW
PLC INPUT _____ ORANGE
PLC OUTPUT _____ BROWN
3. PHOTO EYE AND PROXIMITY SWITCH WIRE COLORS (VOC):
24VDC _____ BROWN
24VDC COM _____ BLUE
PHOTO EYE SIGNAL _____ WHITE
PROXIMITY SWITCH SIGNAL _____ BLACK
4. ALL PHOTO EYES ARE DARK OPERATED. ALL PROX SW'S N.O.
5. CUSTOMER TO FINISH AND INSTALL DISCONNECTS AT MOTORS
AS REQUIRED BY THE NEC, AND ANY STATE OR LOCAL CODES.

ALL 575 VAC, 480 VAC, AND 230 VAC POWER WIRING MUST BE NO
LESS THEN 14 AWG, UNLESS SPECIFIED OTHERWISE. ON THE WIRING
DIAGRAM ALL 24VDC CONTROL WIRING MUST BE NO SMALLER THEN
14 AWG. UNLESS SPECIFIED OTHERWISE. ALL 24VDC CONTROL WIRING
MUST BE NO SMALLER THEN 14 AWG. ON THE INPUT AND LOAD SIDES OF A FUSE BLOCK
AFTER A TERMINAL BLOCK OR POWER DISTRIBUTION BLOCK ALL 24VDC
CONTROL WIRING MUST NO SMALLER THEN 16 AWG, UNLESS OTHERWISE
SPECIFIED ON THE WIRING DIAGRAM.

AMF/ALLEN FOODS, INC. ELKHART, IN.

capway systems

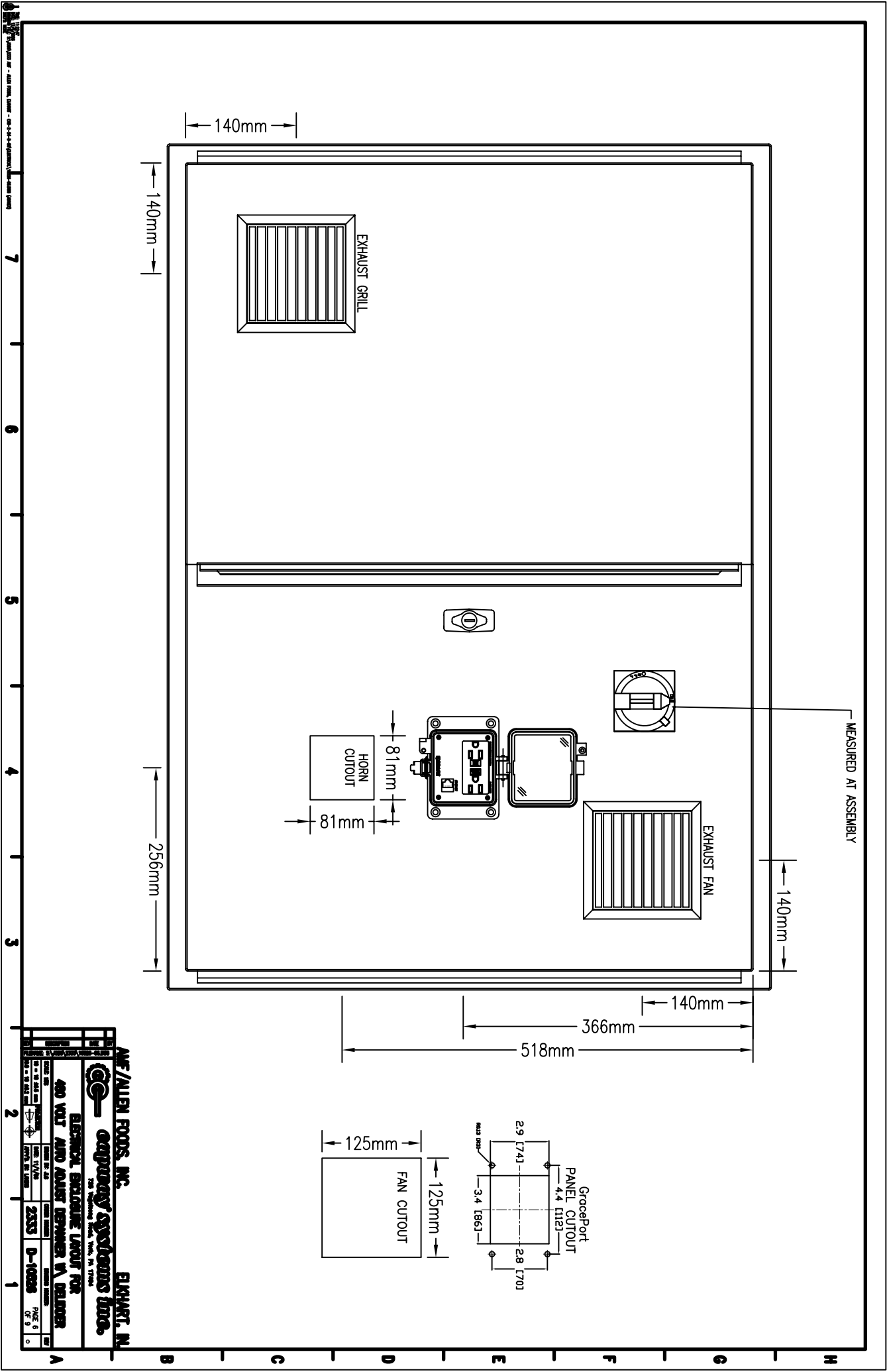
720 Westphalen Road, York, PA 17404

ELECTRICAL WIRING DIAGRAM FOR 480 VOLT AUTO ADJUST DEPAVNER W/ DELIDER

REV	DESCRIPTION	DATE	BY	CHKD	DATE	BY
01	ISSUED	11/17/00	2333			

10 - 3/4" DIA. HOLES
100 - 1/8" DIA. HOLES
100 - 1/8" DIA. HOLES

2333 D-10526 OF 9



AIR/ALLEN FOODS, INC.
200 Washington Blvd., York, PA 17404

Carway Systems Inc.

ELKHART, IN

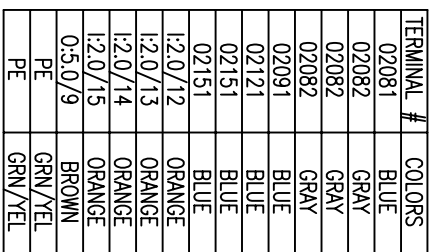
ELECTRICAL ENCLOSURE LAYOUT FOR

400 VOLT AUTO MIST DEMISTER VY DELUOSER

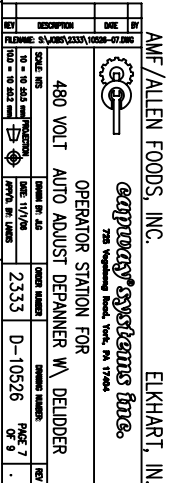
2333 D-10008

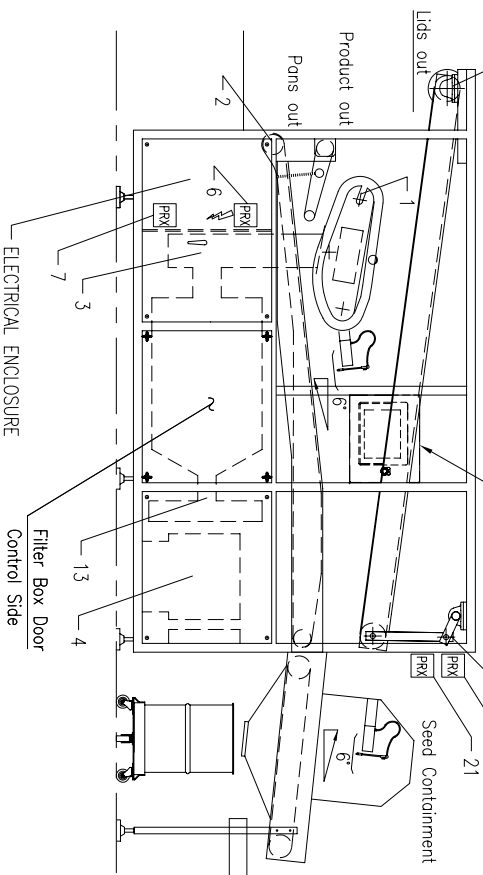
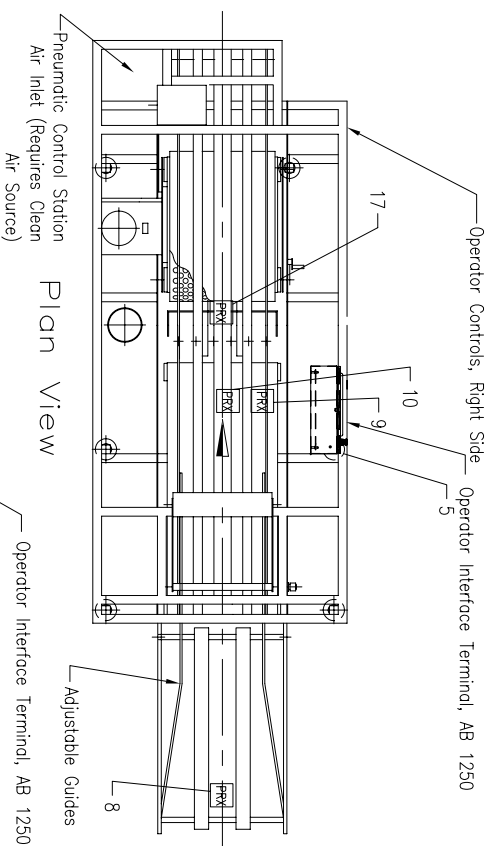
PAGE 6

OF 9



TERMINAL #	COLORS
02081	BLUE
02082	GRAY
02082	GRAY
02082	GRAY
02091	BLUE
02121	BLUE
02151	BLUE
02151	BLUE
1:2.0/12	ORANGE
1:2.0/13	ORANGE
1:2.0/14	ORANGE
1:2.0/15	ORANGE
0:5.0/9	BROWN
PE	GRN/YEL
PE	GRN/YEL

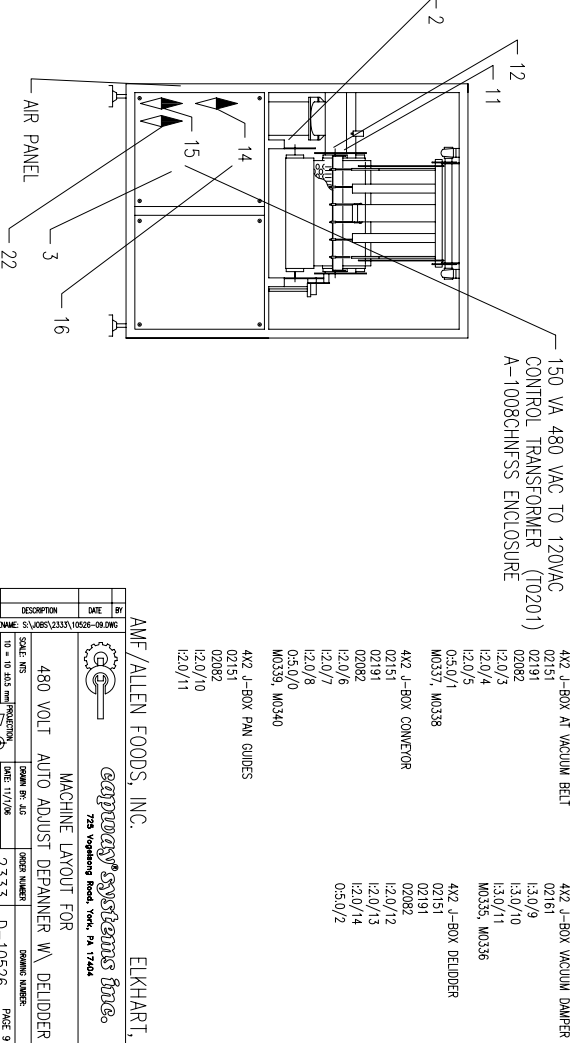




LEFT HAND CONTROLS



ITEM #	PART LABEL	MOTOR HP	PART #	DESCRIPTION	I / O
1	MTR019	1.5	SA47TD190S4-MN1B-503	VACUUM BELT MOTOR	N/A
2	MTR011	1.0	SA47TD180M4-MN07B-503	CONVEYORS MOTOR	N/A
3	MTR036	0.5	R67D171D4 - BMH	CHAMBER LIFT MOTOR V/ ENCODER ON SHAFT (ENC0301)	12.0/0
4	MTR0103	20	20 HP LINCOLN 3600 RPM TFC	VACUUM BLOWER MOTOR	N/A
5	MTR042	0.33	W20D17K4	PAN GUIDES MOTOR V/ ENCODER ON SHAFT (ENC0310)	12.0/9
6	PRX0302	N/A	872C-J5NP18-D4	CHAMBER HEIGHT LIMIT UP PROX. SV.	12.0/1
7	PRX0303	N/A	872C-J5NP18-D4	CHAMBER HEIGHT LIMIT DOWN PROX. SV.	12.0/2
8	PRX0325	N/A	871L-D2EP40-D4	AIR JET'S PROX. SV. (PROVIDED WITH SEED CONTAINMENT)	13.0/7
9	PRX0311	N/A	872C-J5NP18-D4	PAN GUIDES LIMIT UP PROX. SV.	12.0/10
10	PRX0312	N/A	872C-J5NP18-D4	PAN GUIDES LIMIT IN PROX. SV.	12.0/11
11	N/A	N/A	P-TMD02-2906-4*Stroke	CHAMBER TILT LIMIT FORWARD (LM0304)	12.0/3
12	N/A	N/A	P-TMD02-2906-4*Stroke	CHAMBER TILT LIMIT BACK (LM0305)	12.0/4
13	N/A	N/A	P-TMD02-2906-4*Stroke	CHAMBER TILT LIMIT FORWARD (LM0306)	12.0/5
14	N/A	N/A	P-TMD02-2906-4*Stroke	PRODUCT CONVEYOR LIMIT UP (LM0307)	12.0/6
15	N/A	N/A	P-TMD02-2906-4*Stroke	PRODUCT CONVEYOR LIMIT UP (LM0308)	12.0/7
16	N/A	N/A	P-TMD02-2906-4*Stroke	PRODUCT CONVEYOR LIMIT DOWN (LM0309)	12.0/8
17	N/A	N/A	P-TMD02-2906-4*Stroke	VACUUM DAMPER LIMIT UP (LM0320)	13.0/9
18	N/A	N/A	P-TMD02-2906-4*Stroke	VACUUM DAMPER LIMIT DOWN (LM0321)	13.0/10
19	N/A	N/A	P-TMD02-2906-4*Stroke	VACUUM DAMPER LIMIT UP (LM0322)	13.0/11
20	N/A	N/A	P-TMD02-2906-4*Stroke	VACUUM DAMPER LIMIT DOWN (LM0323)	13.0/12
21	N/A	N/A	P-TMD02-2906-4*Stroke	VACUUM DAMPER LIMIT UP (LM0324)	13.0/13
22	N/A	N/A	P-TMD02-2906-4*Stroke	VACUUM DAMPER LIMIT DOWN (LM0325)	13.0/14



REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
1	FILENAME: S:\08\233\233\10526-08.DWG		
2	480 VOLT AUTO ADJUST DEPANNER W/ DELIDDER		
3	SCALE: 1/8" = 1"		
4	DATE: 11/7/06		
5	DRAWN BY: JLC		
6	CHECKED BY: JLC		
7	2333		
8	D-10526		
9	PAGE 9		

REV	DESCRIPTION	DATE	BY
FILENAME:	S:\08\233\233\10526-08.DWG		
 SCALE: 1/8" = 1/4"  PROJECTION			
480 VOLT			
MACHINE LAYOUT FOR			
AUTO ADJUST DEPANNER W/ DELIDDER			
DRAWN BY: JLS			
DATE: 11/1/96			
CHECKED BY: JMS			
2333			
D-10526			
PAGE 9			



caraway systems inc.

725 Vogelstein Road, York, PA 17404



ELECTRA

a. ESSENTIAL INFORMATION

Dear Customer,

These operating instructions are entrusted to you as the buyer of our equipment. They contain important information and drawings which are only intended for your guidance.

We expect you to treat them confidentially and not to make them accessible to third parties. One copy must be handed over to your operators.

It is essential for the operation and reliability of our products that our operating and maintenance instructions, as well as the accident prevention regulations are adhered to exactly.

Accordingly, the proper use of technical products includes the observation of the operating and maintenance instructions and precautions against foreseeable mistakes.

If we supply accessories later, they are entered in the index. We depend on these details to a large extent when supplying spare parts.

Please give the type of machine or plant with every order, in addition to factory number, the order number and the works number. If you have any inquiries on this manual, please state the page number given at the bottom.

In our efforts to give you quicker and better service, following the above procedures will help.

b. SAFETY REGULATIONS

In order to prevent accidents with this machine, please read the following safety regulations carefully:

- When putting the system into service, operating and maintaining always avoid any danger to life, limb, health and property.
- Only allow the installation and operation to be performed by fully trained personnel.
- Temporary and unskilled workers must only be allowed to operate the installation while under the supervision of trained personnel.
- Work on a controls box, electrical or control component must only be performed by fully trained personnel or the firm's electrician.
- Any work performed after the installation has occurred must satisfy the applicable regulations.

DANGER SITUATIONS

BEFORE OPENING THE SWITCH BOX, TURN OFF THE MAIN SWITCH AND REMOVE THE FUSES

- Before working on the equipment, “LOCK OUT” the electrical and pneumatic energy.
- If a problem arises, **DO NOT** place hands or interfere in the machine. Switch off the machine and solve the problem.
- Keep hands away from the switches during operation.
- **DO NOT** attempt to climb over or crawl under running conveyors.
- Safety covers and chain guards may only be removed when the equipment is switched off.
- Always ensure that there are no other persons in the danger zone before starting the installation.
- Always switch off the main switch before making any repairs.

PERFORM REGULAR MAINTENANCE!

c. LOCKOUT/TAGOUT PROCEDURES

PURPOSE

The user is responsible for ensuring that safe procedures are in place for isolation of the equipment, and that these procedures are used before any cleaning or maintenance tasks are commenced. All power sources should be locked out and tagged indicating by whom, for what and why the power has been removed.

This procedure establishes the minimum requirements for the lockout or tagout of energy devices. It should be used to ensure that the machine or equipment is isolated from all potentially hazardous energy sources, and locked out or tagged out before employees perform any servicing or maintenance activities where the unexpected movement, start-up or release of stored energy could cause injury. Refer to your company's Lockout/Tagout policy for the recommended procedure.

DEFINITIONS

- a. **Affected Employee:** An employee whose job requires him/her to operate or use a machine or equipment on which maintenance or repair is being performed under this lockout/tagout policy, or whose job requires him/her to work in an area in which such maintenance or repair is being performed.
- b. **Authorized Individual:** A knowledgeable individual to whom the supervisor has given the authority and responsibility to lock or implement a lockout/tagout procedure on machines or equipment to perform maintenance or repair. An authorized individual and an affected employee may be the same person when the affected employee's duties also include performing maintenance or repair of a machine or equipment which must be locked and tagged out.
- c. **Knowledgeable Individual:** An individual who is qualified to operate the controls or equipment and is familiar with the effects of operation.

RESPONSIBILITY

Appropriate employees shall be instructed in the safety significance of the lockout (or tagout) procedure as listed above as authorized employees. Each new or transferred affected employee whose operations are or may be in the area shall be instructed in the purpose and use of the lockout procedure.

SEQUENCE OF LOCKOUT OR TAGOUT SYSTEM PROCEDURE (ANSI Z-244.1)

- 1) **Preparation:** Notify all affected employees that a lockout or tagout system is going to be utilized and the reason therefore. The authorized employee shall know the type and magnitude of the energy that the machine and equipment utilizes and shall understand the hazards thereof.
- 2) **Machine or Equipment Shutdown:** If the machine or equipment is operating, shut it down by the normal stopping procedures (push stop button, open toggle switch, etc.).
- 3) **Machine or Equipment Isolation:** Operate the main disconnect switch, valve, or other energy isolating device so that the energy source(s) (electrical, mechanical, pneumatic, etc.) is disconnected or isolated from the equipment. Stored energy such as rotating motors must be allowed to come to a complete rest. Stored energy, such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems and air, gas, steam or water pressure, etc., must also be dissipated or restrained by methods such as grounding, repositioning, blocking, etc.
- 4) **Application of Lockout/Tagout:** Lockout and/or tagout the main disconnect switch with its assigned individual lock even though someone may have locked the control before you.
- 5) **Verification of Isolation:** After ensuring that no personnel are exposed, and as a check on having disconnected the energy source, operate the push button or the normal operating controls to make certain the equipment will not operate.

**CAUTION: RETURN OPERATING CONTROLS TO "NEUTRAL" OR "OFF"
POSITION AFTER THE TEST**

- 6) The machine is now locked or tagged out.

RESTORING MACHINE OR EQUIPMENT TO NORMAL PRODUCTION OPERATIONS

- 1) Before lockout or tagout devices are removed and energy is restored to the equipment, inspect the work area to ensure that nonessential items, such as tools, have been removed and to ensure that the equipment guards and components are operationally intact.
- 2) Check work area to ensure that all employees are in the clear.
- 3) Notify affected employees that lockout/tagout devices have been removed.
- 4) Each lockout/tagout device shall be removed from the energy isolating device by the employee who applied the device. The energy isolating devices may be opened or closed, i.e., circuit breakers, to restore energy to equipment.

PROCEDURE INVOLVING MORE THAN ONE AUTHORIZED PERSON

In the preceding steps, if more than one individual is required to lock out equipment, each person shall place a lock and tag on the group lockout device when that person begins work, and shall remove their lock when that person stops working on the equipment.

LOCKOUT PROCEDURE DURING SHIFT CHANGE

Each worker is responsible for removing their own lock and tag device at the completion of the shift after the preceding shifts personnel have placed their lock and tag on the equipment. This ensures continuous lockout/tagout protection during shift or personnel changes. If work is to cease until the next day the supervisor should place his/her personal lock and tag on the equipment and the workers remove their own locks and tags. When work resumes the workers should place their personal lock and tag to the equipment and the supervisor should remove his/her lock and tag.

d. IMPORTANT HAZARD LABELS

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



DANGER: HIGH VOLTAGE



CAUTION: ELECTRIC SHOCK HAZARD



LOCKOUT ELECTRICAL AND MECHANICAL POWER



CAUTION: HAND CRUSH HAZARD



FALLING HAZARD



PINCH POINT



ARC FLASH HAZARD



MAGNETIC FIELDS – NO PACEMAKERS



MACHINE SHUTS DOWN WHEN DOORS ARE OPENED

e. SANITATION AND CLEANING

GENERAL STATEMENT

A good sanitation and cleaning program goes hand-in-hand with your maintenance program. Careful adherence to these programs will greatly enhance the productivity and food safety issues of your facility. This section is written with the intent to comply with sanitation standard ANSI/BISSC/Z50.2-2003. Questions and/or suggestions should be sent in writing to:

Capway Systems, Inc.
725 Vogelsong Road
York, PA 17404-1765
Attn: Manual/Compliance

Over the last several decades, consumers have come to expect (and demand) a safer food supply. They are more aware of healthier diets and expect consistent quality from their food sources. Media coverage has heightened consumer awareness of food born illness from contamination.

This contamination comes from 4 main sources:

- Chemical
Cleaning and/or maintenance supplies
- Allergens
Naturally occurring proteins within a product or ingredient, which can potentially cause a severe reaction
- Biological
Bacteria, mold, pathogens, and pest infestations
- Physical
Foreign material such as wood, glass, metal, etc.

Together (food producer and equipment supplier) we can minimize food safety risks. **Food safety is a requirement, not an option.**

It is not the intent of this manual to recommend a specific detailed cleaning procedure or cleaning agent ... it is only our intent to recommend basic cleaning procedures and develop recommended schedules for those procedures. As part of this manual, you will find charts which specify chemical reactions occurring with various materials used in the manufacture of the equipment. It is the responsibility of the end user (in conjunction with your chemical supplier) to determine if a particular chemical is safe, not only to the cleaning personnel and consumer but also to the equipment.



For your safety and the safety of others, regularly clean the equipment and the direct surroundings.



Cleaning of the equipment must be completed in a safe manner by competent, trained personnel.



Cleaning staff must be informed of and follow all safety instructions and regulations regarding the equipment and surrounding environment.



Understand and follow your company's cleaning and sanitizing procedures.

WET CLEANING

Please check the equipment specifications to determine if the equipment was manufactured for a “wash down” application according to in-place-cleaning (IPC) as defined in this section.

This equipment may or may not be designed for use in a wash down application. This information is available in the order confirmation.

Wash Down: Equipment designed to withstand moderate pressure with direct contact of water spray. This does not constitute high pressure wash down. High pressure wash down is when water pressures directed at the surface are greater than 150 psi. If the equipment is not rated for high pressure wash down, it is recommended that nominal pressure of less than 150 psi be used.



If this equipment is designed for a wash down application, please be advised of the following:

1. **Capway Systems recommend using only cleaning solutions approved in the food preparing industry. Some cleaning solutions, however, may be too aggressive to use with the plastics and metals in this equipment.**
2. **Avoid direct spray on the bearing housings and/or bushings. Some of the cleaning solution may penetrate into the bearing housing causing the lubricant inside to break down. This may lead to damage of the equipment and create costly repairs and extensive periods of production downtime.**



If this equipment is not designed for a wash down application, but a wash down will occur in near proximity:

1. **Cover all electrical boxes, photo-eyes and motors with plastic bags. DO NOT remove bags until use of water has ceased.**

WATER QUALITY

Water quality can have a dramatic effect on your cleaning ability with or without cleaning chemicals.

It goes without saying that cleaning water must be of potable quality. In addition, of course, the water must be soft. Hard water greatly reduces the cleaning action of many detergents. Hard water in itself can create a number of surface scale or surface film problems such as rust formations or calcium deposits. An effective cleaning program must have an adequate supply of soft, hot water. Conditioned water reduces the corrosive effects of hard water, and extends the economic life of plumbing systems as well as that of many other pieces of equipment using water. Many efforts have been made to classify water hardness. The U.S. Geological Survey Water Supply Paper number 658 classifies hardness as follows:

- Soft: 0-3.5 grains per gallon
- Moderately hard: 3.5-7.0 grains per gallon
- Hard: 7.0-10.5 grains per gallon
- Very hard: Over 10.5 grains per gallon

WATER TEMPERATURE

There are many opinions about the correct temperature for cleaning water. Whereas there may be an application or two for exceptionally hot water (165-200°F), generally speaking, water at 110-155°F is more than adequate. In fact, many detergents are most effective in the presence of warm water. Extremely hot water can set or “cook” soil to the surface that is to be cleaned. Be sure to check with your cleaning supplies provider to verify the best temperature for the solution you are using. **Water in excess of 160 degrees will cause a serious scalding hazard!**

CLEANING CHEMICALS

Selecting the correct chemical for the cleaning job at hand is important. This will result in fewer cleaning hours required and an improvement in the quality of the cleaning job. The following discussion is very general because this topic is covered in much detail in many food sanitation texts. In addition, it is always smart to work closely with the chemical supplier. Their knowledge is invaluable in helping to develop the optimal chemical choices and cleaning parameters for specific applications.

SOILS

There are two types of soils: acid and alkaline. Most food soils are acid soils (fats, proteins, carbohydrates). Alkaline soils include mineral salts and water hardness. Some soils are complex soils composed of a combination of soil types. The type of soil dictates the type of cleaning chemical. In general, acid cleaners are used for alkaline soils, and alkaline cleaners are used for acid soils.

CLEANERS

Efficient cleaners will:

- Soften water, suspend hardness
- Emulsify fats and certain proteins
- Saponify fats (turn to soap)
- Penetrate through wetting action
- Disperse particles
- Suspend particles
- Peptize proteins (physical formation of solutions)
- Rinse freely
- Dissolve readily in water
- Not corrode
- Adjust pH to acid cleaning

Be sure that the cleaners used have the capability to do these things. Any chemical supplier will be able to supply a good list of the efficiency attributes that their cleaners exhibit.

DRY CLEANING

A great many of the cleaning jobs around a food plant are dry cleaning jobs which require sweeping, brushing, wiping, blowing (on a minimal basis), and vacuuming. When purchasing brushes and brooms, they should be of high quality to minimize the risk of contamination resulting from lost bristles (and the associated hair complaints likely to follow). Cleaning tools should be designated (color coded) “product zone” or “non-product zone” and stored separately to prevent cross-contamination. It is recommended that brushes be cleaned and sanitized after each use.

Vacuuming offers advantages over the other dry cleaning methods: it does not spread dust or pests and it picks up as it goes along. It also removes deeply imbedded dust and dirt. There are two types of industrial vacuum systems available: portable and central. Each has a place in the average food plant and each has desirable features. The efficiency of a sanitation program in an average size food plant will increase noticeably with the use of a vacuum cleaning system. However, these systems must be managed in a manner to prevent pest infestation (neglect = infestation).

CLEANING PLASTICS

Plastic guards are susceptible to scratches and abrasions, as well as to damage by certain solvents. You'll want to observe some general precautions when cleaning a plastic guard:

- Never use abrasive cleaners, abrasive pads, or gritty cloths.
- Do not remove dirt by scraping with a sharp tool, such as a razor blade or putty knife.
- Do not clean with window cleaning fluids or strong solvents such as gasoline, denatured alcohol, carbon tetrachloride, or acetone. They will cause the plastic to craze with minute cracks.
- To clean a plastic guard, use either a solution of mild soap or detergent and water or a weak solution of household ammonia and water (**DO NOT** use ammonia for polycarbonates). Apply with a soft cloth or cellulose sponge and rinse well with clear water. To prevent water spots, blot dry with a chamois or a damp cellulose sponge.
- Please use an antistatic cleaner and polish (similar to Kleenmaster Brilliantize) for plastics and shining surfaces. These products clean and glaze in one operation. Surfaces resist finger marks, dust, and abrasion. Recommended for: plastics, aircraft, boats, mirrors, showcases, sneeze guards, television screens, chandelier crystals, fiberglass, chromium, refrigerators, glazed ceramics, polished marble and granite, and medical and dental equipment.
- **Hint:** Never clean plastic with paper towels – they will scratch!

COMPRESSED AIR

Some cleaning and maintenance operations involve the use of the compressed air. Treat compressed air with respect, it can be dangerous if misused. The user is responsible for issuing guidelines for the safe use of compressed air.



Compressed air moves particles that can cause serious eye injuries. Always wear eye protection and do not use more than 15 psi (103 kpa) of pressure. Use only an OSHA approved air nozzle.

Limit the use of compressed air when cleaning dusty surfaces (flour, 10X sugar, etc.). Vacuuming will prevent “broadcasting” dust including difficult to clean overhead areas.

CLEANING AND MAINTENANCE SAFETY PRECAUTIONS



If you have any reason to think that the equipment is operating below its usual standard or abnormally in any way, you must report this to your supervisor as soon as possible.

Continuing to use equipment which you believe is operating below standard could lead to damage to the equipment or other equipment and adversely affect the products.

Be especially aware of unusual noises or vibrations.

LOCKOUT/TAGOUT PROCEDURES



Before attempting cleaning or maintenance of the equipment ensure that it is isolated from all power sources:

- Electrical supply
- Pneumatic supply
- Hydraulic supply
- Mechanical blocking
- Hydronic supply

Ensure that the lockout procedures have been applied.

Ensure that any equipment which operates at elevated temperatures has cooled to a safe working temperature before starting work.

Failure to carry out these instructions could result in serious injury.



Upon completion of any cleaning or maintenance activities ensure that all components are correctly assembled and the equipment is safe to operate. **DO NOT** run the equipment unless all guards are securely fitted in their correct position. If parts are not correctly installed, or guards are not fitted properly, serious injury can result. Test any safety systems before putting the equipment back into production.

Lock all electrical enclosures that do not have safety interlocks such that access to them is only by authorized personnel.

CONFINED SPACE



Before attempting cleaning or maintenance of the equipment, ensure that the area to be cleaned is not considered a “confined space”. If the area is considered a confined space, then special testing and additional procedures must be followed. Please refer to the Confined Space Program mandates that your employer currently uses.

NOTE: Failure to follow proper Confined Space regulations and instructions may result in serious or fatal injury.

FREQUENCIES

Food processing equipment should be cleaned frequently enough to prevent microbial/bacteria/pathogenic accumulations, and to sufficiently remove soil/dirt/product residues (defined as anything not intended to be in the product) and/or other foreign material contaminants on or around product contact surfaces. Because of varied applications, products produced and regulatory requirements within the food industry, Capway cannot recommend specific cleaning frequencies. Federal, state and/or local guidelines/mandates should be referenced to when considering cleaning frequencies for food processing equipment.

In developing a cleaning and sanitation schedule ... your plant must consider ALL 4 of the previously mentioned sources of contamination (chemical, allergens, biological and physical). Cross contamination from any single source will require immediate attention and **CAN NOT** be postponed until the next “scheduled” cleaning event.

Interval	Frequency	
A	Daily	8-10 hrs
B	Weekly	50-70 hrs
C	Monthly	200 hrs
D	Quarterly	500 hrs
E	6-month	1000 hrs
F	Yearly	2000 hrs
G	2-years	4000 hrs

A typical equipment list for cleaning in a food processing application includes (but is not limited to):

1. Air nozzle (OSHA approved 30 psi or less)
2. Air hose
3. Scraper
4. Sanitary wipes or paper towels
5. Broom
6. Shovel
7. Food waste and non-food waste (trash) containers
8. Foam application unit (use only on equipment if equipment is classified as wash down)
9. Water hose and nozzle (use only on equipment if equipment is classified as wash down)
10. Squeegee
11. Mop and bucket
12. Wet Floor sign
13. Plastic covering material (for electric components) and strapping tape
14. Scouring pad
15. "Equipment Only" color coded brush
16. Vacuum
17. Ladder
18. Upright power lift (for heights over 8 feet)

A typical list of personal protective equipment (PPE) includes (but is not limited to):

1. Chemical resistant (rubber) boots with no-slip soles
2. Rubber apron
3. Rubber gloves
4. Face shield or goggles
5. Dust mask
6. Lockout/Tagout

Safety Notes

NEVER mix non-compatible chemicals such as chlorine and ammonia or acids. Violent reaction and/or noxious gases can occur as a result. Follow label instructions.

Water temperature should never exceed 160 degrees in manual or semi-manual cleaning operations (scalding hazard).

Working from a ladder: Be certain the ladder is placed in a non-traffic area. Never step higher than the 2nd step from the top. If possible, work with someone to hold the ladder steady.

Be familiar with equipment and surroundings. **YOU ARE RESPONSIBLE FOR THE SAFETY OF YOURSELF AND OTHERS AROUND YOU!**

DEFINITIONS

The following definitions are included for your reference to help interpret various subsections of this manual:

Accessible: A surface which is on or can be quickly exposed for inspection and cleaning, using simple tools normally used by operating or cleaning personnel, such as screwdrivers or wrenches.

Readily accessible: A surface, which is or can be easily and quickly exposed for inspection and cleaning without the use of tools.

Cleanability: Made of such materials, so finished, and so fabricated that soil may be effectively removed by normal cleaning means. (ASME/ANSI F2.1-1986)

Clean in place (CIP): A procedure dependent upon circulating appropriate cleaning solutions at relatively high velocities for a specified time and temperature in a closed system specifically designed for this purpose.

The 3A Accepted Practices for Permanently Installed Sanitary Product Pipelines and Cleaning Systems shall be used as guidelines in determining design criteria for products that are highly perishable.

When specified clean-in-place (CIP) procedures are developed, they shall be included in this definition.

Clean out of place (COP): A method of removing the equipment to an area remote to the operating area that will allow complete cleaning.

Closed: Fitted together tightly with no openings large enough to permit the entry or harborage of vermin, including insects.

Corrosion resistant: A material that maintains its surface characteristics under prolonged influence of the normal components of the environment, such as product, ingredients, ambient conditions, and cleaning material.

Dead end: A place wherein product, ingredients, cleaning agents, or extraneous matter may be trapped, retained or not completely displaced in normal operation or cleaning procedures.

Equipment disassembly procedures: Detailed, written equipment disassembly procedures provided by the manufacturer to allow end-user to adequately clean the machine.

In place cleaning (IPC):

Mechanical cleaning: A procedure for using compressed air or vacuum to adequately remove dust, scrap, and residue to provide dry cleaning.

Wash down design: Stationary equipment designed to allow complete washing with a high pressure hose, (“high pressure” refers to water pressure supplied to the facility by the local utility and is considered to be less than 100 psi.) using water and cleaning agents, with no difference in operating characteristics at end of wash down cycle.

The bakery **SHALL NOT** use water produced by pressurization such as from “pressure washers”. Water pressure in excess of 150 psi can damage equipment components even though these components are considered as “wash down”.

Non-absorbent: A material under ordinary conditions of use, that will not retain an amount of the substances with which it normally comes in contact nor be affected adversely or affect adversely the product or ingredients with which it comes in contact, or create an unsanitary condition.

The 3A Sanitary Standards Tests for Rubber and Rubber-Like Materials, and the 3A Sanitary Standards Tests for Multiple-Use Plastic Materials, shall be used as the criteria for determining compliance of such materials with this definition.

When absorbency tests are developed for other materials, they shall be included in this definition.

Non-toxic: Materials, which under conditions of their use, conform to the procedures and requirements of U.S. Food and Drug Administration as being non-toxic.

Product zone: All surfaces of the equipment with which product or ingredients may normally come in contact and return to the product or ingredients.

Non-product zone: All surfaces outside the product zone as defined above.

Protective coating: A protective coating shall prevent corrosion of the base material, shall not affect or be affected by the substances in contact with it, shall be non-toxic, non-absorbent, shall not impart an odor or taste to the product, and shall be bonded to the underlying surface so as to be resistant to chipping and peeling. It shall have a durable, smooth surface without breaks exposing the base material, shall resist abrasion in ordinary use, and shall maintain its surface characteristics under prolonged influence of the environment such as the product, and cleaning agents.

Removable: A part which can be quickly separated from the machine or equipment, using simple tools normally used by operating or cleaning personnel such as screwdrivers or wrenches.

Readily removable: A part, which can be easily and quickly separated from the equipment without the use of tools.

Sealed: The condition resulting from the filling of a crack, crevice, joint or opening, so as to effectively prevent the entry or passage of moisture, liquids, gases, and solids.

Shall: When the verb “shall” is used, the requirements of these standards can be met only by literal compliance.

Should: Use of the verb “should” indicates a preferred condition.

Smooth: A uniform surface free of pits, crevices and scale. Within the product zone, surface roughness height shall be no greater than 1.8 micron (70 micro inches) Arithmetic Average.

Special disassembly tools and equipment: The detailed list provided by the manufacturer, of tools and/or special equipment that may be required to disassemble the certified machine to insure satisfactory cleaning.

Sufficient clearance: Shall mean designed and installed to permit complete access to all areas for inspection and cleaning.

f. PERSONAL AND FOOD HYGIENE

You are working with food which is usually for human consumption. Therefore, it is essential that you maintain the highest standards of hygiene within the process area. Adherence to GMP (Good Manufacturing Practices) is necessary with any operation where food items are being produced.



You should have received training in personal and food hygiene from your employer. If you have not received this training, DO NOT use the equipment or enter the process area. Arrange training with your supervisor or training manager. Working in the process area without adequate understanding of hygiene can lead to contamination of food.

Below is a list of basic hygiene rules. This list is not a substitute for proper training by the user, and is issued here for guidance only.

- Wash your hands thoroughly before entering the process area.
- Wear all provided protective clothing recommended by your employer such as hair-net, beard-net, and overalls.
- If suffering from an illness or infection, obtain a doctor's approval before coming to work.
- Avoid touching your nose, ears and mouth when you are in the process area.
- Remove your watch and any loose jewelry before entering the process area.
- Leave all medicines, pills and tablets which you need during the day in the First Aid station, securely locked away if necessary.
- Don't carry small loose items in your shirt/blouse pockets.
- Never take food or drinks into the process area.
- Keep all tools in a box or bag.

g. STAINLESS STEEL CORROSION RESISTANCE DATA

CHART XVI—Corrosion Resistance Data

Chemical Media	Temp. °F.	316	302	304	430	403	410
Acetic Acid							
5 to 20%	70°	■	■	■	■	■	■
50%	70°	■	■	■	■	■	■
80%	70°	■	■	■	■	■	■
100%	70°	■	■	■	■	■	■
50%	Boiling	■	■	■	■	■	■
80%	Boiling	■	■	■	■	■	■
100%	Boiling	■	■	■	■	■	■
Acetic Anhydride							
90%	70°	■	■	■	■	■	■
90%	Boiling	■	■	■	■	■	■
Acetic Vapors							
30%	Hot	■	■	■	■	■	■
100%	Hot	■	■	■	■	■	■
Acetone							
70°	70°	■	■	■	■	■	■
Boiling	Boiling	■	■	■	■	■	■
Acetylene	70°	■	■	■	■	■	■
Alcohol, Ethyl							
70°	70°	■	■	■	■	■	■
Boiling	Boiling	■	■	■	■	■	■
Alcohol, Methyl							
70°	70°	■	■	■	■	■	■
150°	150°	■	■	■	■	■	■
Aluminum	Molten	■	■	■	■	■	■
Aluminum Acetate							
Saturated	70°	■	■	■	■	■	■
Saturated	Boiling	■	■	■	■	■	■
Aluminum Chloride							
25%	70°	■	■	■	■	■	■
Saturated	70°	■	■	■	■	■	■
Aluminum Fluoride	70°	■	■	■	■	■	■
Aluminum Hydroxide							
Saturated	70°	■	■	■	■	■	■
Aluminum Potassium Sulphate							
2% and 10%	70°	■	■	■	■	■	■
2% and 10%	Boiling	■	■	■	■	■	■
Saturated	Boiling	■	■	■	■	■	■
Aluminum Sulphate							
10%	70°	■	■	■	■	■	■
Saturated	70°	■	■	■	■	■	■
10%	Boiling	■	■	■	■	■	■
Saturated	Boiling	■	■	■	■	■	■
Ammonia (Dry or Moist)							
All concentrations	70°-212°	■	■	■	■	■	■
Anhydrous	70°	■	■	■	■	■	■
Anhydrous	Hot	■	■	■	■	■	■
Ammonium Bicarbonate							
70° and Hot	70° and Hot	■	■	■	■	■	■
Ammonium Carbonate							
1% and 5%	70°	■	■	■	■	■	■
Aerated or agitated	70°	■	■	■	■	■	■
Ammonium Chloride							
1%	70°	■	■	■	■	■	■
10-28-50%	Boiling	■	■	■	■	■	■
Ammonium Nitrate							
All concentrations	70°	■	■	■	■	■	■
Saturated	Boiling	■	■	■	■	■	■
Ammonium Oxalate, (5%)	70°	■	■	■	■	■	■
Ammonium Persulphate, (5%)	70°	■	■	■	■	■	■
Ammonium Perchlorate							
10%	Boiling	■	■	■	■	■	■
Ammonium Phosphate							
5%	70°	■	■	■	■	■	■
Saturated	70°	■	■	■	■	■	■
Ammonium Sulphate							
1% and 5%	70°	■	■	■	■	■	■
10%	Boiling	■	■	■	■	■	■
Saturated	Boiling	■	■	■	■	■	■
Ammonium Sulphite							
70° and Boiling	70° and Boiling	■	■	■	■	■	■
Aniline							
3%	70°	■	■	■	■	■	■
Concentrated crude	70°	■	■	■	■	■	■
Aniline Hydrochloride	70°	■	■	■	■	■	■
Antimony	Molten	■	■	■	■	■	■
Antimony Trichloride	70°	■	■	■	■	■	■
Amyl Acetate (Conc.)	70°	■	■	■	■	■	■
Amyl Chloride	70°	■	■	■	■	■	■
Arsenic Acid	150°	■	■	■	■	■	■
Barium Carbonate	70°	■	■	■	■	■	■
Barium Chloride							
5%	70°	■	■	■	■	■	■
Saturated	70°	■	■	■	■	■	■
Aqueous solution	Hot	■	■	■	■	■	■
Barium Nitrate							
Aqueous solution	Hot	■	■	■	■	■	■
Barium Sulphate	70°	■	■	■	■	■	■
Barium Sulphide							
Saturated Solution	70°	■	■	■	■	■	■
Beer	70°	■	■	■	■	■	■
Barley (Malt and Hops)	70°	■	■	■	■	■	■
Alcohol (3 1/2 to 4 1/2%)	160°	■	■	■	■	■	■
Benzene	70°	■	■	■	■	■	■
Benzoic Acid	70°	■	■	■	■	■	■
Benzol	70°	■	■	■	■	■	■
Blood (Meat Juices)	Cold	■	■	■	■	■	■
Borax (5%)	Hot	■	■	■	■	■	■
Boric Acid							
5%	Hot	■	■	■	■	■	■
Saturated solution	Boiling	■	■	■	■	■	■
Bromine	70°	■	■	■	■	■	■
Buttermilk	70°	■	■	■	■	■	■
Butyric Acid							
5%	70°	■	■	■	■	■	■
5%	150°	■	■	■	■	■	■
Aqueous Sol. Sp. G. .964	Boiling	■	■	■	■	■	■
Calcium Carbonate	70°	■	■	■	■	■	■
Calcium Chlorate							
Dilute solution	70°	■	■	■	■	■	■
Dilute solution	Hot	■	■	■	■	■	■
Calcium Chloride							
Dilute solution	70°	■	■	■	■	■	■
Conc. solution	70°	■	■	■	■	■	■

Corrosion Resistance Data

The following table presents information as to the relative corrosion resistance of representative types of stainless steels, namely Types 316, 302, 304, 430, 403 and 410. This data is based on laboratory tests and should be considered only as an indication of service life to be anticipated.

Under service operating conditions, many variations are encountered such as fluctuations in temperature, impurities in materials being processed, and local variations in concentrations, etc. Fabrication problems such as welding, brazing and heat treating must also be considered in the selection of the right type of stainless. The design factor must be studied as it, too, enters into the selection. It is important that sufficient access be made to equipment that it might be properly cleaned. Crevices and sharp corners should be avoided and welds should be ground smooth.

In view of the above, it is recommended that, wherever possible, samples of stainless should be subjected to actual operating conditions for evaluation before application to production.

Symbols and Colors Indicate Recommendation

- Recommended
- Light attack — use with caution
- Chemically attacked — not recommended
- Not tested

* Pitting occurs under some conditions.

Chemical Media	Temp. °F.	316	304	430	410
Calcium Hydroxide					
10% Boiling					
20% Boiling					
50% Boiling					
Calcium Hypochlorite (2%) 70°		*	*	*	
Calcium Sulphate Saturated 70°					
Carbolic Acid					
CP 70°					
CP Hot					
Carbonated Water (Carbonic Acid) Cold and Hot					
Carbon Bisulphide 70°					
Carbon Monoxide Gas					
1400°					
1600°					
Carbon Tetrachloride					
CP (Dry) 70°					
CP (Dry) Boiling					
Aqueous solution (10%) 70°		*	*	*	
Chinosol					
Antiseptic solution, 1-500 70°					
Chloroacetic Acid 70°					
Chlorobenzol Pure, Dry 70°					
Chloric Acid 70°					
Chlorinated Water Saturated 70°					
Chlorine Gas					
Dry gas 70°					
Moist gas 70°					
Chloroform (Dry) 70°					
Chromic Acid					
CP 10% 70°					
CP 10% Boiling					
CP 50% Boiling					
Chromic Acid 50% commercial (Cont. SO ₃) 70°					
50% commercial (Cont. SO ₃) Boiling					
Chromium Plating Bath 70°					
Cider 70°					
Citric Acid					
10% 70°					
25% 70°					
50% 70°					
10% Boiling					
25% Boiling					
50% Boiling					
Coca-Cola Syrup (Pure) 70°					
Coffee Boiling					
Copper Acetate Saturated 70°					
Copper Carbonate Sat. sol. in 50% NH ₄ OH					
Copper Chloride					
1% aerated 70°		*	*	*	
5% aerated 70°		*	*	*	
Copper Cyanide Saturated Boiling					
Copper Nitrate					
5% 70°					
50% Boiling					

Chemical Media	Temp. °F.	316	304	430	410
Copper Sulphate					
5% aerated 70°					
Saturated Boiling					
Creosote (Coal Tar) Hot					
Cyanogen Gas 70°					
Dichloroethane Boiling					
Dinitrochlorobenzene Melted and solidified 70°					
Dyewood Liquor 70°		**			
Epsom Salt					
Magnesium sulphate Cold and Hot 70°		*	*		
Ether 70°					
Ethyl Alcohol, (10% to 100%) 70°					
Ethyl Chloride (Dry) 70°					
Ethylene Glycol (Conc.) 70°					
Ferric Chloride All concentrations 70°					
Ferric Hydroxide 70°					
Ferric Nitrate All concentrations 70°					
Ferrous Chloride Saturated 70°					
Ferrous Sulphate 70°					
10% Boiling					
10% Boiling					
Fluorine (Gas) 70°					
Formalin (Formaldehyde, 40%) 70°		*	*		
Formic Acid					
5% 70°					
10% 70°					
50% 70°					
100% 70°					
10% Boiling					
50% Boiling					
100% Boiling					
Fruit Juices 70°					
Fuel Oil Hot					
Furfural 70°					
Gallic Acid					
5% 70°					
5% 150°					
Saturated, 212°F Boiling					
Gasoline 70°					
Gelatine 70°					
Glue					
Dry 70°		*	*		
Solution acid 70° and 140°		*	*		
Glycerine 70°					
Hydrobromic Acid					
Hydrochloric Acid All concentrations 70°					
Hydrocyanic Acid					
Hydrofluoric Acid All concentrations 70°					
and Hot					
Hydrofluosilicic Acid 70°					
Hydrogen Peroxide 70°					
Boiling					
Hydrogen Sulphide					
Dry 70°		*	*		
Wet 70°		*	*		
Iodine 70°					
Iodoform 70°					
Kerosene 70°					

Chemical Media	Temp. °F.	316	304	430	410
Ketchup 70°					
Lactic Acid					
1%, 5% and 10% 70°					
1% Boiling					
5% Boiling					
10% Boiling					
Lard 70°					
Lead (Molten) 1000°F					
Lead Acetate (5%) Boiling					
Linseed Oil 70°					
Lysol 70°					
Magnesium Carbonate All concentrations 70°					
Magnesium Chloride 1% and 5% 70°		*	*		
Hot		*	*		
Magnesium Hydroxide 70°					
Magnesium Nitrate All concentrations 70°					
Malic Acid Cold and Hot 70°					
Mayonnaise 70°		*	*		
Mercuric Chloride (Dil. Sol.) 70°					
Mercury					
Methanol (See Methyl Alcohol)					
Milk (Fresh or Sour) Cold or Hot					
Mixed Acids					
50% H ₂ SO ₄ + 50% HNO ₃ Cold 200°					
Boiling					
70% H ₂ SO ₄ + 10% HNO ₃ + 20% water Cold 200°					
Boiling					
15% H ₂ SO ₄ + 5% HNO ₃ + 80% water Boiling					
Molasses					
Molybdic Acid (5%) 70°					
Mustard 70°		*	*	*	
Muriatic Acid 70°					
Naphtha (Pure) 70°					
Naphtha (Crude) 70°					
Nickel Chloride Solution 70°		*	*		
Nickel Sulphate Solution 70°		*	*		
Niter Cake Fused					
Nitric Acid					
All concentrations 70°					
5% Boiling					
20%, 40% and 65% Boiling					
Concentrated Boiling					
Fuming conc. 70°					
Fuming conc. Boiling					
Nitrous Acid (5%) 70°					
Oils (Crude) Cold and Hot		**	**	**	
Oils (Vegetable and Mineral) Cold and Hot		**	**	**	
Oleic Acid					
70±					
300°					
400°					
Oxalic Acid					
5% 70°					
10% 70°					
10% Boiling					
25% Boiling					
50% Boiling					

* Pitting occurs under some conditions.
 ** Attack may occur if sulphuric acid is present.

Chemical Media	Temp. °F.	316	304	430	410
Paraffin	Cold and Hot	■	■	■	■
Petroleum Ether		■	■	■	■
Phenol (See Carboic Acid)		■	■	■	■
Phenolic Resins	Cold and Hot	■	■	■	■
Phosphoric Acid		■	■	■	■
1% and 5%	70° and Boiling	■	■	■	■
10% Still	70°	■	■	■	■
10%	Boiling	■	■	■	■
50%	Boiling	■	■	■	■
Picric Acid	70°	■	■	■	■
Pine Tar Oil	Cold and Hot	■	■	■	■
Potassium Bichromate		■	■	■	■
25%	70°	■	■	■	■
25%	Boiling	■	■	■	■
Potassium Bromide	70°	■	■	■	■
Potassium Carbonate		■	■	■	■
Solution	70° and Boiling	■	■	■	■
Potassium Chlorate		■	■	■	■
Saturated	Boiling	■	■	■	■
Potassium Chloride		■	■	■	■
1% and 5%	70°	■	■	■	■
1% and 5%	Boiling	■	■	■	■
Potassium Dichromate		■	■	■	■
All concentrations		■	■	■	■
	Cold and Hot	■	■	■	■
Potassium Ferricyanide		■	■	■	■
5%	70°	■	■	■	■
5% and 25%	Boiling	■	■	■	■
Potassium Ferrocyanide	70°	■	■	■	■
Potassium Hydroxide		■	■	■	■
5%	70°	■	■	■	■
27% and 50%	Boiling	■	■	■	■
Potassium Iodide		■	■	■	■
All concentrations		■	■	■	■
	Cold and Hot	■	■	■	■
Potassium Nitrate		■	■	■	■
50%	70°	■	■	■	■
50%	Boiling	■	■	■	■
Potassium Oxalate		■	■	■	■
Potassium Permanganate		■	■	■	■
5%	70°	■	■	■	■
5%	Boiling	■	■	■	■
Potassium Sulphate		■	■	■	■
1%	70°	■	■	■	■
5%	70°	■	■	■	■
5%	Hot	■	■	■	■
Potassium Sulphide		■	■	■	■
Solution	Hot	■	■	■	■
Pyrogalllic Acid		■	■	■	■
Quinine Bisulphate (Dry)		■	■	■	■
Quinine Sulphate (Dry)		■	■	■	■
Rosin	Molten	■	■	■	■
Sauerkraut Brine	70°	■	■	■	■
Sea Water	70°	■	■	■	■
Sewage		■	■	■	■
Silver Bromide		■	■	■	■
Silver Chloride		■	■	■	■
Silver Nitrate		■	■	■	■
10%	70°	■	■	■	■
10%	Boiling	■	■	■	■
Soaps	70°	■	■	■	■
Sodium Acetate (Moist)		■	■	■	■
Sodium Bicarbonate		■	■	■	■
All concentrations	70°	■	■	■	■
5%	150°	■	■	■	■

Chemical Media	Temp. °F.	316	304	430	410
Sodium Bichromate		■	■	■	■
Sodium Bisulphate		■	■	■	■
10%	70°	■	■	■	■
10%	Boiling	■	■	■	■
Sodium Borate		■	■	■	■
All concentrations		■	■	■	■
	Cold and Hot	■	■	■	■
Sodium Carbonate		■	■	■	■
5%	Boiling	■	■	■	■
50%	Boiling	■	■	■	■
Molten	1650°	■	■	■	■
Sodium Chlorate		■	■	■	■
25%	Cold and Hot	■	■	■	■
Sodium Chloride		■	■	■	■
All concentrations	70°	■	■	■	■
Saturated	70° and Boiling	■	■	■	■
Sodium Citrate		■	■	■	■
All concentrations		■	■	■	■
	Cold and Hot	■	■	■	■
Sodium Fluoride		■	■	■	■
5%		■	■	■	■
Sodium Hydroxide		■	■	■	■
20% and 30%	70°	■	■	■	■
20%	Boiling	■	■	■	■
30%	Boiling	■	■	■	■
Molten	650°	■	■	■	■
Sodium Hypochlorite (5%)	70°	■	■	■	■
Sodium Hyposulfite	70°	■	■	■	■
Sodium Nitrate		■	■	■	■
All concentrations		■	■	■	■
	Cold and Hot	■	■	■	■
Sodium Nitrite		■	■	■	■
All concentrations		■	■	■	■
	Cold and Hot	■	■	■	■
Sodium Perchlorate		■	■	■	■
10%	70°	■	■	■	■
10%	Boiling	■	■	■	■
Sodium Peroxide (10%)	70°	■	■	■	■
	Boiling	■	■	■	■
Sodium Phosphate		■	■	■	■
5%	Cold and Hot	■	■	■	■
Sodium Sulphate		■	■	■	■
5%	70°	■	■	■	■
Saturated	Boiling	■	■	■	■
Sodium Sulphide		■	■	■	■
5%	70°	■	■	■	■
50%	Boiling	■	■	■	■
Sodium Sulphite		■	■	■	■
5%	70°	■	■	■	■
25% and 50%	Boiling	■	■	■	■
Sodium Thiosulphate		■	■	■	■
25%	70°	■	■	■	■
Saturated	70° and Boiling	■	■	■	■
Acid fixing bath (Hypo)	70°	■	■	■	■
Stannic Chloride		■	■	■	■
Sp. Gr. 1.21	70°	■	■	■	■
Sp. Gr. 1.21	Boiling	■	■	■	■
Stannous Chloride		■	■	■	■
Saturated	120°	■	■	■	■
Saturated	Boiling	■	■	■	■
Steam		■	■	■	■
Stearic Acid	70°	■	■	■	■
Strontium Hydroxide		■	■	■	■
Strontium Nitrate Solution	Hot	■	■	■	■

Chemical Media	Temp. °F.	316	304	430	410
Sugar Juice	Hot	■	■	■	■
Sulphur		■	■	■	■
Fused	265°	■	■	■	■
Boiling	830°	■	■	■	■
Sulphur Chloride	Cold and Hot	■	■	■	■
Sulphur Dioxide Gas		■	■	■	■
Dry	575°	■	■	■	■
Moist	70°	■	■	■	■
Sulphur Monochloride	70°	■	■	■	■
Sulphuric Acid		■	■	■	■
5%	70°	■	■	■	■
10%	70°	■	■	■	■
50%	70°	■	■	■	■
Concentrated	70°	■	■	■	■
Fuming	70°	■	■	■	■
5%	Boiling	■	■	■	■
10%	Boiling	■	■	■	■
50%	Boiling	■	■	■	■
Concentrated	Boiling	■	■	■	■
Sulphurous Acid		■	■	■	■
Saturated	70°	■	■	■	■
150# pressure	375°	■	■	■	■
Tannic Acid		■	■	■	■
10%	70°	■	■	■	■
50%	70°	■	■	■	■
10%	Boiling	■	■	■	■
50%	Boiling	■	■	■	■
Tanning Liquor	70°	■	■	■	■
Tar		■	■	■	■
Tartaric Acid		■	■	■	■
10%	70°	■	■	■	■
50%	70°	■	■	■	■
10%	Boiling	■	■	■	■
50%	Boiling	■	■	■	■
Tin	Molten	■	■	■	■
Trichloroacetic Acid	70°	■	■	■	■
Trichlorethylene (Dry)	70°	■	■	■	■
Tung Oil	Cold and Hot	■	■	■	■
Uric Acid	70°	■	■	■	■
Varnish		■	■	■	■
	70°	■	■	■	■
	Hot	■	■	■	■
Vegetable Juices		■	■	■	■
Vinegar		■	■	■	■
	70°	■	■	■	■
	Hot	■	■	■	■
Whiskey		■	■	■	■
Wort		■	■	■	■
Zinc	Molten	■	■	■	■
Zinc Chloride		■	■	■	■
5%	70°	■	■	■	■
20%	70°	■	■	■	■
70%	70°	■	■	■	■
5%	Boiling	■	■	■	■
20%	Boiling	■	■	■	■
70%	Boiling	■	■	■	■
Zinc Cyanide (Moist)	70°	■	■	■	■
Zinc Nitrate Solution	Hot	■	■	■	■
Zinc Sulphate		■	■	■	■
5%	70°	■	■	■	■
Saturated	70°	■	■	■	■
25%	Boiling	■	■	■	■

* Pitting occurs under some conditions.
 ** Attack may occur if sulphuric acid is present.

h. PLASTIC CONVEYOR CHEMICAL RESISTANCE GUIDE

The chemical resistance data presented in this table is based on information from polymer manufacturers. The data is indicative only for the conditions under which it was collected and should be considered as a recommendation only, not as a guarantee. This data pertains to chemical resistance only, and the temperatures listed are generally the chemical temperatures. Other design and personal safety concerns were not considered in making recommendations. Prudent application engineering dictates that materials and products should be tested under exact intended service conditions to determine their suitability for a particular purpose.

Chemicals listed without a concentration are for the undiluted chemical. Chemicals listed with a concentration are in solution with water. Descriptions in parenthesis are the active ingredient. In general, as the temperature of an application rises, the chemical resistance of a material decreases.

MATERIAL SUITABILITY CODE
R = Recommended
NR = Not Recommended
Q = Questionable
— = No Available Information

CHEMICAL NAME	STANDARD MATERIALS								SPECIAL APPLICATIONS MATERIALS					
	Polypropylene		Polyethylene		Acetal		EC Acetal		Heat Resistant Nylon		Nylon		Flame Retardant Material	
	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)
Acetic Acid	R	R	R	Q	—	—	—	—	NR	NR	NR	NR	R	R
Acetic Acid - 5%	R	R	R	R	R	—	R	—	R	NR	Q	NR	R	R
Acetone	R	R	R	R	Q	Q	Q	Q	R	R	R	R	R	R
Alcohol - All Types	R	R	R	R	—	—	—	—	R	R	R	R	R	R
Alum - All Types	R	R	R	R	—	—	—	—	Q	—	—	—	—	—
Aluminum Compounds	R	R	R	R	—	—	—	—	Q	R	R	R	R	R
Ammonia	R	R	R	R	—	—	—	—	R	R	R	R	—	—
Ammonium Compounds	R	R	R	R	—	—	R	—	Q	R	R	R	R	R
Amyl Acetate	Q	NR	Q	NR	—	—	—	—	R	N	R	N	—	—
Amyl Chloride	NR	NR	Q	NR	—	—	—	—	—	—	—	—	—	—
Aniline	R	R	R	NR	—	Q	—	Q	Q	—	—	—	NR	NR
Aqua Regia	NR	NR	Q	NR	—	—	—	—	—	NR	NR	NR	NR	NR
Arsenic Acid	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Barium Compounds	R	R	R	R	—	—	—	—	R	R	R	R	R	R
Barium Soap Grease	R	Q	—	—	—	—	—	—	—	—	—	—	—	—
Beer	R	R	R	R	—	—	—	—	R	—	—	—	R	R
Benzene	Q	NR	Q	NR	R	Q	R	Q	R	R	R	R	R	R
Benzenesulfonic Acid - 10%	R	R	R	R	—	—	—	—	R	—	—	—	—	—
Benzoic Acid	R	R	R	R	—	—	—	—	R	Q	Q	Q	—	—
Borax	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Boric Acid	R	R	R	R	—	—	—	—	Q	R	R	R	—	—
Brake Fluid	R	R	—	—	R	R	R	R	R	R	R	R	R	R
Brine - 10%	R	R	R	R	R	R	R	R	—	—	—	—	—	—
Bromic Acid	NR	NR	NR	NR	—	—	—	—	—	NR	NR	NR	—	—
Bromine - Liquid or Fumes	NR	NR	NR	NR	—	—	—	—	NR	NR	NR	NR	NR	NR
Bromine Water	NR	NR	—	—	—	—	—	—	NR	NR	NR	NR	—	—
Butyl Acetate	NR	NR	Q	NR	—	—	—	—	R	R	R	R	R	R
Butyl Acrylate	NR	NR	R	Q	—	—	—	—	—	—	—	—	—	—
Butyric Acid	R	—	R	Q	—	—	—	—	Q	R	R	R	—	—
Calcium Compounds	R	R	R	R	—	—	—	—	Q	—	—	—	R	R
Calcium Soap Grease	R	Q	—	—	—	—	—	—	—	—	—	—	—	—
Calgonite - 0.3%	R	R	—	—	R	R	R	R	—	—	—	—	—	—

CHEMICAL NAME	STANDARD MATERIALS								SPECIAL APPLICATIONS MATERIALS					
	Polypropylene		Polyethylene		Acetal		EC Acetal		Heat Resistant Nylon		Nylon		Flame Retardant Material	
	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)
Carbon Dioxide	R	R	R	R	—	—	—	—	R	R	R	R	R	R
Carbon Disulfide	Q	NR	Q	NR	—	—	—	—	R	R	R	R	—	—
Carbon Tetrachloride	NR	NR	NR	NR	R	Q	R	Q	R	R	R	R	R	R
Cellosolve - TM	R	R	—	—	—	—	—	—	—	—	—	—	—	—
Chloroacetic Acid	R	R	—	—	—	—	—	—	—	NR	NR	NR	—	—
Chlorine - Gas	NR	NR	Q	NR	NR	NR	NR	NR	—	NR	NR	NR	NR	NR
Chlorine - Liquid	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Chlorine Water (0.4% Cl)	R	Q	R	Q	NR	NR	NR	NR	—	NR	NR	NR	—	—
Chlorobenzene	NR	NR	Q	NR	—	—	—	—	R	R	R	R	NR	NR
Chloroform	NR	NR	NR	NR	—	—	—	—	Q	—	Q	—	R	R
Chlorosulfonic Acid	NR	NR	NR	NR	—	—	—	—	NR	NR	NR	NR	NR	NR
Chromic Acid - 50%	R	R	R	Q	—	—	—	—	NR	—	Q	—	—	—
Citric Acid	R	R	R	R	—	—	—	—	—	R	R	R	R	R
Citric Acid - 10%	R	R	R	R	R	—	R	—	R	R	R	R	R	R
Citrus Juices	R	R	R	R	—	—	—	—	R	R	R	R	R	R
Clorox - TM	R	Q	—	—	NR	NR	NR	NR	—	NR	NR	NR	—	—
Coconut Oil	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Copper Compounds	R	R	R	R	—	—	—	—	Q	—	Q	—	R	R
Corn Oil	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Cottonseed Oil	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Cresol	R	R	R	Q	—	—	—	—	NR	NR	NR	NR	—	—
Cyclohexane	R	Q	NR	NR	—	—	—	—	—	—	R	—	R	R
Cyclohexanol	R	Q	Q	NR	—	—	—	—	R	—	R	—	—	—
Cyclohexanone	R	Q	NR	NR	—	—	—	—	R	—	R	—	—	—
Detergents	R	R	R	R	R	R	R	R	R	—	—	—	—	—
Dextrin	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Dibutyl Phthalate	R	Q	—	—	—	—	—	—	R	R	R	R	R	R
Diethyl Ether	NR	NR	NR	NR	Q	Q	Q	Q	R	R	R	R	—	—
Diethylamine	R	R	—	NR	—	—	—	—	R	—	—	—	—	—
Diglycolic Acid - 30%	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Diisooctyl Phthalate	R	R	—	—	—	—	—	—	—	—	—	—	—	—
Dimethyl Phthalate	R	R	—	—	—	—	—	—	—	—	—	—	—	—
Dimethylamine	R	—	—	—	—	—	—	—	R	R	R	R	—	—
Dioctyl Phthalate	R	Q	—	—	—	—	—	—	R	R	R	R	R	R
Ethyl Acetate	R	R	Q	Q	Q	NR	Q	NR	R	R	R	R	R	R
Ethyl Ether	Q	Q	—	—	—	—	—	—	—	—	—	—	R	R
Ethylamine	R	R	—	—	—	—	—	—	—	—	—	—	—	—
Ethylene Chloride	NR	NR	—	—	—	—	—	—	—	—	—	—	Q	Q
Ethylene Glycol - 50%	R	R	R	R	R	Q	R	Q	R	Q	R	Q	R	R
Ferric / Ferrous Compounds	R	R	R	R	—	—	—	—	Q	—	—	—	—	—
Formaldehyde - 37%	R	R	R	Q	—	—	—	—	—	—	—	—	R	R
Formic Acid - 85%	R	Q	R	R	—	—	—	—	NR	NR	Q	NR	Q	Q
Freon	—	—	R	R	Q	Q	Q	Q	—	—	—	—	R	R
Fuel Oil #2	R	Q	R	NR	Q	Q	Q	Q	R	R	R	R	—	—
Furfural	NR	NR	Q	NR	—	—	—	—	R	—	R	—	—	—
Gasoline	Q	NR	R	NR	R	R	R	R	R	R	R	R	R	R
Glucose	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Glycerol	R	R	—	—	—	—	—	—	R	R	R	R	—	—
Heptane	NR	NR	Q	NR	R	R	R	R	R	R	R	R	R	R
Hexane	R	Q	NR	NR	—	—	—	—	R	R	R	R	R	R

CHEMICAL NAME	STANDARD MATERIALS								SPECIAL APPLICATIONS MATERIALS					
	Polypropylene		Polyethylene		Acetal		EC Acetal		Heat Resistant Nylon		Nylon		Flame Retardant Material	
	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)
Hydrobromic Acid - 50%	R	R	R	R	—	—	—	—	NR	NR	NR	NR	—	—
Hydrochloric Acid	R	R	R	R	NR	NR	NR	NR	NR	NR	NR	NR	Q	Q
Hydrochloric Acid - 10%	R	R	R	R	NR	NR	NR	NR	NR	NR	NR	NR	Q	Q
Hydrofluoric Acid - 35%	R	R	R	R	NR	NR	NR	NR	NR	NR	NR	NR	—	—
Hydrogen Peroxide - 3%	R	R	R	R	R	R	R	R	Q	Q	Q	Q	R	R
Hydrogen Peroxide - 90%	Q	Q	R	Q	—	—	—	—	NR	NR	NR	NR	R	R
Hydrogen Sulfide	R	R	R	R	—	—	—	—	R	R	R	R	—	—
Hydroiodic Acid	NR	NR	—	—	—	—	—	—	—	—	—	—	—	—
Igepal - 50%	R	R	—	—	R	Q	R	Q	—	—	—	—	—	—
Iodine - Crystals	R	R	Q	Q	—	—	—	—	—	NR	NR	NR	—	—
Isooctane	NR	NR	R	—	—	—	—	—	R	R	R	R	—	—
Jet Fuel	Q	NR	Q	Q	R	R	R	R	R	R	R	R	R	R
Kerosene	Q	NR	Q	Q	R	R	R	R	R	—	—	—	R	R
Lactic Acid	R	R	R	R	—	—	—	—	NR	NR	Q	NR	—	—
Lanolin	R	Q	R	R	—	—	—	—	—	—	—	—	—	—
Lard	—	—	R	R	—	—	—	—	—	R	R	R	—	—
Lauric Acid	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Lead Acetate	R	R	R	R	—	—	—	—	R	R	R	R	—	—
Lemon Oil	Q	NR	Q	NR	—	—	—	—	—	—	—	—	—	—
Ligroin	Q	NR	—	—	—	—	—	—	—	—	—	—	—	—
Lime Sulfur	R	—	—	—	—	—	—	—	—	—	—	—	—	—
Linseed Oil	R	R	R	R	R	R	R	R	R	R	R	R	R	R
Lubricating Oil	R	Q	—	—	R	R	R	R	R	Q	R	Q	R	R
Magnesium Compounds	R	R	R	R	—	—	—	—	Q	—	R	—	—	—
Malic Acid - 50%	R	R	R	R	—	—	—	—	R	R	R	R	—	—
Manganese Sulfate	R	—	R	R	—	—	—	—	Q	Q	Q	Q	—	—
Margarine	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Mercuric Compounds	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Mercury	R	R	R	R	—	—	—	—	R	—	R	—	—	—
Methyl Cellosolve	R	—	—	—	—	—	—	—	—	—	—	—	—	—
Methyl Chloride	NR	NR	—	—	—	—	—	—	—	R	R	R	—	—
Methyl Ethyl Ketone	R	Q	NR	NR	—	—	—	—	R	—	R	—	R	R
Methyl Isobutyl Ketone	R	Q	—	—	—	—	—	—	—	—	—	—	—	—
Methylene Chloride	Q	NR	NR	NR	—	—	—	—	Q	Q	Q	Q	NR	NR
Methylsulfuric Acid	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Mineral Oil	Q	NR	R	NR	R	R	R	R	—	—	—	—	R	R
Mineral Spirits	Q	NR	—	—	—	—	—	—	R	—	—	—	—	—
Molasses	R	R	R	R	—	—	—	—	R	R	R	R	—	—
Motor Oil	R	Q	—	—	R	R	R	R	R	R	R	R	R	R
Naphtha	R	Q	Q	NR	—	—	—	—	R	R	R	R	R	R
Nickel Compounds	R	R	R	R	—	—	—	—	Q	—	Q	—	—	—
Nitric Acid - 30%	R	Q	R	R	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Nitric Acid - 50%	Q	NR	R	Q	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Nitric Acid - Fuming	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Nitrobenzene	R	Q	NR	NR	—	—	—	—	Q	—	Q	—	NR	NR
Nitrous Acid	Q	NR	—	—	—	—	—	—	—	—	—	—	—	—
Nitrous Oxide	R	—	—	—	—	—	—	—	—	—	—	—	—	—
Oleic Acid	R	NR	—	—	R	R	R	R	R	R	R	R	R	R
Olive Oil	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Oxalic Acid	R	R	R	R	—	—	—	—	Q	—	—	—	—	—

CHEMICAL NAME	STANDARD MATERIALS								SPECIAL APPLICATIONS MATERIALS					
	Polypropylene		Polyethylene		Acetal		EC Acetal		Heat Resistant Nylon		Nylon		Flame Retardant Material	
	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)
Oxygen	NR	NR	—	—	—	—	—	—	R	R	R	R	—	—
Ozone	NR	NR	Q	NR	—	—	—	—	Q	Q	Q	Q	—	—
Palmitic Acid - 70%	R	R	R	R	—	—	—	—	R	—	R	—	R	R
Peanut Oil	R	R	—	—	—	—	—	—	—	—	R	—	—	—
Perchloric Acid - 20%	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Perchloroethylene	NR	NR	NR	NR	—	—	—	—	Q	NR	Q	NR	—	—
Phthalic Acid - 50%	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Phenol	R	R	R	R	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Phenol - 5%	R	R	R	R	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Phosphoric Acid - 30%	R	R	R	R	—	—	—	—	NR	NR	NR	NR	Q	Q
Phosphoric Acid - 85%	R	R	R	R	—	—	—	—	NR	NR	NR	NR	Q	Q
Photographic Solutions	R	R	R	R	—	—	—	—	R	—	R	—	—	—
Plating Solutions	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Potassium Compounds	R	R	R	R	—	—	—	—	R	—	—	—	R	R
Potassium Hydroxide	R	R	R	R	—	—	—	—	R	—	Q	—	R	R
Potassium Iodide (3% Iodine)	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Potassium Permanganate	R	Q	R	R	—	—	—	—	NR	NR	NR	NR	—	—
Silver Cyanide	R	R	—	—	—	—	—	—	—	—	—	—	—	—
Silver Nitrate	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Sodium Compounds	R	R	R	R	—	—	R	R	Q	—	—	—	R	R
Sodium Chlorite	R	Q	R	R	—	—	R	R	Q	NR	NR	NR	R	R
Sodium Hydroxide	R	R	R	R	—	—	R	R	R	NR	NR	NR	Q	Q
Sodium Hydroxide - 60%	R	R	R	R	R	R	R	R	R	NR	NR	NR	Q	Q
Sodium Hypochlorite - (5% Cl)	R	Q	—	—	NR	NR	NR	NR	NR	—	Q	—	R	R
Stannic Chloride	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Stannous Chloride	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Stearic Acid	R	Q	R	R	—	—	—	—	R	R	R	R	—	—
Succinic Acid	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Sugar	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Sulfamic Acid - 20%	R	R	—	—	NR	NR	NR	NR	—	—	—	—	—	—
Sulfate Liquors	R	R	—	—	—	—	—	—	—	—	—	—	—	—
Sulfur	R	R	R	R	—	—	—	—	R	R	R	R	—	—
Sulfur Chloride	R	—	—	—	—	—	—	—	—	—	—	—	—	—
Sulfur Dioxide	R	R	R	R	—	—	—	—	R	Q	Q	Q	R	R
Sulfuric Acid - 3%	R	R	R	R	R	R	R	R	NR	NR	NR	NR	Q	Q
Sulfuric Acid - 50%	R	R	R	R	NR	NR	NR	NR	NR	NR	NR	NR	Q	Q
Sulfuric Acid - 70%	R	Q	R	Q	NR	NR	NR	NR	NR	NR	NR	NR	Q	Q
Sulfuric Acid - Fuming	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	Q	Q
Sulfurous Acid	R	—	R	R	—	—	—	—	Q	Q	Q	Q	—	—
Tallow	R	R	R	Q	—	—	—	—	R	R	R	R	—	—
Tannic Acid - 10%	R	R	R	R	—	—	—	—	—	—	—	—	R	R
Tartaric Acid	R	R	R	R	—	—	—	—	Q	Q	R	Q	—	—
Tetrahydrofuran	Q	NR	—	—	—	—	—	—	R	—	R	—	R	R
Toluene	NR	NR	NR	NR	Q	NR	Q	NR	R	R	R	R	R	R
Tomato Juice	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Transformer Oil	R	Q	R	Q	—	—	—	—	R	R	R	R	—	—
Tributyl Phosphate	R	Q	—	—	—	—	—	—	—	—	—	—	—	—
Trichloroacetic Acid	R	R	—	—	—	—	—	—	R	NR	NR	NR	—	—
Trichloroethylene	NR	NR	NR	NR	—	—	—	—	R	NR	Q	NR	—	—
Tricresyl Phosphate	R	Q	—	—	—	—	—	—	—	—	—	—	—	—

(Continued) CHEMICAL NAME	STANDARD MATERIALS								SPECIAL APPLICATIONS MATERIALS					
	Polypropylene		Polyethylene		Acetal		EC Acetal		Heat Resistant Nylon		Nylon		Flame Retardant Material	
	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)	70 °F (21 °C)	140 °F (60 °C)
Trisodium Phosphate	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Turpentine	Q	NR	Q	NR	—	—	—	—	R	R	R	R	—	—
Urea	R	R	R	R	—	—	—	—	R	R	R	R	—	—
Vinegar	R	R	R	R	—	—	—	—	—	—	—	—	—	—
Wine	R	R	R	R	—	—	—	—	R	R	R	R	—	—
Xylene	NR	NR	NR	NR	—	—	—	—	R	R	R	R	R	R
Zinc Compounds	R	R	R	R	—	—	—	—	Q	—	Q	—	R	R

MATERIAL SUITABILITY CODE

R = Recommended

NR = Not Recommended

Q = Questionable

— = No Available Information

i. LUBRICATION TABLE

A = Alternative	K = At Choice	S = Standard	
Ball bearings in SEW motor		Aralub HL3 BP Energrelase LS3 Mobilux Grease #3 Shell Alvania Grease #3 Tribol 3030	K K K S A
Ball bearings in SEW motor brake side		Kluber Unisilon TK44N3 Mobil Grease 28 (not) Wacker Silicon 511	K K K
Ball bearings in demag motor			
Bearing blocks-open		Shell Alvania Grease #3 Tribol 3030	K A
Bearings-open		Shell Alvania Grease #3 Tribol 3030	K A
Bearing with eccentric lock collar		Shell Alvania Grease #3 Tribol 3030	K A
Bearing blocks and bearings (fans)		Shell Alvania Grease #3 Tribol 3030	K A
Linear ball bearing		Shell Alvania EP Grease R3 Tribol 3030	S A
Threaded rod			
Reduction gearing		Aralub FDPOO Avia Gear Grease BP Energrelase LS2 BP Energrelase RBB2 Esso Andok B Esso Beacon 2 Esso Fibrax EP370 Fuchs Renosod FGB Kluber Natosbin B1600EP Mobil Mobilplex 44 Mobilux Grease #2 Optimol Longtime PDOO Shell Alvania Grease #2 Shell Grease FP4 Shell Gear Grease H Tribol 3030 Texaco Glissando GF1464 Tunap Tungrease OMC2-OO	K K K K K K K K K K K K K K S A K K
Toothed rack (if protected)		Molub Alloy - 00 Shell Gear Grease H Tribol 3030	A K A
Turning point steel on steel		Shell Unedo Grease Tribol 3030	K A
Ball bearing ring		Shell Alvania Grease #3 Tribol 3030	K A
Plain bearing bronze (not self lube)		Shell Unedo Grease Tribol 3030	K A

A = Alternative	K = At Choice	S = Standard	
WAN-3 gear box, servo vacuum valve greased for life			
Demag gear box filled with grease		Aralub FDPOO BP Energrease HTEPOO Esso Fibrax EP370 Molub Alloy-00 Shell Gear Grease H	K K K A K
Demag worm gear box filled with grease		Aralub FDPOO BP Energrease HTEPOO Esso Fibrax EP370 Molub Alloy-00 Shell Gear Grease H	K K K A K
SITI gear box for height adjustment depanner (automatic)		Shell Tivelta Compound A	S
SEW shaft mounted, helical bevel gear box toothed wheel in half-bath, planetary gear box		Shell Omala 150 BP Energol GRX 150 Esso Spartan EP 150 Tribol 1100-150	S A A A
SEW work gear box*		Shell Omala C460 Tribol 1100-460	S A
Demag helical gear box		Shell Omala 220 Esso Spartan EP 220 BP Energol GR.XP 220 Aral Degol BG 220 Tribol 1100-220	K K K K A
Axis planetroll filled with grease		Santotrac 50 Tribol 1100 ISO 68 Variotrac 68	S A A
All conveyors and automatic lubrication of Capproof and Capmatic roller chain which contacts the product		Cheveron FM 460 X Quinplex White Gear #4090	S A
Driving chain for all conveyors and machines		Molub Alloy 10-46	S
Lifting roller chain		Bel-Ray No-Tox 2500	S
Captrack roller chain		Bel-Ray No-Tox 2500	S
Capway belt		Chevron IM460X	S

* The difference of mineral oil versus synthetic oil shows the motor efficiency is 82% for the SEW box motor when the gearbox had mineral oil in it and 85% when the gearbox had synthetic oil in it. According to the gear manufacturers, the oil sump temperature can be as high as 200°F and be considered a normal operating temperature. Another "rule of thumb" according to the engineer is an ambient temperature plus 100°F. This would explain the "warm gearbox syndrome" when the units are operating in the plants.

j. COMPONENT LITERATURE WEB SITES

ABB – www.abb.us
Acme Electric Corporation – www.acmepowerdist.com
Aget Manufacturing – www.agetmfg.com
Allen-Bradley (Rockwell Automation) – www.ab.com
AMF – www.amfbakery.com
Ammeraal – www.ammeraal.com
APW – www.apw.com
Ashworth – www.ashworth.com
Autogard – www.autogardcorp.com
Balluff – www.balluff.com
Banner – www.baneng.com
Beka – www.beka.nl
Belimo – www.belimo.com
Bimba – www.bimba.com
Boston Gear – www.bostongear.com
Cambridge Inc. – www.cambridge-inc.com
Candy Controls – www.candycontrols.com
Condair – www.axair.ch
Crydom – www.crydom.com
Dart Controls – www.dartcontrols.com
Daybrite – www.daybrite.com
Duff-Norton – www.duffnorton.com
Efector, Inc. – www.ifmefector.com
Euchner – www.euchner-usa.com
Federal Signal Corporation – www.federalsignal-indust.com
Festo – www.festo-usa.com
Fincor – www.fincor.net
Gamlet Inc. – www.gamlet.com
Grace Engineered Products – www.grace-eng.com
Gudel – www.gudel.com
Hoffman Enclosures – www.hoffmanonline.com
Honeywell – www.honeywell.com
Hubbell – www.hubbell.com
IDEC – www.idec.com
IFM Electronics – www.imf-electronic.com
Intralox – www.intralox.com
Johnson Controls – www.jci.com
Joyce Dayton – www.joycejacks.com
K&M – www.klocknermoeller.com or www.moellerusa.com
KEBCO – www.kebco.com
Maryland Wire Belt – www.marylandwirebelts.com
McMaster-Carr – www.mcmaster.com
Mennekes – www.mennekes.com
Moeller – www.klocknermoeller.com
MURR – www.murrelektronik.com
N-Tron – www.n-tron.com
Ned Air – www.ned-air.nl
Nexen – www.nexengroup.com
Olflex – www.olflex.com
Omega – www.omega.com
Omron – www.omron.com
Penn Wire Products Corp. – www.pennwire.com
Pfannenberger – www.pfannenbergerusa.com

Phoenix Contact – www.interface.phoenixcontact.com
PILZ – www.pilzusa.com
PULS – www.puls-power.com
Red Lion – www.redlion-controls.com
Rexroth – www.rexrothmecman.com
Rittal – www.rittal-corp.com
Schmersal – www.schmersalusa.com
Scientific Technologies Inc. – www.sti.com
SEW – www.seweurodrive.com
SICK – www.sick.com
Siemens – www.sea.siemens.com
SMC Corp. – www.smcusa.com
Southeast Cooler – www.secooler.com
Square D – www.squared.com
Square D (US) – www.us.squared.com
SSAC – www.ssac.com
TB Woods – www.tbwoods.com
TURK Inc. – www.turck-usa.com
Vaisala – www.vaisala.com
Valvcon – www.valvcon.com
Van der Graaf – www.vandergraaf.com
WAM – www.wamgroup.com
Weidmuller – www.weidmuller.com

OPERATIONS MANUAL

a. INSTALLATION

	GENERAL	Examine the machine for damage. Any damage must be reported to us immediately. See that no fasteners are missing or have loosened while in transit. Open the small vent holes in the oil filler cap of the gearmotor, and then check the oil level of the gearboxes. This must be at the correct level. If this is not so, add oil according to the instructions given by the manufacturer.
	SET-UP	Place the machine in its permanent position. The machine must stand level. Make sure that the machine fits properly at the infeed and discharge end(s). The whole assembly must be performed by the supplier's experienced installation personnel. After assembly, all functions must be carefully checked and adjusted.
	CONNECTION	The customer must arrange beforehand: • The connection of electrical service to the main electrical panel. • The provision of the necessary compressed air service.
GROUNDING MUST BE DONE AS REQUIRED BY LOCAL CODES!		

b. PREPARATION FOR START-UP

	PREPARATION FOR START-UP	Before putting the machine into production, the following points must be carefully checked: • Check that all fasteners are properly tightened. • Check the position of side guides in respect to the vacuum chamber. • Check the speed. • Check all conveyors. • Check drive and end wheels. • Check the position and functions of the proximity switches and photo switches. • Check oil levels of drive motors and top them off if required. • Check the tension and position of the driving chains. • Check the air pressure lines for leakage. • Air pressure set @ 80 psi.
	ELECTRICAL	The electrical installation must be put into service by a qualified electrician. • Check the grounding and the correct functioning of the electrical installation. • Check the main supply, correct voltages, cutouts and safety switches. • Check the operations, jam and signal voltages. • Check the tightness of fitting screws in the panel and tighten them further if necessary. • Check motor protectors and thermal relays are to the correct values. • Check the rotational direction of the motors; if necessary, reverse two-phase connections. • Check all functions according to the circuit diagram.
THE CIRCUIT DIAGRAMS ARE SITUATED IN THE CONTROL BOX.		

c. COMMISSIONING

- Turn main disconnect switch on.
- Reset alarm.
- Check the adjustments.
- Switch on the start button.
- Set speed.
- Open or close the vacuum valve sufficiently to ensure that the product is sucked out of the pans, but without damaging the crust.
- When work is finished, switch off the machine.

d. CONVEYOR SAFETY

Conveyor related injuries are common and can be very costly to employers. In recent years the U.S. Department of Labor and Bureau of Labor Statistics reported, on average, 50 conveyor related fatalities per year. These workplace accidents account for approximately 25 percent of all workers' compensation claims and up to 35 percent of all associated costs. Establishing conveyor safety measures and exercising caution around conveyors is absolutely critical in any material handling operation.

There should be an adequate number of medically qualified people present in the facility at all times. This includes normal operation as well as maintenance and cleaning activities.



Keep loose clothing away from the conveyor.

Avoid wearing jewelry while operating conveyor.

Keep fingers and hair away from conveyor.

Do not climb, step, stand, sit, or ride on the conveyor at any time.

Be familiar with all emergency stop locations.

Do not remove or alter guards or any other safety features.

Operate conveyor with trained personnel only.

Report all unsafe practices to your supervisor.



Be aware of any local and federal regulatory requirements for safety.



Potential conveyor hazards include, but are not limited to:

Mechanical hazards:

- Nip points
- Shear points
- Pinch points
- Crush points
- Lacerations
- Transfer areas
- Power transmissions

Pneumatic hazards:

- Nip points
- Shear points
- Pinch points
- Crush points

Electrical hazards:

- Electrical shock
- Arc flash

Magnetic hazards:

- Pacemaker wearers should avoid close contact.

The equipment is provided with safety features which can prevent accidents from occurring. These safety features must be tested often to ensure they are functioning properly.

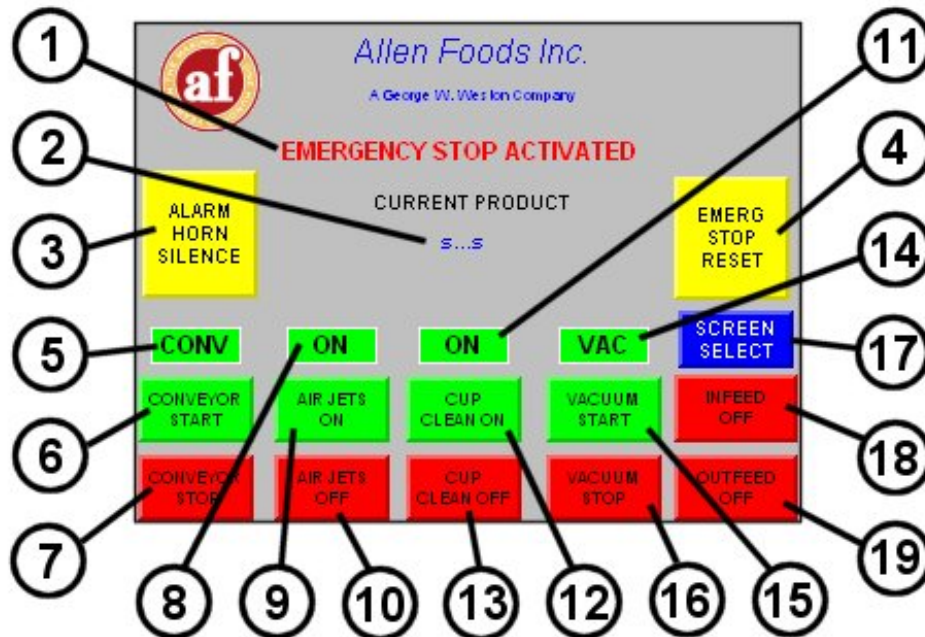


Do not test during production, but in a separate test period. Test at least one time per week.

Table 1: Testing the safety systems: Test each separately!

What to test...	How to test...	What to expect...
Emergency stops	Press emergency stop button. Reset the system after activating each button.	Part of the equipment being tested should stop.
Audible and light signals	Press emergency stop button. Reset the system after activating each button.	Lights should flash and the audible signal can be heard.
Start and reset buttons	- First activate an emergency stop, cancel this and then press the start button. - Press the reset button and then the start button.	- The equipment should not start. - The equipment should start.
Main switches	Turn main switch to the “OFF” (“O”) position.	Power should be disconnected from the switch box.
Work switches	Turn work switch to the “OFF” (“O”) position.	The related motor should stop.
Instruction and warning labels	Regularly check that the labels are present and legible.	

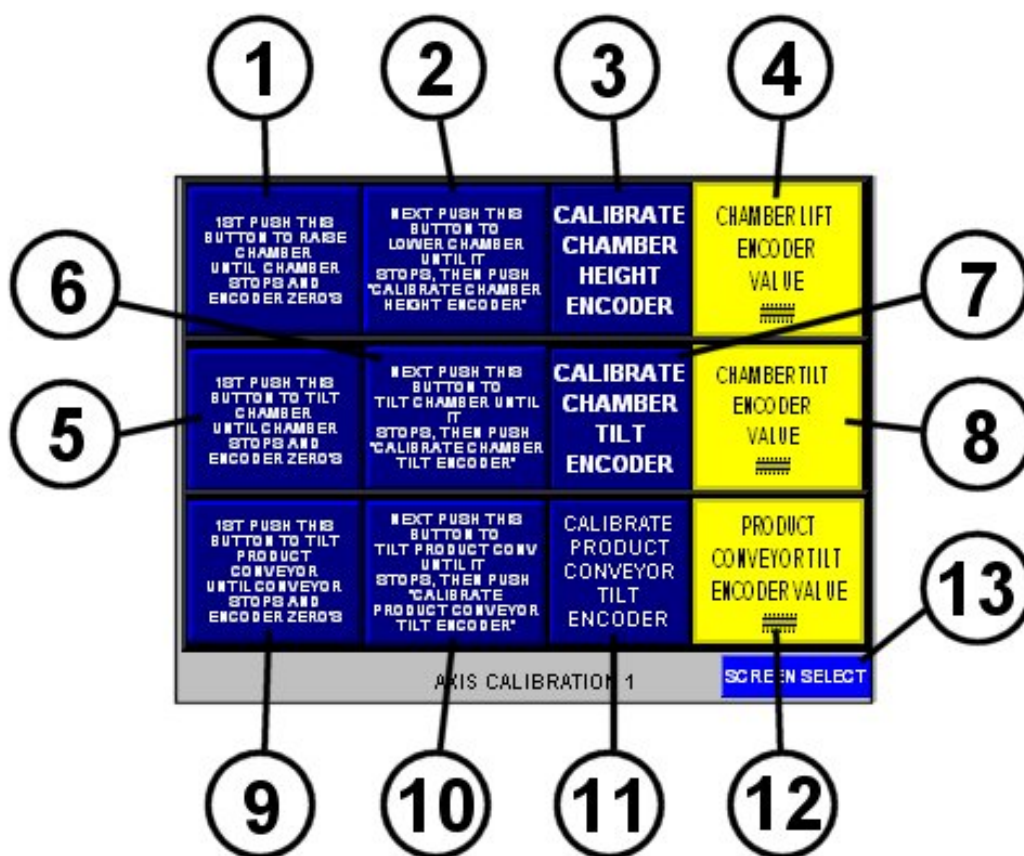
e. DEPANNER PANEL VIEW SCREENS



MAIN SCREEN

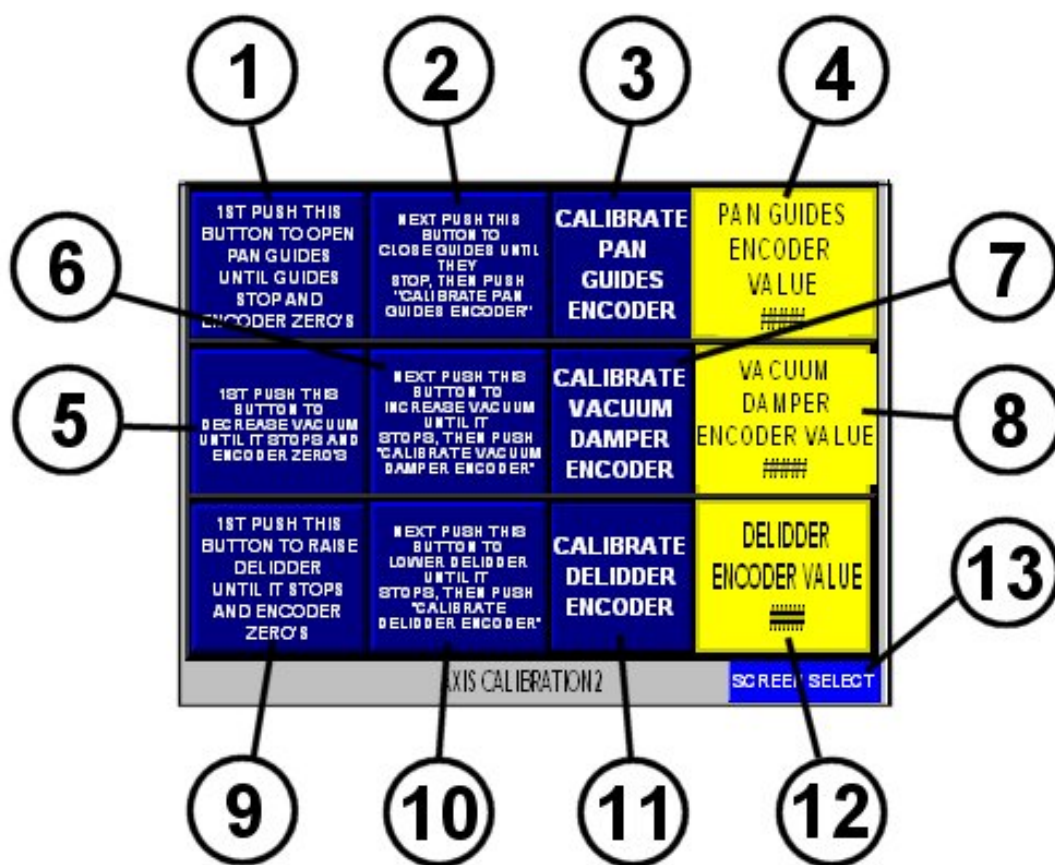
ITEM #	DESCRIPTION
1	Displays if E-Stop is activated.
2	Displays current running product (recipe).
3	Silences the alarm horn.
4	Resets the depanner after an emergency stop has been pushed.
5	Displays if conveyor is in run or stopped mode.
6	Starts the conveyor motors.
7	Stops the conveyor motors.
8	Displays if air jets is in on or off mode.
9	Starts the air jets.
10	Stops the air jets.
11	Displays if cup cleaner is in on or off mode.
12	Starts the cup cleaner.
13	Stops the cup cleaner.
14	Displays if vacuum is in run or stopped mode.
15	Starts the vacuum blower motor.
16	Stops the vacuum blower motor.
17	Goes to the screen select screen.
18	Starts or stops infeed conveyor. (Relay for customer use)
19	Starts or stops outfeed conveyor. (Relay for customer use)

The depanner is factory shipped with a user name of capway and a password of 0003 for accessing the hidden screens.



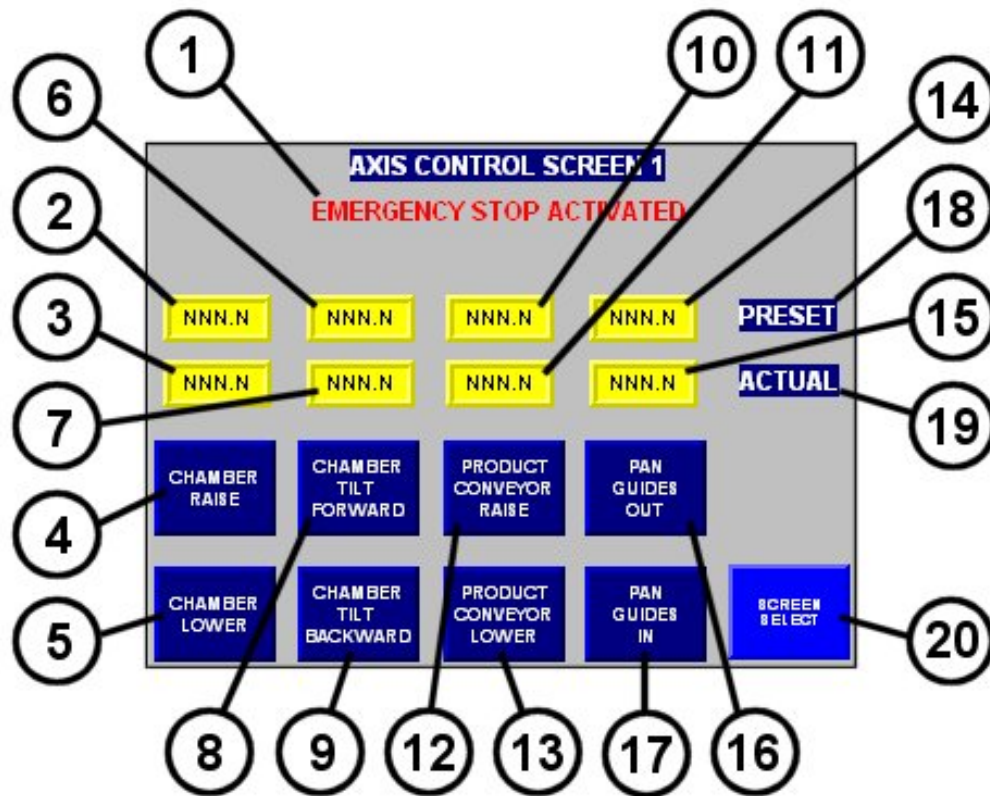
AXIS CALIBRATION SCREEN 1

ITEM #	DESCRIPTION
1	Raises chamber lift until it stops and zero's encoder.
2	Lowers chamber lift until it stops and zero's encoder.
3	Calibrates chamber lift height encoder.
4	Displays chamber lift height encoder value.
5	Tilts chamber forward until it stops and zero's encoder.
6	Tilts chamber backward until it stops and zero's encoder.
7	Calibrates chamber tilt encoder.
8	Displays chamber tilt encoder value.
9	Raises product conveyor until it stops and zero's encoder.
10	Lowers product conveyor until it stops and zero's encoder.
11	Calibrates product conveyor tilt encoder.
12	Displays product conveyor tilt encoder value.
13	Goes to the screen select screen.



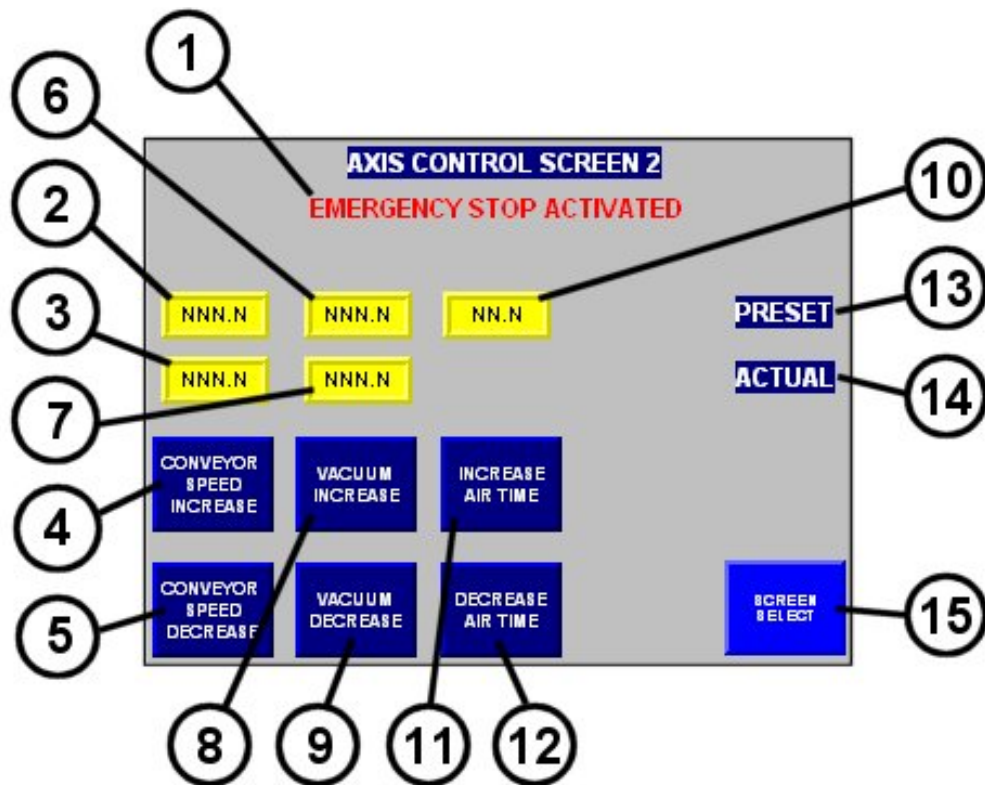
AXIS CALIBRATION SCREEN 2

ITEM #	DESCRIPTION
1	Opens pan guides until they stop and zeros encoder.
2	Closes pan guides until they stop and zeros encoder.
3	Calibrates pan guides encoder.
4	Displays pan guides encoder value.
5	Decreases vacuum until it stops and zeros encoder.
6	Increases vacuum until it stops and zeros encoder.
7	Calibrates vacuum damper encoder.
8	Displays vacuum damper encoder value.
9	Raises delidder until it stops and zeros encoder.
10	Lowers delidder until it stops and zeros encoder.
11	Calibrates delidder encoder.
12	Displays delidder encoder value.
13	Goes to the screen select screen.



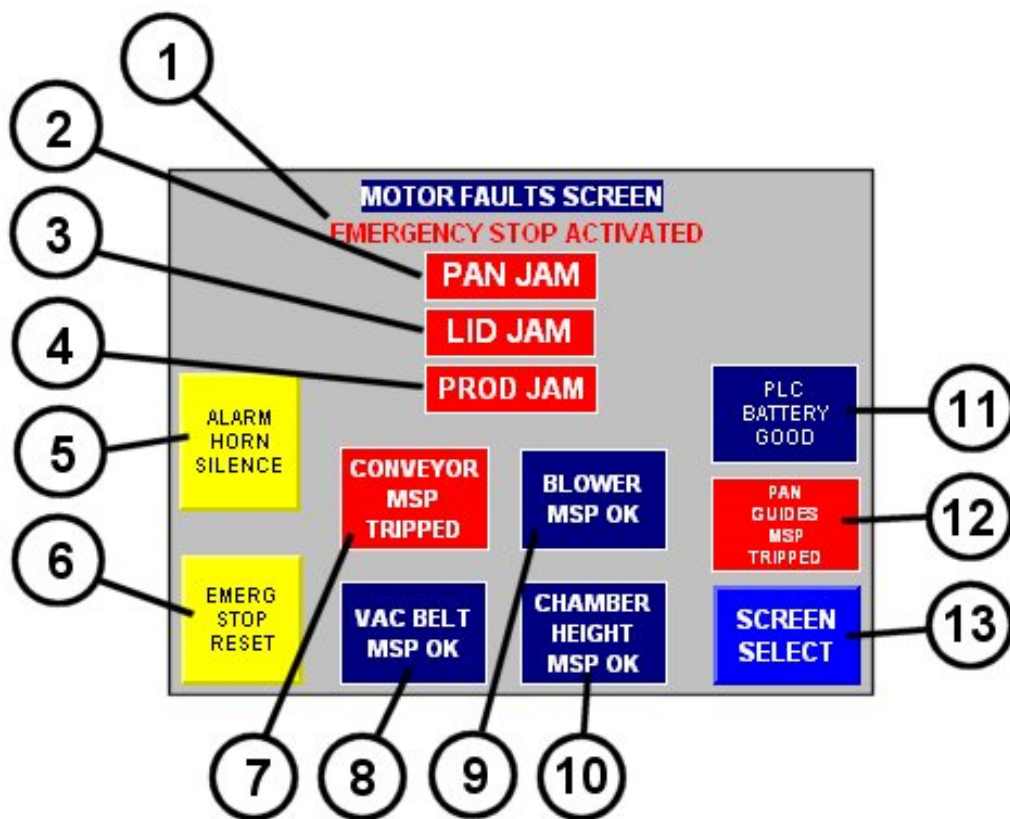
AXIS CONTROL SCREEN 1

ITEM #	DESCRIPTION
1	Displays if E-Stop is activated.
2	Recipe setting for chamber height.
3	Current height of chamber.
4	Manually raises chamber for setting up a recipe.
5	Manually lowers chamber for setting up a recipe.
6	Recipe setting for chamber tilt.
7	Current tilt of chamber.
8	Manually tilt forward chamber for setting up a recipe.
9	Manually tilt backward chamber for setting up a recipe.
10	Recipe setting for product conveyor height.
11	Current height of product conveyor.
12	Manually raises product conveyor for setting up a recipe.
13	Manually lowers product conveyor for setting up a recipe.
14	Recipe setting for pan guides position.
15	Current position of pan guides.
16	Manually moves pan guides out for setting up a recipe.
17	Manually moves pan guides in for setting up a recipe.
18	Description (preset by recipe).
19	Description (actual).
20	Goes to the screen select screen.



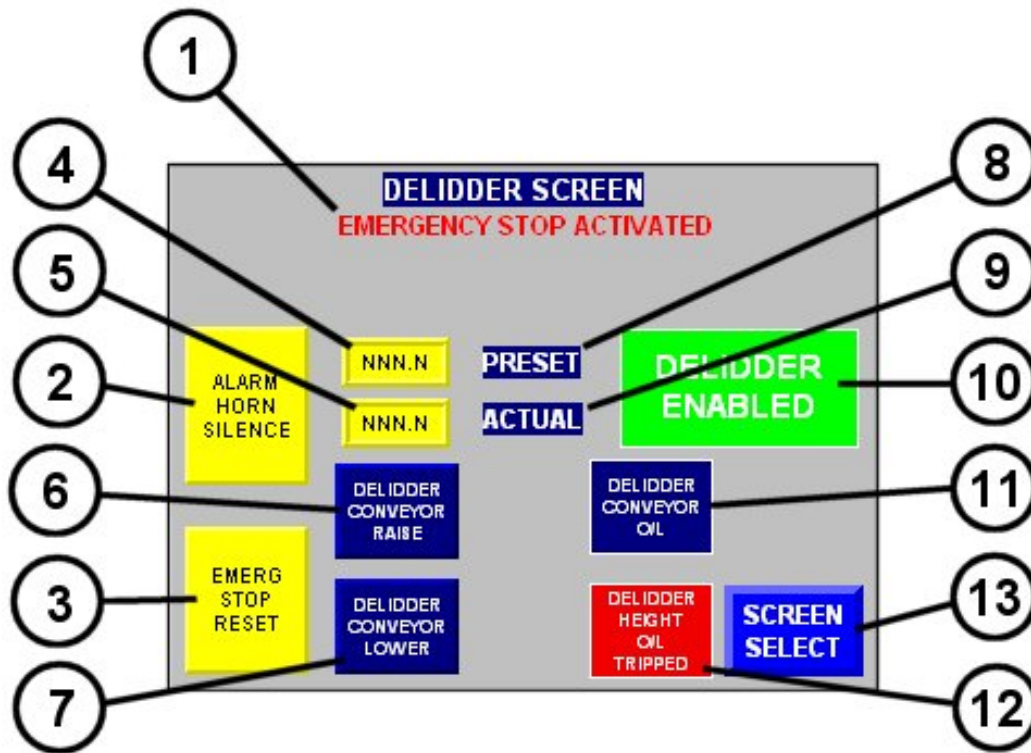
AXIS CONTROL SCREEN 2

ITEM #	DESCRIPTION
1	Displays if E-Stop is activated.
2	Recipe setting for conveyor speed.
3	Current conveyor speed.
4	Manually increases conveyor speed for setting up a recipe.
5	Manually decreases conveyor speed for setting up a recipe.
6	Recipe setting for vacuum pressure.
7	Current vacuum pressure.
8	Manually increases vacuum pressure for setting up a recipe.
9	Manually decreases vacuum pressure for setting up a recipe.
10	Recipe setting for air delay after product is cleared.
11	Manually increase air jets on time for setting up a recipe.
12	Manually decreases air jets on time for setting up a recipe.
13	Description (preset by recipe).
14	Description (actual).
15	Goes to the screen select screen.



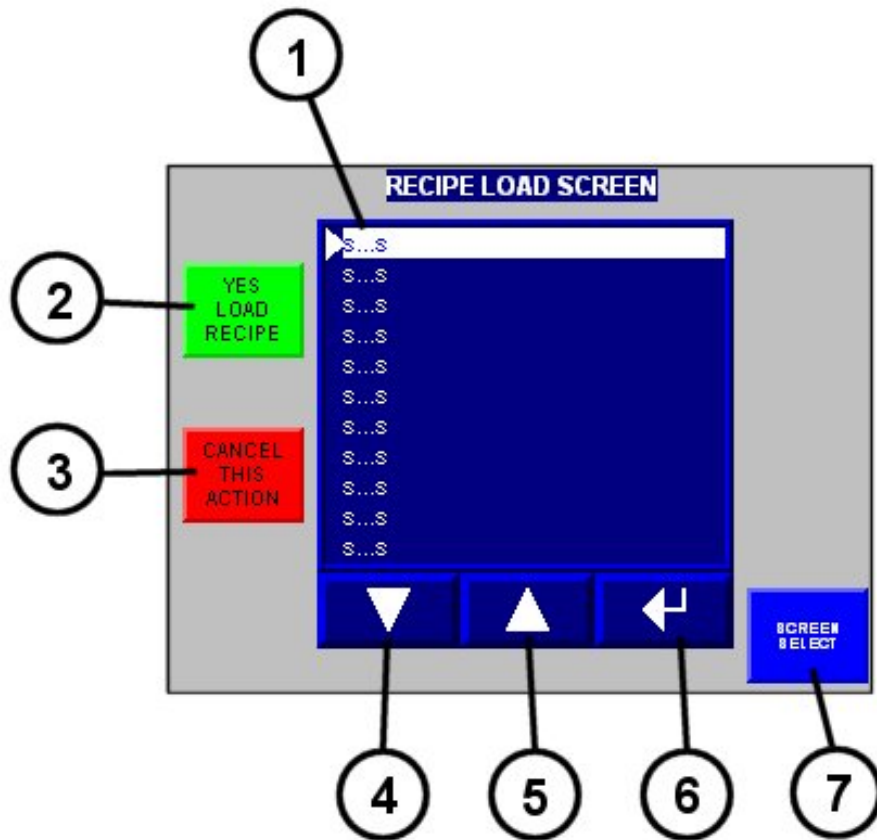
DEPANNER FAULTS SCREEN

ITEM #	DESCRIPTION
1	Displays if E-Stop is activated.
2	Displays "PAN JAM" if a pan jam occurs.
3	Displays "LID JAM" if a lid jam occurs.
4	Displays "PROD JAM" if a product jam occurs.
5	Silences the alarm horn.
6	Resets the depanner after an emergency stop has been pushed.
7	Displays if the conveyor motor overloads are in an "ok" or "failed" state.
8	Displays if the vacuum belt motor overloads are in an "ok" or "failed" state.
9	Displays if the vacuum blower motor overload is in an "ok" or "failed" state.
10	Displays if the vacuum lift motor overload is in an "ok" or "failed" state.
11	Displays the PLC battery state.
12	Displays if the pan guides motor overload is in an "ok" or "failed" state.
13	Goes to the screen select screen.



DELIDDER FAULTS SCREEN

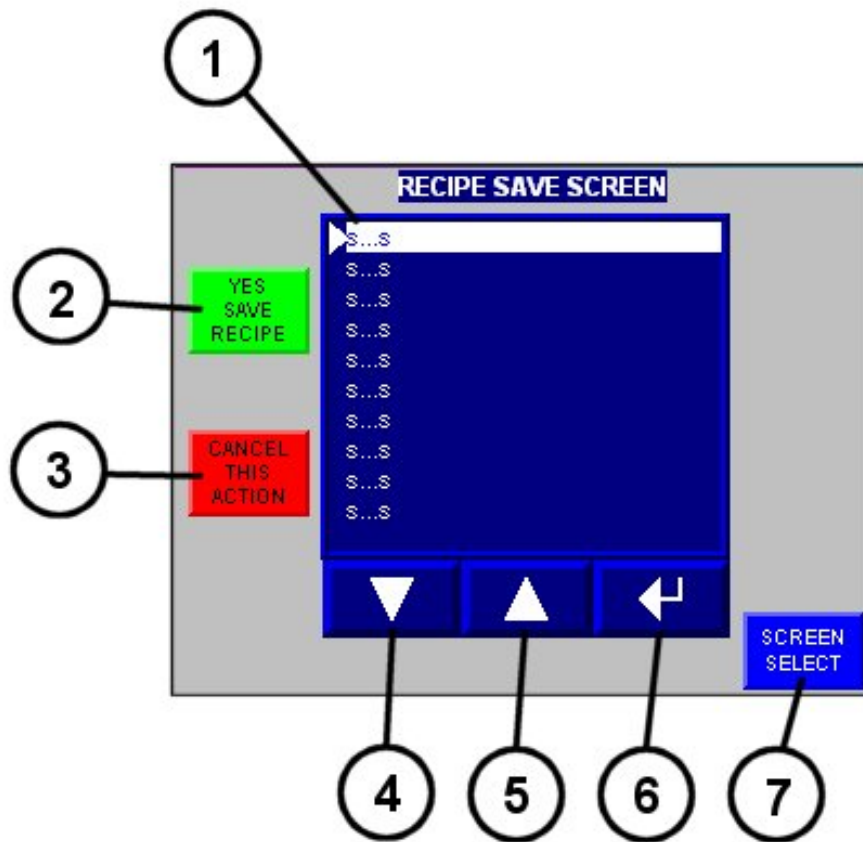
ITEM #	DESCRIPTION
1	Displays if E-Stop is activated.
2	Silences the alarm horn.
3	Resets the depanner after an emergency stop has been pushed.
4	Recipe setting for delidder conveyor height.
5	Current height of delidder conveyor.
6	Manually raises delidder conveyor for setting up a recipe.
7	Manually lowers delidder conveyor for setting up a recipe.
8	Description (preset by recipe).
9	Description (actual).
10	Displays if delidder conveyor is enabled.
11	Displays if the delidder conveyor is in an "ok" or "failed" state.
12	Displays if the delidder height is in an "ok" or "failed" state.
13	Goes to the screen select screen.



RECIPE LOAD SCREEN

ITEM #	DESCRIPTION
1	Select recipe to load.
2	Load selected recipe.
3	Cancel newly selected recipe and/or undo newly loaded.
4	Scroll down.
5	Scroll up.
6	Enter. To accept selected recipe.
7	Goes to the screen select screen.

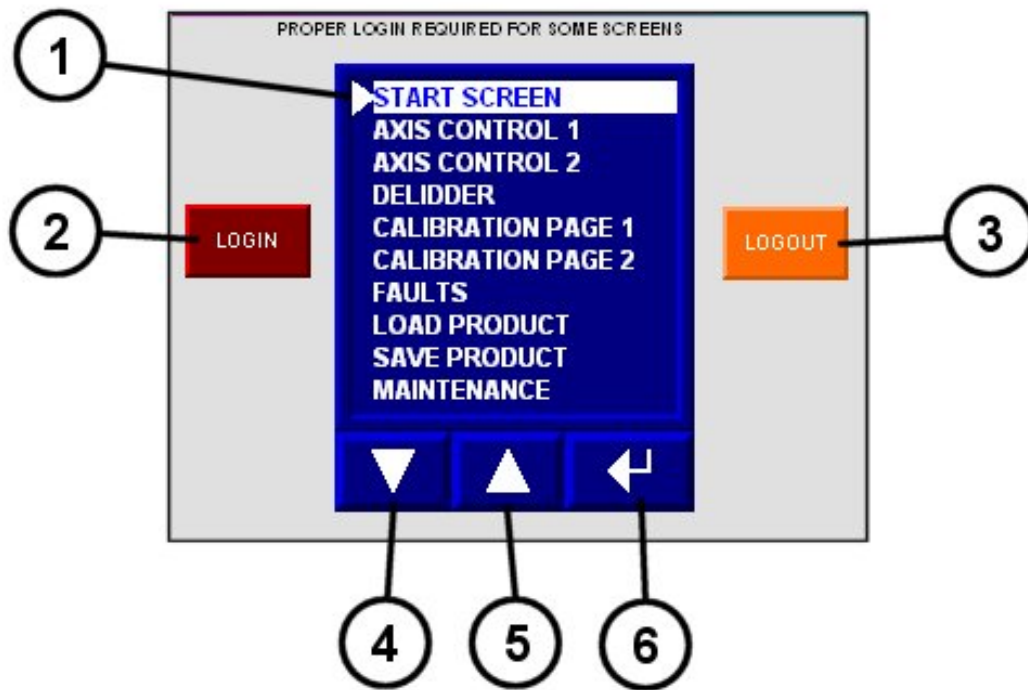
To access this screen a user login is required.



RECIPE SAVE SCREEN

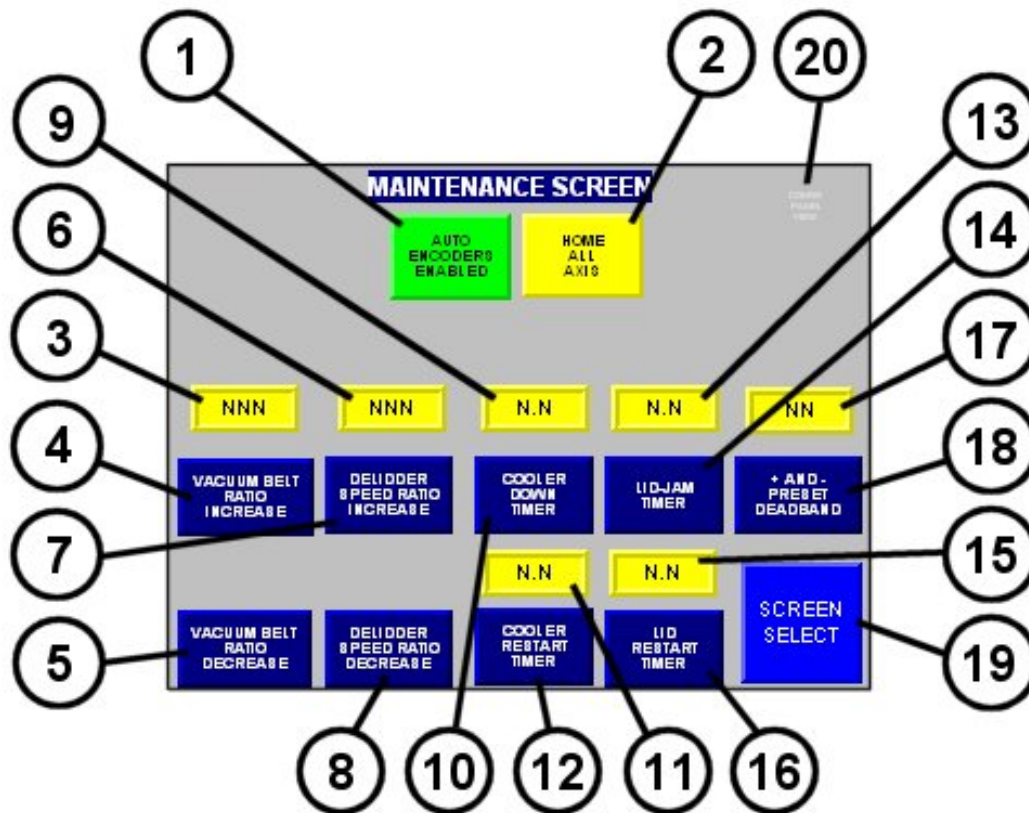
ITEM #	DESCRIPTION
1	Select recipe to save.
2	Saves new recipe.
3	Cancel and/or undo save of new recipe.
4	Scroll down.
5	Scroll up.
6	Enter. To accept selected recipe.
7	Goes to the screen select screen.

To access this screen a user login is required.



SELECT SCREEN

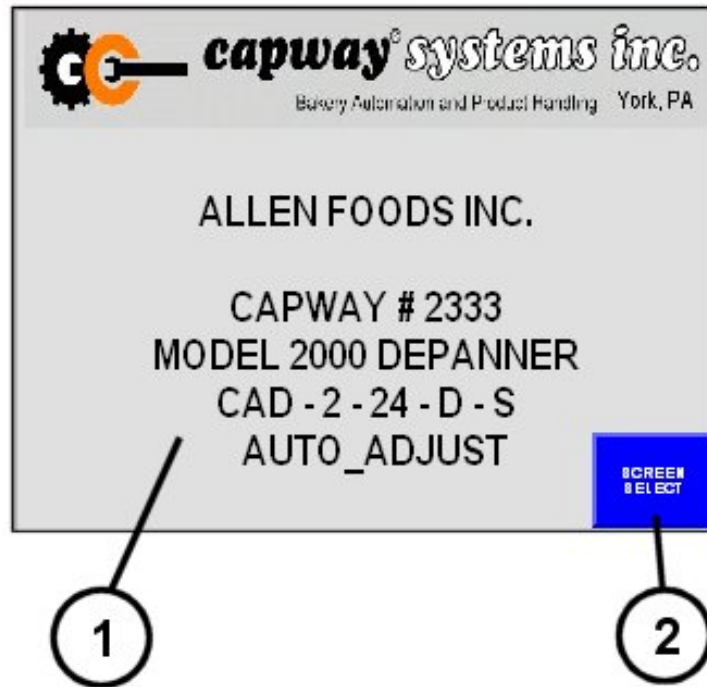
ITEM #	DESCRIPTION
1	Select screen to go to.
2	User login.
3	User logout.
4	Scroll down.
5	Scroll up.
6	Enter. To move to selected screen.



MAINTENANCE SCREEN

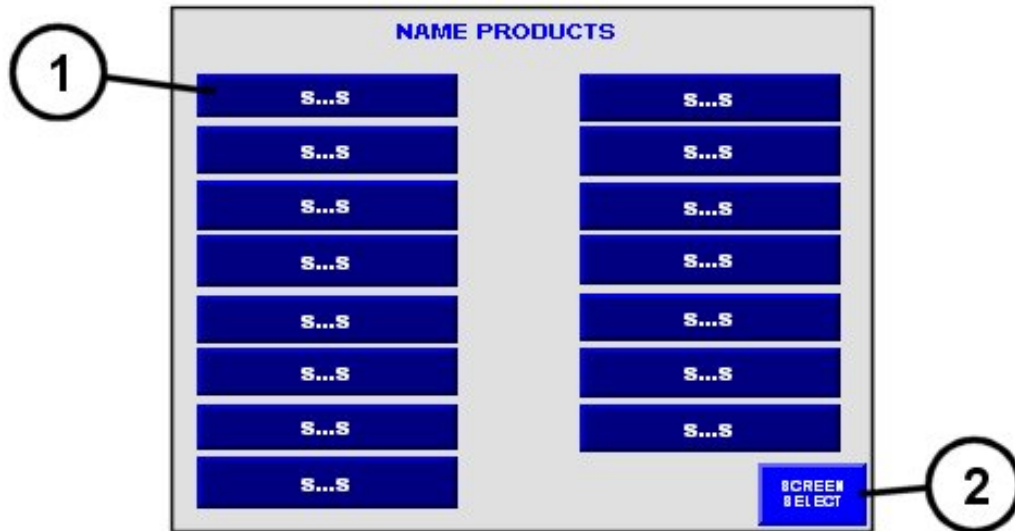
ITEM #	DESCRIPTION
1	Push button to enable or disable encoders.
2	Reset all axis to the home position.
3	Set point display (in %) for the vacuum belt speed to pan conveyor speed ratio.
4	Increases the vacuum belt speed in relation to the pan conveyor.
5	Decreases the vacuum belt speed in relation to the pan conveyor.
6	Set point display (in %) for delidder conveyor speed to pan conveyor speed ratio.
7	Increases the delidder conveyor speed in relation to the pan conveyor.
8	Decreases the delidder conveyor speed in relation to the pan conveyor.
9	Set point display (in sec.) for cooler stopped time.
10	Changes the cooler stopped time before "Cooler Stopped" is displayed.
11	Set point display (in sec.) for the cooler restart time.
12	Changes the time setting for how long it takes for the depanner to restart after the cooler has restarted.
13	Set point display (in sec.) for lid jam delay time.
14	Changes the time a lid is in the lid jam photo eye's line of sight before a "Lid Jam" is displayed.
15	Set point display (in sec.) for the lid conveyor restart time.
16	Changes the time setting for how long it takes for the depanner to restart after a lid jam is cleared.
17	Set point display for deadband.
18	Sets deadband.
19	Goes to the screen select screen.
20	Access to configuration mode for the panel view.

To access this screen a user login is required.



INFORMATION SCREEN

ITEM #	DESCRIPTION
1	Information display.
2	Goes to the screen select screen.



NAME PRODUCTS SCREEN

ITEM #	DESCRIPTION
1	Select a recipe and name it with the alpha/numeric keypad.
2	Goes to the screen select screen.

f. GENERAL MAINTENANCE

(see Component Literature folder for manufacturer's specific recommendations)

	GENERAL MAINTENANCE	The maintenance program is designed to restrict failures to a minimum, ensuring a long life and good functioning of your machine. We suggest that you to supplement the maintenance schedule advised here with your own experience in practice. As with all moving parts, they must be periodically checked for wear and adjustment. Careful adherence to the maintenance schedules will greatly enhance the productivity of your installation. Use only those lubricants recommended by the manufacturer or others clearly equal to them. The following maintenance and lubrication schedule is given as a general guide based on an eight hour working day for the installation. Many of the maintenance points can be inspected visually and adjustments made without the need for disassembly.
	GENERAL ELECTRICAL MAINTENANCE	1. Control Box • Check the door seals. • Check the connections. • Remove dirt with a vacuum cleaner. • Check the pilot lights. • Check for loose fuses. • Check all connections in the control box every year. 2. Wiring • Check wiring. • Check the cable functions to the switch box and the components of the machine. 3. Proximity Switches/Photo-Eyes/Limit Switches • Check function. • Check mounting. • Remove dirt.

	MAINTENANCE SCHEDULE	Maintenance Interval = 8 hours working time per day.		
		Working Time (Hours)		
		A.	8-10	Daily
		B.	50-70	Weekly
		C.	200	Monthly
		D.	500	Per Quarter
		E.	1000	Per 1/2 Year
		F.	2000	Per Year
		G.	4000	Per Two Years

Maintenance Activities

The equipment should never be operated without the safety systems. However on rare occasions and for specific tasks, it may be necessary to run the equipment with some guards or safety devices removed. For example, a maintenance person repairing a machine may have to have the power turned “ON” to operate the machine with the guard removed in order to determine whether or not the repairs are successful.

These situations are potentially very dangerous and great care must be taken to execute this work in a safe manner.

When servicing or maintaining equipment it is strongly recommended that personnel never work alone. A “safety buddy” should always be standing by in case there is an accident.



Before performing any maintenance tasks, be familiar with and fully understand your company’s Lockout/Tagout procedures.



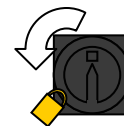
Read the safety instructions before any maintenance is performed to this equipment.



Only authorized, competent, trained personnel can perform maintenance to this equipment.



When working on the equipment, the work switch must be set to the “OFF” (“O”) position and locked in place with a padlock.



Use safe working practices at all times. Examples of safe working practices would be:

- Using suitable protective equipment, such as:

• Hardhats	• Overalls
• Safety glasses	• Dust masks
• Ear protection	• Fume and dust extraction
• Gloves	

Enclosure Access Panels

The enclosure access panels are opened by means of an Allen wrench (left panel) or by turning hand latches (right panel). (See fig. below)

**Panel View Box Access (Optional)**

Access to the panel view box is by means of the supplied key. (See fig. below)



Belt Tension

The belt, over time, may begin to stretch slightly which may cause the belt to slip on the pulley. If this occurs the tension on the belt will need to be adjusted.



Do not apply excessive tension when tightening the belt. Too much tension can lead to premature belt wear and bearing failure which could cause the drive and tail shaft to break and ultimately lead to extensive periods of production down-time and costly repairs.

Proper tension on the belt is critical not only to the belt life but also the bearings, bushings, or shafts. When adjusting or setting the belt tension enough pressure should be applied to make the belt taut with just enough tension to allow the belt to move without slipping.

To correctly tension the belt, follow the procedures and refer to Figure 1 below.

- 1) Loosen the bolts for the tail shaft on both sides (end take-up only). (Item 1)
- 2) Turn both of the adjustment bolts in the appropriate direction. (Item 2)
 - a. Clockwise to add tension
 - b. Counterclockwise to release tension

To ensure that the belt will align properly, be sure to turn the each bolt the same amount. If the belt is not tracking straight (walking to one side), slight adjustments can be made to align the belt by turning one bolt more than the other. (Does not apply to “V” type belts.)

- 3) After the correct amount of tension has been applied and the belt is tracking straight, the tail shaft bolts (end take-up only) can be tightened to “lock” the shaft in place. (Item 1)

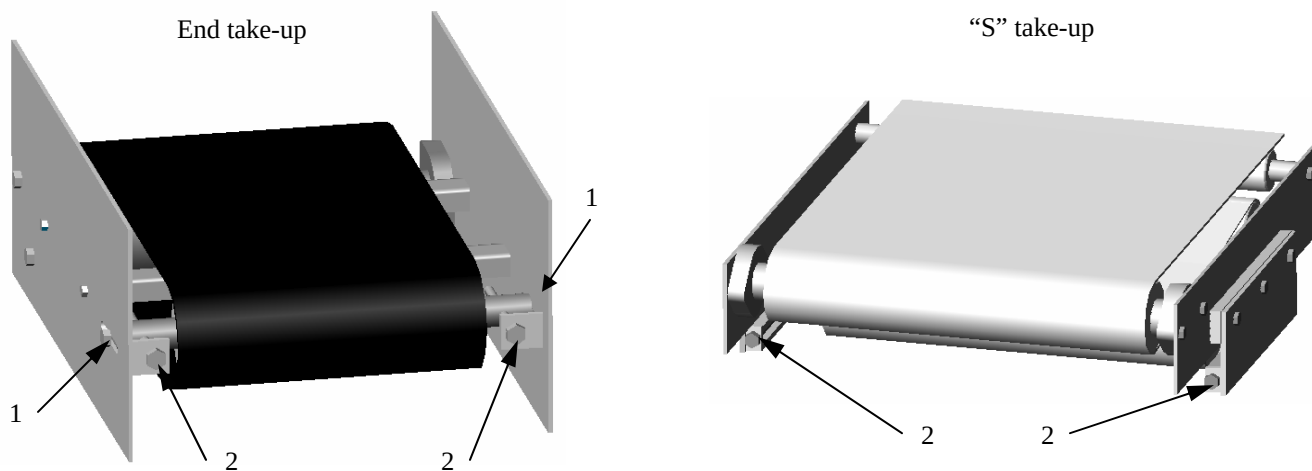


Figure 1

Preventive Maintenance

To maintain the well functioning and efficient capabilities of this equipment, it is necessary that routine preventive maintenance be performed. The machine must be checked, tested, and maintained on a regular basis (see Table 1). If these checks are not performed, equipment failure may occur, leading to prolonged production downtime. If possible, these actions should be completed outside of production hours.

Table 1: Maintenance interval

Interval	Frequency	
A	Daily	8-10 hrs
B	Weekly	50-70 hrs
C	Monthly	200 hrs
D	Quarterly	500 hrs
E	6-month	1000 hrs
F	Yearly	2000 hrs
G	2-years	4000 hrs

The maintenance interval table above is given as a general guideline and should be referenced when performing preventive maintenance activities. However, due to varying run hours and other environmental issues we suggest that you supplement the maintenance schedule advised here with your own experience in practice.

Mechanical

This conveyor is equipped with moving mechanical components. **Be familiar with all associated risks related to mechanical components.**



**Never mix different types of lubricants.
Never mix synthetic oil with mineral oil.**

When lubricating metal chains the oil must reach the pivot-points (between pin and bush).

Maximum chain-wear (elongation percentage):

3% for sprocket wheels with 15 to 32 teeth
2% for sprocket wheels with 33 to 80 teeth
3% for sprocket wheels with more than 81 teeth

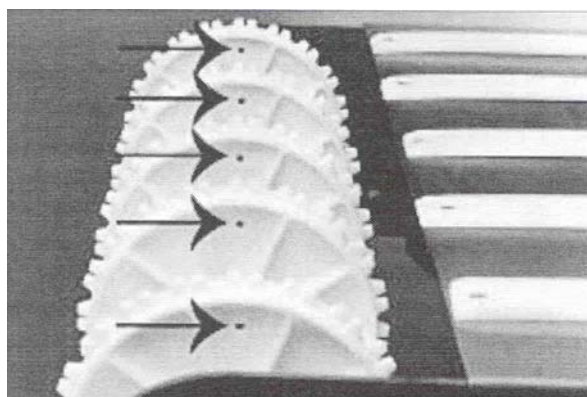
Interval	Component (if applicable)	What to do...	What to check...
A	Conveyor belt		- Correct path in the guidance - Tension: tighten or loosen if necessary
A	Guards		In place and secure
B	Bearings	Lubricate*	- Wear - Free spinning - Excessive noise: squeaking, grinding, etc.
C	Conveyor belt		Check for excessive wear
C	Wear strips		Excessive wear
C	Machine		Alignment adjustment
C	Drive and roller chains	Lubricate	- Excessive wear - Damaged links - Proper alignment - Tension
C	Chain sprocket	Lubricate	- Excessive wear - Missing teeth
D	Frame		Loose or missing hardware
D	Motor gear box	Add/remove oil	- Oil level - Excessive noise: squeaking, grinding, etc. - Excessive heat
D	Threaded rods	Lubricate	Check for stiffness
D	Nibbling belt and carriage		- Check traveling position - Check for damage
F	Drive chain		Disassemble; clean with dry cleaning naphtha (lighter fluid); put in lukewarm oil and allow to drip
G	Motor gear box	Change oil	- Drain oil - Rinse gear box and fill with fresh oil - Check brake function, if applicable

* Under normal operating conditions bearings are lubricated for life, however, regular lubrication prolongs their life span. The bearing manufacturer recommends using no more than 3 grams when re-greasing bearings. Over greasing can lead to overheating and/or unsealing the bearing seals.

Aligning Intralox Sprockets

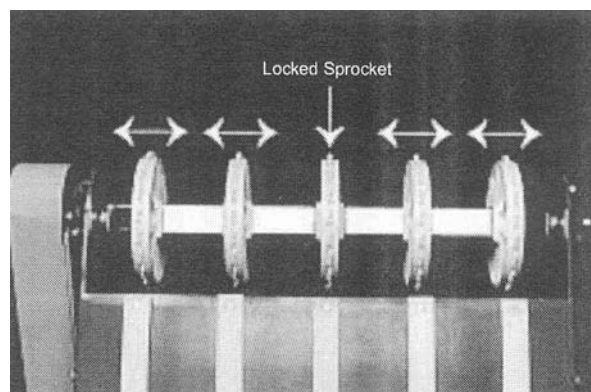
Sprockets must be installed on the shafts so that the teeth are properly aligned. On sprockets having square bores and a number of teeth evenly divisible by four, the teeth will be aligned properly no matter how the sprockets are placed on the square shaft (i.e., $16 \div 4 = 4$).

However, when the number of teeth on a sprocket cannot be evenly divided by four, special care must be taken to insure all sprockets are “timed” alike. In this case, there is a pilot hole manufactured in each sprocket. When the sprockets are installed, all of these holes must be placed on the same side of the shaft (see illustration below).



Intralox Sprocket Positions on the Shaft

Intralox recommends that only one sprocket be “locked” on each of the drive and idle shafts. These sprockets, normally in, or close to the center, provide positive lateral tracking and keep the belt running properly between the side frames (see illustration below).



The locked sprocket on the drive shaft must be in the same lateral position as the locked sprocket on the idle shaft. All other sprockets must be laterally free on the shaft to follow the thermal elongation/contraction of the belt. Where there are only two sprockets per shaft, lock the sprockets on the drive journal side.

Rough Top Belting

The rough top belting provides enough friction to convey product or pans up an incline and is available with two different types of belt depending on the application. A rough top belt which is primarily used to carry pans or boards is available in black. A rough top belt which is used to carry only product is a white belt.

Cleatrac Belting

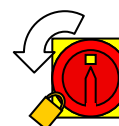
The Cleatrac belt is a mesh belt which needs to be kept clear of any debris to realize a long life. It needs to be cleaned regularly of hard deposits by raising the temperature of the band to about 800-900°F [400-480°C] to carbonize any debris. Soft accumulations can be removed by steam cleaning with an industrial cleaning agent. After cleaning, the band must be oiled to prevent rusting. General inspection should include: no product debris, equal tension across full width, equal sag on both sides (no greater than 1/32 inch [1 mm]), no broken welds, no curl along belt edges, no broken wires, out of crimp, discolored, evenly distributed load and tension/tracking.

Electrical

This conveyor may be equipped with electrical-powered components such as switches, solenoids, motors, photo-eyes, etc. **Be familiar with all associated risks related to electricity and electrical equipment.**



Tasks concerning electricity, the main power switch must be set to the “OFF” (“O”) position and locked in place with a padlock.



Interval	Component (if applicable)	What to do...	What to check...
B	Photo-eyes and reflectors		- Proper alignment with clear field of view - Function (voltage LED should be on, detection LED should come on if an object passes in front)
B	Wiring		- Pinched or severed wires - Cuts in insulation - Hanging wires, secure if necessary
B	Junction boxes		- Fixed in place, secure if necessary - Securely closed - Wires clamped leading into box
B	Solenoids and switches		- Proper function - Fixed in place, tighten if necessary - Wires securely connected
C	Motors		Excessive noise: squeaking, grinding, etc.

Pneumatic

This conveyor may be equipped with additional air-powered components such as lifting mechanisms, lift gate, clamps, etc. **Be familiar with all associated risks related to this type of equipment.**

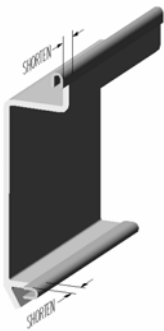
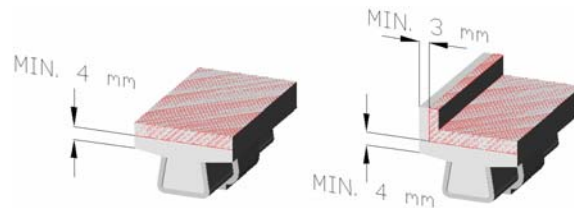
Interval	Component (if applicable)	What to do...	What to check...
A	Air piping and tubes		- Leaks in tubing - Leaks at connections - Tightness of connections
B	Pressure regulator		- Pressure must be ± 6 bar - Remove dirt, oil, and water from bowl
B	Cylinders		- Proper function - Air leaks around seals and fittings

Capway Systems recommends regular inspection of the equipment by our expert personnel. This can be arranged by contacting our service department at (717) 843-0003.

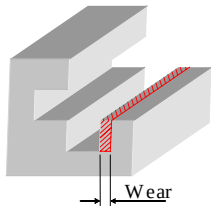
Wearstrips

Under normal operation the wearstrips for plastic belts do not typically wear rapidly. However, if there is noticeable wear, the problem may be caused by other contributing factors such as improper belt path. If the wear is excessive the wearstrips will need to be changed to prevent damage to the belt and other conveyor components. See illustration below for determination of excessive wear. The wearstrips for the chain conveyors are an ultra-high molecular weight material and/or nylon, depending on the application. These materials do not require any special lubrication.

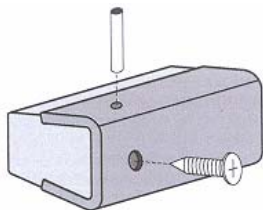
Capway wearstrips utilize a specialized crimping process to lock the UHMW guide rail profile shape permanently in place to create a solid guide rail that eliminates the potential for hidden contamination. The UHMW profile shape and 304 stainless steel sheave are married solidly together so that liquids or material fines cannot penetrate beyond the guide rail mating surfaces. These guide rails meet the requirements set forth by the FDA for food contact applications, USDA standards for handling meat and poultry and 3-A sanitary standards for contact surfaces of dairy equipment.



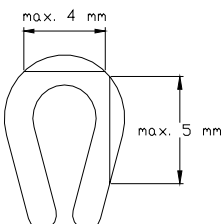
The plastic profiles will lengthen due to the belt friction.
 Shorten the guide to ± 10 mm before the end of the steel profile.



Guides in the outside of bends wear faster than others.
 Check regularly and replace if wear exceeds 2 mm.



When the guide rail is used as a wearstrip, the UHMW insert should be fastened to the metal sheath at the leading end of the rail. Using a sheet metal screw through the back of the sheath or a heavy wire pin from the side should be adequate. This will prevent the insert from sliding within the sheath in the event the chain accidentally catches on a leading edge. This also allows for the thermal expansion and contraction of the UHMW insert.



Replace these guides when wear will have flattened out 4 mm of material on top and 5 mm on the side.

SANITATION AND CLEANING



For your safety and the safety of others, regularly clean the equipment and the direct surroundings.



Cleaning of the equipment must be completed in a safe manner by competent, trained personnel.



Cleaning staff must be informed of and follow all safety instructions and regulations regarding the equipment and surrounding environment.



Understand and follow your company's cleaning and sanitizing procedures.

This equipment may or may not be designed for use in a wash-down application. This information is available in the order confirmation.



If this equipment is designed for a wash-down application, please be advised of the following:

1. Capway Systems recommend using only cleaning solutions approved in the food preparing industry. Some cleaning solutions, however, may be too aggressive to use with the plastics and metals in this equipment.
2. Avoid direct spray on the bearing housings and/or bushings. Some of the cleaning solution may penetrate into the bearing housing causing the lubricant inside to break-down. This may lead to damage of the equipment and create costly repairs and extensive periods of production downtime.



If this equipment is not designed for a wash-down application, but a wash down will occur in near proximity:

1. Cover all electrical boxes, photo-eyes and motors with plastic bags.... DO NOT remove bags until use of water has ceased.

Cleaning



It is recommended that prior to cleaning, the equipment should be turned “OFF” to prevent any accidental injuries.

At the beginning of each shift, use a low-pressure air line to blow any dust or debris off of the equipment and carefully blow dust off of the photo-eye sensors and reflectors.

Interval	Component (if applicable)	What to do...
A	Conveyor belt	Remove dirt particles
B	Conveyor belt and installation	Remove sticky dirt. Clean with warm water and soft detergent.
B	Photo-eyes and reflectors	Clean with a dry cloth.
B	Drive chain	Remove remains of product with a brush.
C	Motor	Clean cooling fins
C	Oil drip pans	Clean

To prevent corrosion and to maintain free and easy adjustments (where applicable), adjusting screws and other various components will have to be wiped down with a light coating of food grade oil every week.

g. MAINTENANCE TABLE - DEPANNER

	Maintenance Point	Lubrication & Cleaning Agent	Remarks
A	Every 8 working hours/daily		
A1	Depanner	With damp cloth; DO NOT spray with water or steam	Clean depanner outside
A2	Conveyor and inside of the vacuum chamber		Remove remains of product
B	Every 50 working hours/weekly		
B1	Crumb catcher in air case (filter)		Clean crumb catcher. Close the hatch properly. NOTE: Never open the hatch when the fan is running.
B2	Drive chains		Remove remains of products with brush
B3	Proximity and photo electric switches		Clean with dry cloth; check functioning
C	Every 200 working hours/monthly		
C1	Vacuum cups	Warm water with soft cleaning agent	Clean and check for damage and cracks. Replace damaged cups.
C2	Vacuum belt	Warm water with soft cleaning agent	Remove stuck on remains of oil or emulsion
C3	Conveyor chains	Oil lightly after cleaning	Clean and check for repair
C4	Drive chains	Type of oil (See Table)	Check for wear
C5	Linear ball bearings	Type of oil (See Table)	Clean and check for wear
D	Every 500 working hours/per quarter		
D1	Propeller blades and fans		Clean blades with dry cleaning naphtha (lighter fluid). DO NOT SPRAY WITH WATER! It gives bad results and unbalances.
D2	Fan V-belt		Check tension
D3	Geared motor(s)		Check oil level. Clean cooling vanes.
E	Every 1000 working hours/per 1/2 year		
E1	Drive and slave wheels		Check
E2	Threaded rods	Type of oil (See Table)	Check for stiffness
E3	Flange bearings & bearing blocks	Lubricated for life	Check if eccentric collar is correctly positioned; re-tension if necessary; clean and check for damage; replace if required.
E4	Geared motor(s)	Type of oil (See Table)	Drain oil; flush casing & refill with fresh oil; service only after the first 1000 hours; check brake functions

	Maintenance Point	Lubrication & Cleaning Agent	Remarks
F	Every 2000 working hours/per year		
F1	Driving chains	Type of oil (See Table)	Disassemble; clean with dry cleaning naphtha; put in lukewarm oil and let drip
F2	Installation		Electrical and mechanical inspection
F3	Bearings drive shaft of fan	Grease with Kluber Staurgas NBU 8 IP (10 gr) or equivalent	Check bearings
G	Every 4000 working hours/per two years		
G1	Geared motor(s)	Type of oil (See Table)	Drain oil, flush casing and refill with fresh oil
G2	Motor (bearings)	Type of grease (See Table)	Check, clean and grease
G3	Installation		General inspection
NOTE: NEVER USE TWO TYPES OF GREASE TOGETHER! NEVER MIX SYNTHETIC OIL WITH MINERAL OIL!			

h. MAINTENANCE TABLE - BELT CONVEYORS

	Maintenance Point	Lubrication & Cleaning Agent	Remarks
A	Every 8 working hours/daily		
A1	Conveyor belt		Remove coarse residue from conveyors. Clean
B	Every 50 working hours/weekly		
B1	Conveyor belt	Warm water with soft cleaning agent	Remove stuck on remains of oil or emulsion.
B2	Rollers		Clean (with brush)
B3	Belt run and tension		Check for correct running. Retighten if necessary.
C	Every 200 working hours/monthly		
C1	Drive chain	Type of oil (See Table)	Clean and oil. Retighten if required.
C2	Bearings of supporting and tensioning rollers	Type of oil (See Table)	Oil
C3	Oil drip pan		Clean
D	Every 500 working hours/per quarter		
D1	Flanged bearings and tension rings (collars) bearings	Lubricated for life	Check if collar (tension ring) is correctly positioned. Retighten if necessary.
D2	Chain covers		Check the position. Check fixing bearing plate.
D3	Geared motors		Clean cooling vanes. Check oil level.
E	Every 1000 working hours/per 1/2 year		
E1	Drive chain and sprocket		Check for wear
E2	Geared motor	Type of oil (See Table)	Drain oil. Flush casing and refill with fresh oil. Service only after the first 1000 hours.
E3	Geared motor with brake		Check brake
F	Every 2000 working hours/per year		
F1	Drive chain	Type of oil (See Table)	Disassemble; clean with dry cleaning naphtha; put in lukewarm oil and let drip
F2	Bearings	Type of grease (See Table)	Clean, check for damage. Grease if necessary
F3	Conveyor belt		Mechanical and electrical inspection. Clean.

	Maintenance Point	Lubrication & Cleaning Agent	Remarks
G	Every 4000 working hours/per two years		
G1	Geared motor(s)	Type of oil (See Table)	Drain oil. Flush casing and refill with fresh oil.
G2	Motor (bearings)	Type of grease (See Table)	Check and clean. Grease if necessary
G3	Motor with brake and bearings on brake side	Type of grease (See Table)	Check and clean. Fill 1/3 of the space between the balls. Grease if necessary.
G4	Conveyor		General inspection
NOTE: NEVER USE TWO TYPES OF GREASE TOGETHER! NEVER MIX SYNTHETIC OIL WITH MINERAL OIL!			

i. MAINTENANCE TABLE - PNEUMATICS

	Maintenance Point	Lubrication & Cleaning Agent	Remarks
A	Every 8 working hours/daily		
A1	Air hoses/tubing		Check for tightness
B	Every 40 working hours/weekly		
B1	Service unit		Fill with new oil
B2	Compressed air connection		Check pressure (± 6 bar)
C	Every 200 working hours/monthly		
C1	Air filter		Clean
C2	Cylinder		Clean
C3	Valves		Clean and check
D	Every 500 working hours/per quarter		
D1	Service unit		Empty filter and clean pressure regulator
D2	Air connection and pneumatic coupling		Check
NOTE: NEVER USE TWO TYPES OF GREASE TOGETHER! NEVER MIX SYNTHETIC OIL WITH MINERAL OIL!			

j. MAINTENANCE TABLE - CRUMB CATCHER FILTER



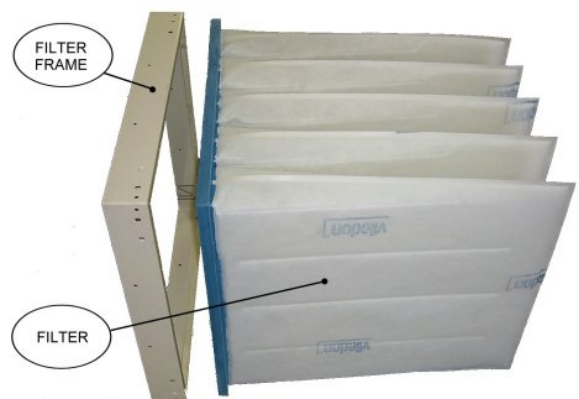
Daily, at least after 40 working hours, remove the hatch of the air case and clean the filter bag.

Open the hatch of the vacuum chamber and clean the inner compartment.

NOTE: By cleaning or exchanging the filter, care should be taken that the filter bags are set in the right position.

FILTER BAG

Slide filter in from this side.



k. TROUBLESHOOTING

Problem	Cause	Remedy
Damage to bread crust	Vacuum pressure probably too high	Close vacuum valve a little
	The vacuum chamber is too low	The cups must not be compressed more than 15 mm (9/16")
Bread sticks to form	Ventilator does not work	Check the thermal magnetic motor safety device
	Air passage through vacuum cups is blocked	Clean
	Damage to connecting hose (from ventilator to vacuum chamber)	Replace hose
	Baking forms/pan sets not greased or incorrectly greased	Check greasing machine
	Insufficient vacuum power	Open vacuum valve a little more
	Bread crust loose, so only flakes are sucked up	After baking, the flakes must be firmly attached to the crust
Vacuum cups are split or burnt	Distance between vacuum chamber and baking form/pan set is too small	Set vacuum chamber higher
Loss of vacuum pressure	Filter clogged	Leakage, clean
	Dirty ventilator	Clean
	Leaking air hose	Replace
Loaf or roll slips back on discharge conveyor	Wear of discharge belts	Replace
	Discharge conveyor belt slanting too much	Adjust
The depanner stops without obvious reason	Broken chain	Repair
	Motor failure	Check the thermal magnetic motor

SPARE PARTS MANUAL

TABLE OF CONTENTS:

- 1. Spare Parts List**
- 2. Lift and Tilt Assembly (Drawing Number D-400-2528)**
- 3. 4 Feet Infeed Conveyor (Drawing Number C-400-2879-24)**
- 4. Bread Conveyor (Drawing Number D-400-2873-24)**
- 5. Delidder Conveyor (Drawing Number D-400-2953)**
- 6. Delidder Height Adjustment (Drawing Number C-400-2688-24)**
- 7. Product Discharge Conveyor (Drawing Number C-400-2517-24)**
- 8. Vacuum Chamber Assembly (Drawing Number D-400-2548-24)**
- 9. Vacuum Ducts (Drawing Number 400-0936)**
- 10. Vacuum Belt Cups & Retainers (Drawing Number A-400-1091)**
- 11. Seed Containment Unit w/Air Jets (Drawing Number D-400-2994-24)**
- 12. Air Jets Assembly (Drawing Number C-400-2545-24)**
- 13. Air Control (Drawing Number B-400-2744)**
- 14. Filter Assembly (Drawing Number 400-0936)**
- 15. Blower Assembly (Drawing Number D-400-2050-2)**
- 16. Cyclone Separator (Drawing Number C-400-0567-2)**

SPARE PARTS LIST

“DEPANNER” CAD-2-24-D-SS

ORDERING SPARE PARTS

We would like to help you by supplying spare parts quickly. We have therefore drawn up this following spare parts list.

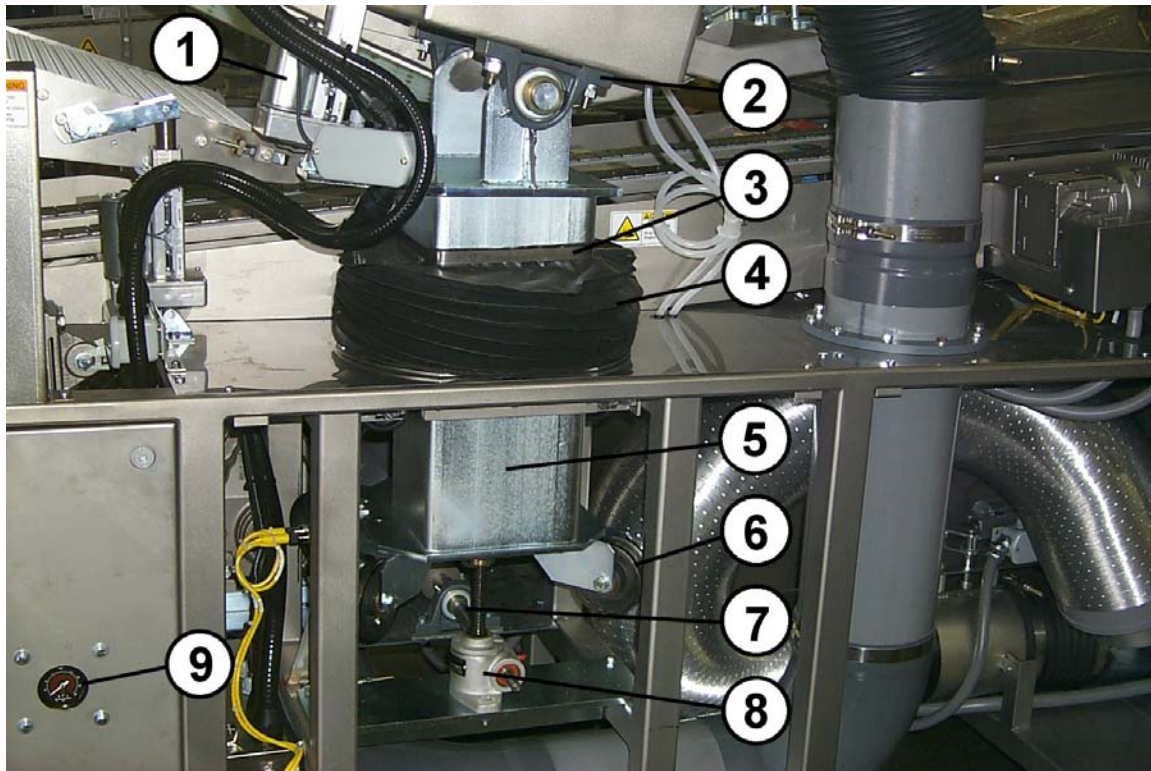
EXAMPLE FOR ORDERING SPARE PARTS

THE FOLLOWING DETAILS ARE NECESSARY WHEN ORDERING PARTS.

	ORDER#: 2333-406
	INSTALLATION: DEPANNER CAD-2-24-D-SS
	DESCRIPTION:
	DRAWING OR PART #:
	POS #:
	QUANTITY:
	CURRENT DATA:

LIFT AND TILT ASSEMBLY

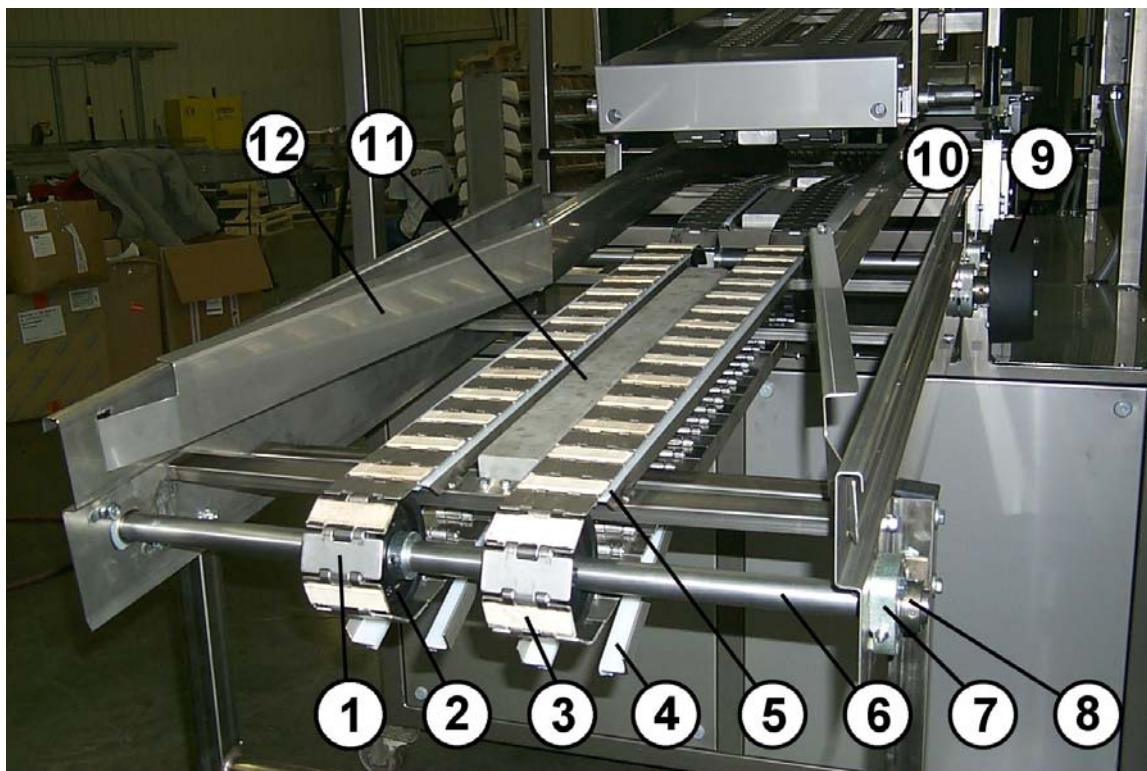
(DRAWING NUMBER D-400-2528)



POS	DESCRIPTION	PART/DRAWING NUMBER
1	ACTUATOR	OOD-ELEC-ACTR
2	PILLOW BLOCK BEARING	OO1-0015-PBLK
3	HOSE CLAMP	OOD-5000-0004
4	BELLOWS BOOT	OOD-5000-0003
5	LIFT POST AUTO W/O HOLE	C-400-2401-1
6	V-GROOVE WHEEL	OOD-5000-0001
7	EXTENSION SHAFT	A-400-2407
8	ACME JACK SCREW	OOD-WJ51-ACME
9	2 1/2" DIA VACUUM GAUGE	OOD-3508-0000
	GEARMOTOR (NOT SHOWN)	SEE MOTOR SHEET

4 FEET INFEEED CONVEYOR

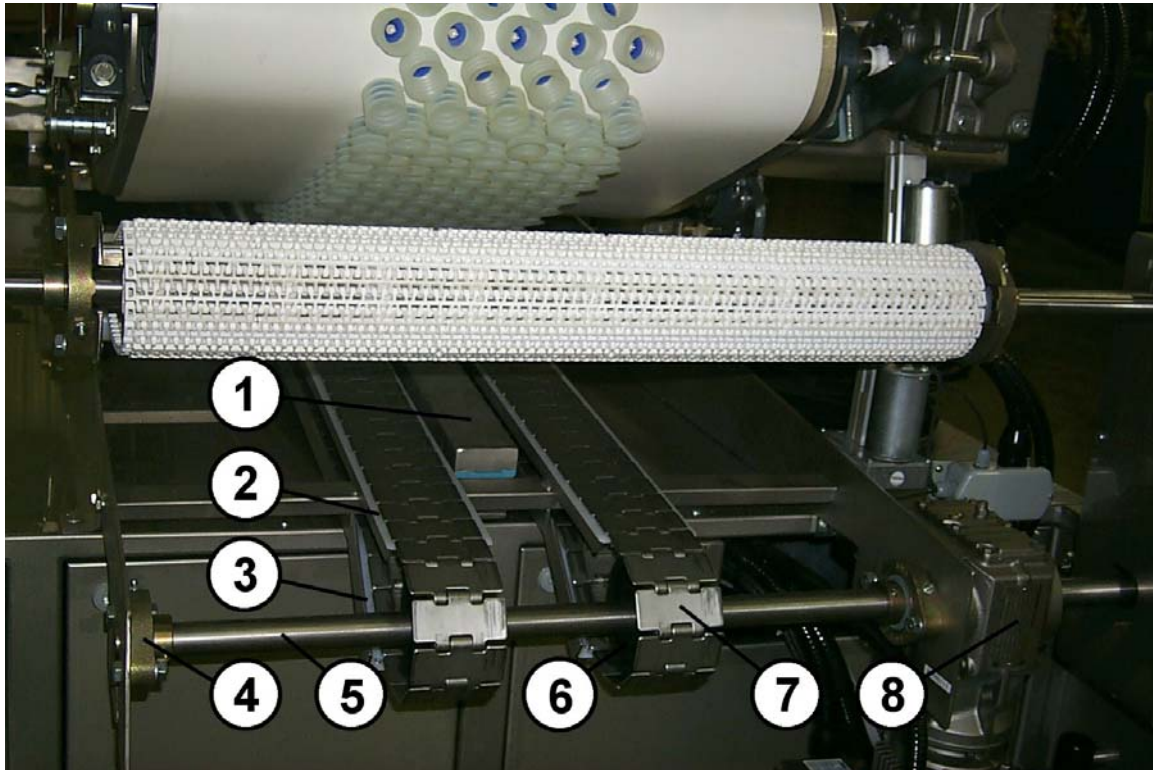
(DRAWING NUMBER D-400-2879-24)



POS	DESCRIPTION	PART/DRAWING NUMBER
1	TABLETOP CHAIN	OO7-1815-0325
2	DRIVE/IDLER SPROCKET	OO8-0449-0193
3	TABLETOP CHAIN W/VUL. TOP	OO7-OSSE-0815
4	BOTTOM WEARSTRIP	OOT-4320-0010
5	TOP WEARSTRIP	OOT-4320-0011
6	IDLER SHAFT	C-400-2624-15-24
7	FLANGE BEARING	OO1-0015-0000
8	SET COLLAR	OO9-0001-0030
9	JUMPER SPROCKET	SEE MOTOR SHEET
10	JUMPER SHAFT	C-400-2624-16-24
11	MAGNET	OOD-2331-0000
12	PIVOT SIDE GUIDE	B-400-2819-6

BREAD CONVEYOR

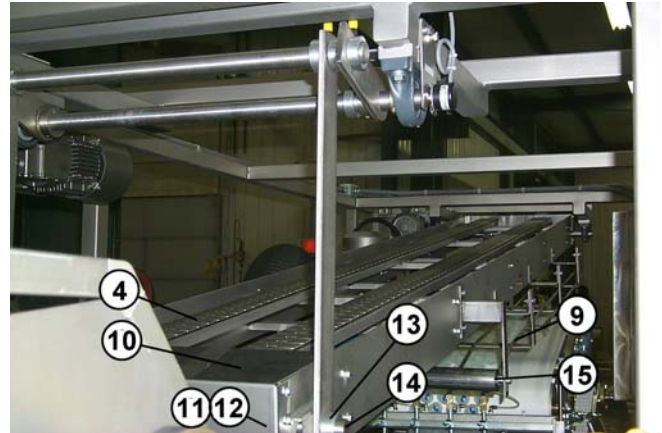
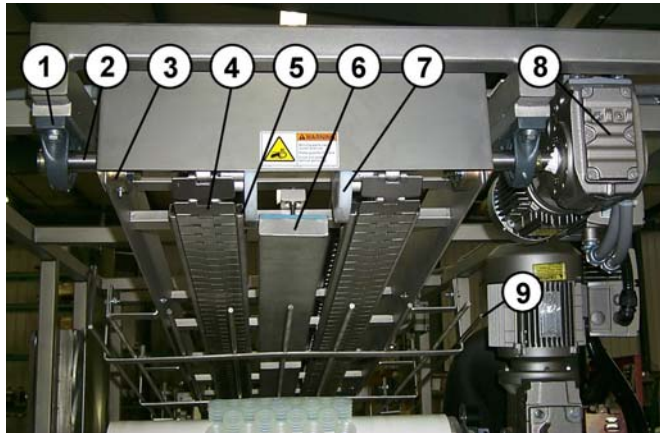
(DRAWING NUMBER D-400-2873-24)



POS	DESCRIPTION	PART/DRAWING NUMBER
1	MAGNETS	OOD-2331-0000, OOD-1502-0275
2	TOP WEARSTRIP	OOT-4320-0011
3	BOTTOM WEARSTRIP	OOT-4320-0010
4	FLANGE BEARING	OO1-0015-0000
5	DRIVE SHAFT MODEL 2000	C-400-3200-24
6	DRIVE/IDLER SPROCKET	OO8-0449-0193
7	TABLETOP CHAIN	OO7-1815-0325
8	MOTOR	SEE MOTOR SHEET

DELIDDER CONVEYOR

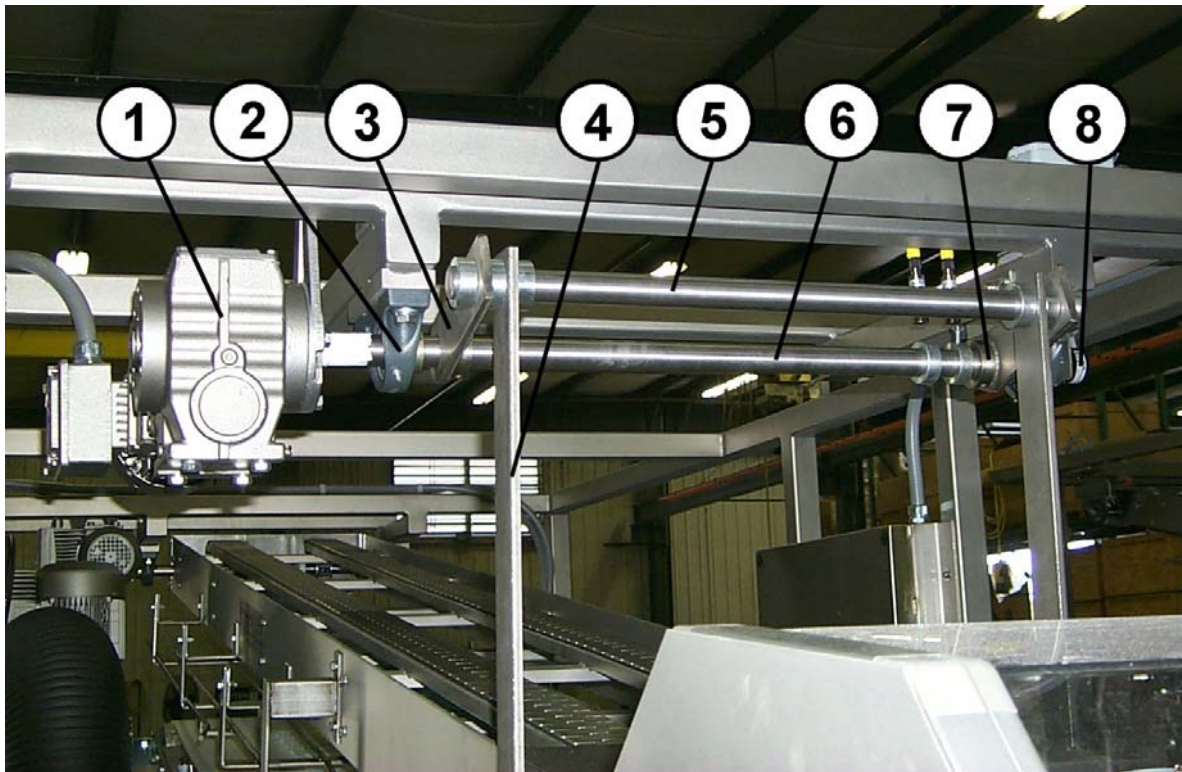
(DRAWING NUMBER D-400-2953)



POS	DESCRIPTION	PART/DRAWING NUMBER
1	PILLOW BLOCK BEARING	OO1-0015-PBLK
2	DRIVE SHAFT FOR KA37	B-400-2953-7B
3	FLANGE BEARING	OO1-0015-0000
4	TABLE TOP CHAIN	OO7-1881-0325
5	WEARSTRIP	OOT-4320-0002
6	MAGNET	#BM703HD
7	DRIVE SPROCKET	A-400-1638
8	MOTOR	SEE MOTOR SHEET
9	SAFETY RACK	C-400-1494-24
10	TAIL GUARD	B-400-2953-10
11	IDLER SPROCKET (INSIDE GUARD)	A-400-1637
12	INSERT BEARING (INSIDE GUARD)	OO1-0012-0000
13	SET COLLAR	OO9-0001-0030
14	TAIL SHAFT	C-010-0004-55
15	SAFETY ROLLER ASSEMBLY	B-400-1258-24

DELIDDER HEIGHT ADJUSTMENT

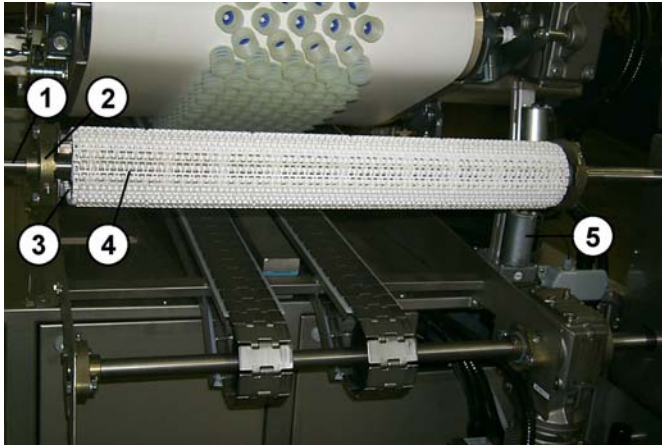
(DRAWING NUMBER C-400-2688-24)



POS	DESCRIPTION	PART/DRAWING NUMBER
1	GEARMOTOR	SEE MOTOR SHEET
2	PILLOW BLOCK BEARING	OO1-0015-PBLK
3	LIFT ARM	B-400-2797-2
4	CONNECTING ARM	A-400-0758-2-565
5	ROUND BAR	O11-0030-0000
6	DRIVE SHAFT	B-400-2798-24
7	SHAFT COLLAR	OO9-0001-0030
8	BUTTERFLY MOUNT ROTARY PULSE GENERATOR	#4211000

PRODUCT DISCHARGE CONVEYOR

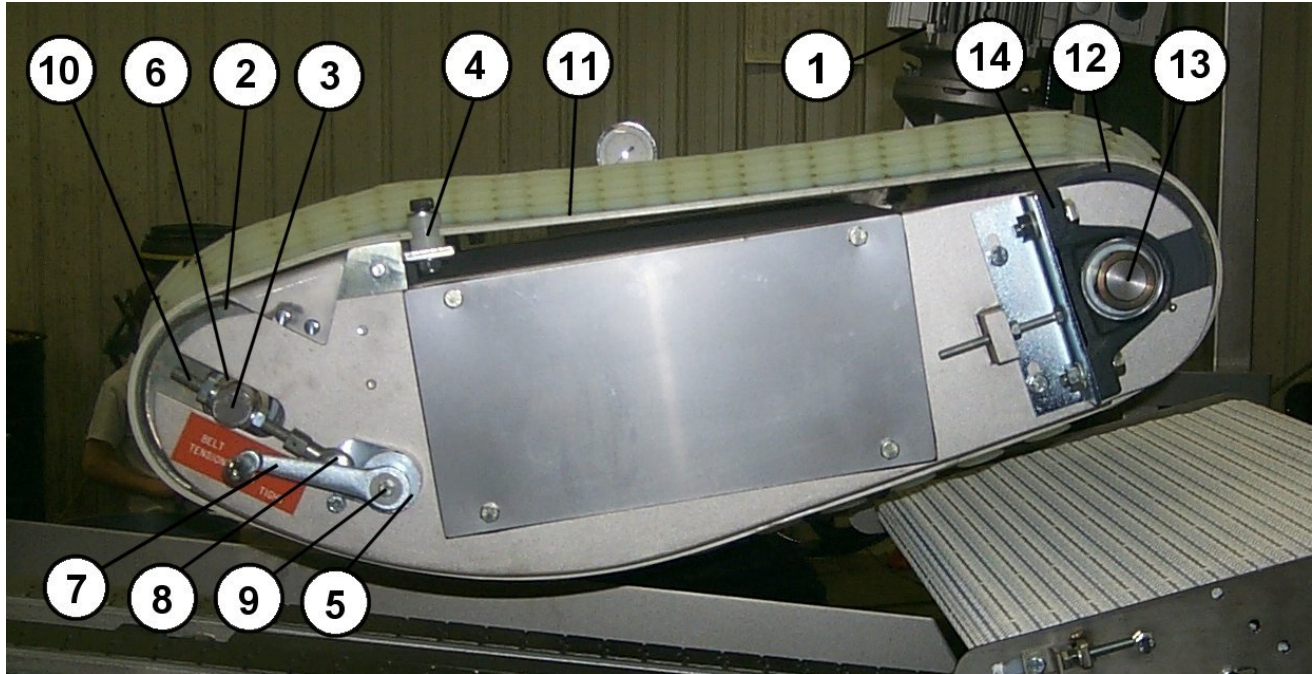
(DRAWING NUMBER C-400-2517-24)



POS	DESCRIPTION	PART/DRAWING NUMBER
1	DRIVE SHAFT	C-400-3190-24
2	FLANGE BEARING	OO1-0015-0000
3	INTRALOX SPROCKET	OO9-INLX-15SB
4	FLUSH GRID FRICTION TOP	OOD-INLX-BT24
5	ACTUATOR	OOD-ELEC-ACTR
6	PIVOT ARM	A-400-2415
7	IDLER ROLLER	OOD-4002-7591
8	TAKE-UP ANGLE	A-400-2421
9	NOSE BAR	OOD-2501-0024
	DRIVE SPROCKET (NOT SHOWN)	SEE MOTOR SHEET

VACUUM CHAMBER ASSEMBLY

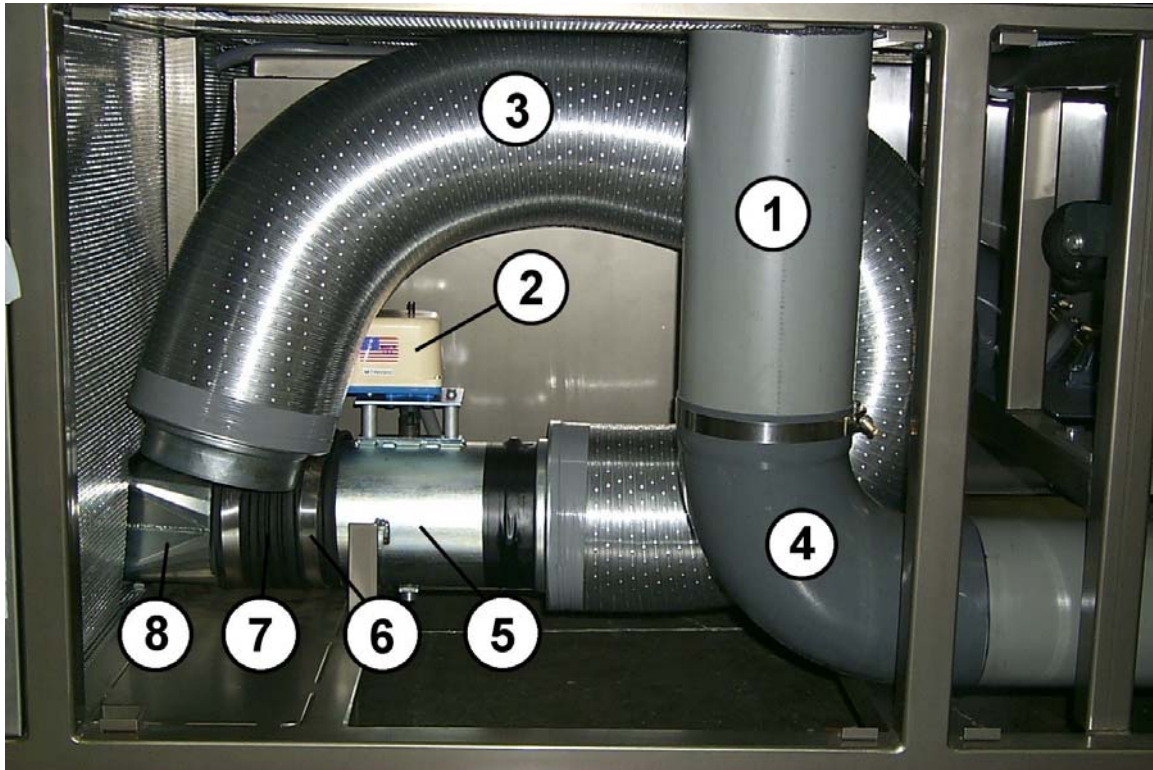
(DRAWING NUMBER D-400-2548-24)



POS	DESCRIPTION	PART/DRAWING NUMBER
1	MOTOR	SEE MOTOR SHEET
2	TAIL PULLEY	OOD-0015-0004
3	TAIL SHAFT	OOD-4000-4530
4	GUIDE ROLLER	OOD-4502-0000
5	FLANGE BUSHING	OO1-SF32-4012
6	RADIAL BEARING	OO1-0012-0000
7	CRANK HANDLE	O27-1000-0006
8	PIVOT ARM	OOD-4000-4551
9	PIVOT SHAFT	OOD-4000-4560
10	ADJUSTMENT SCREW	OOD-4000-4571
11	VACUUM BELT	SEE VACUUM BELT CUPS & RETAINERS
12	VACUUM CHAMBER DRIVE PULLEY	OOD-2530-0024
13	DRIVE SHAFT KA47	B-400-2432-24
14	PILLOW BLOCK BEARING	OO1-0015-PBLK

VACUUM DUCTS

(DRAWING NUMBER 400-0936)



POS	DESCRIPTION	PART/DRAWING NUMBER
1	STRAIGHT PIPE, PVC 200 MM	OOD-4359-0200
2	ELECTRIC ACTUATOR	OOD-ELEC-ACTR
3	AIR DUCT	OOD-3814-0000
4	90° ELBOW, PVC 200 MM	OOD-3821-0000
5	VACUUM DAMPER VALVE ASSEMBLY	OOD-4000-2446
6	HOSE CLAMP	OOD-5000-C511
7	FLEXHAUST HOSE	OOD-FLEX-0008
8	TRANSITION	OOD-3815-0000

VACUUM BELT CUPS & RETAINERS

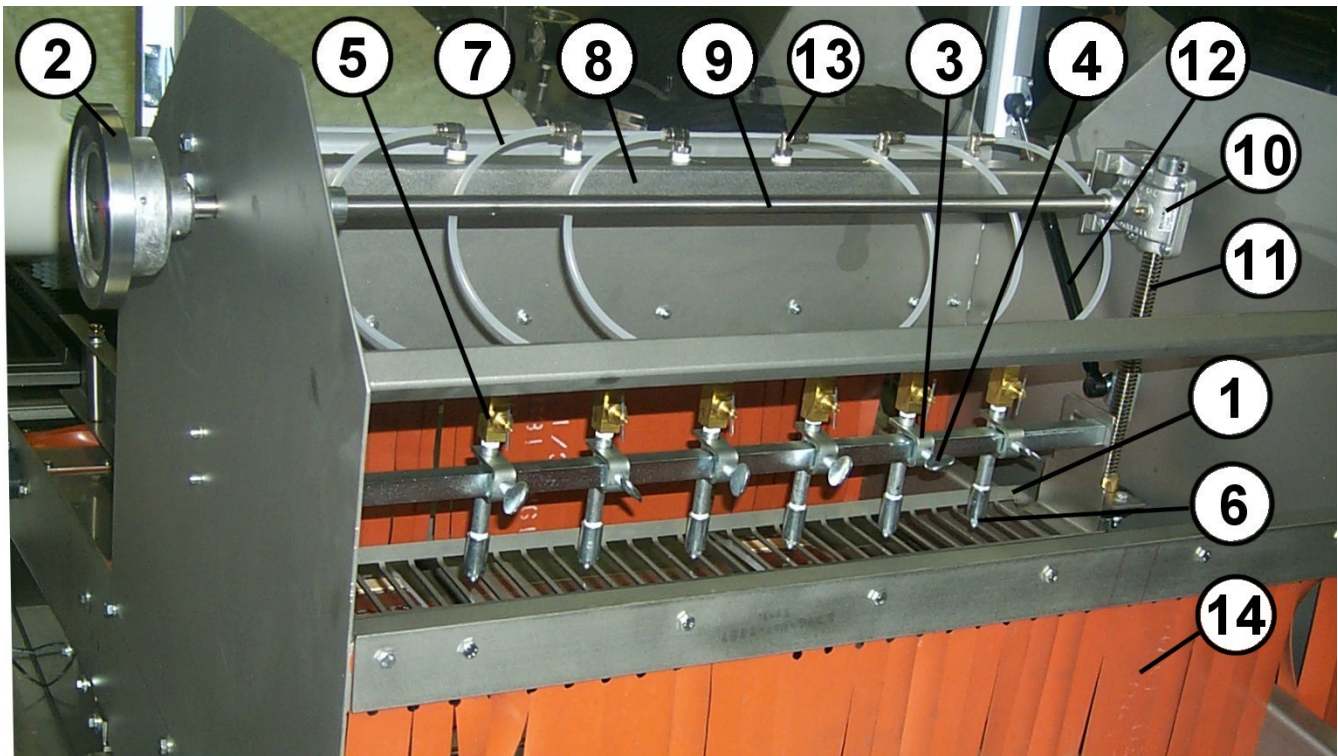
(DRAWING NUMBER A-400-1091)



POS	DESCRIPTION	PART/DRAWING NUMBER
	VACUUM BELT	#3M1604 660W x 1860L 310 HOLES
	VACUUM CUP	OOD-3512-0002 40 MM DIA. STANDARD
	RETAINER	OOD-3513-0003 3/8" B.

SEED CONTAINMENT UNIT W/AIR JETS

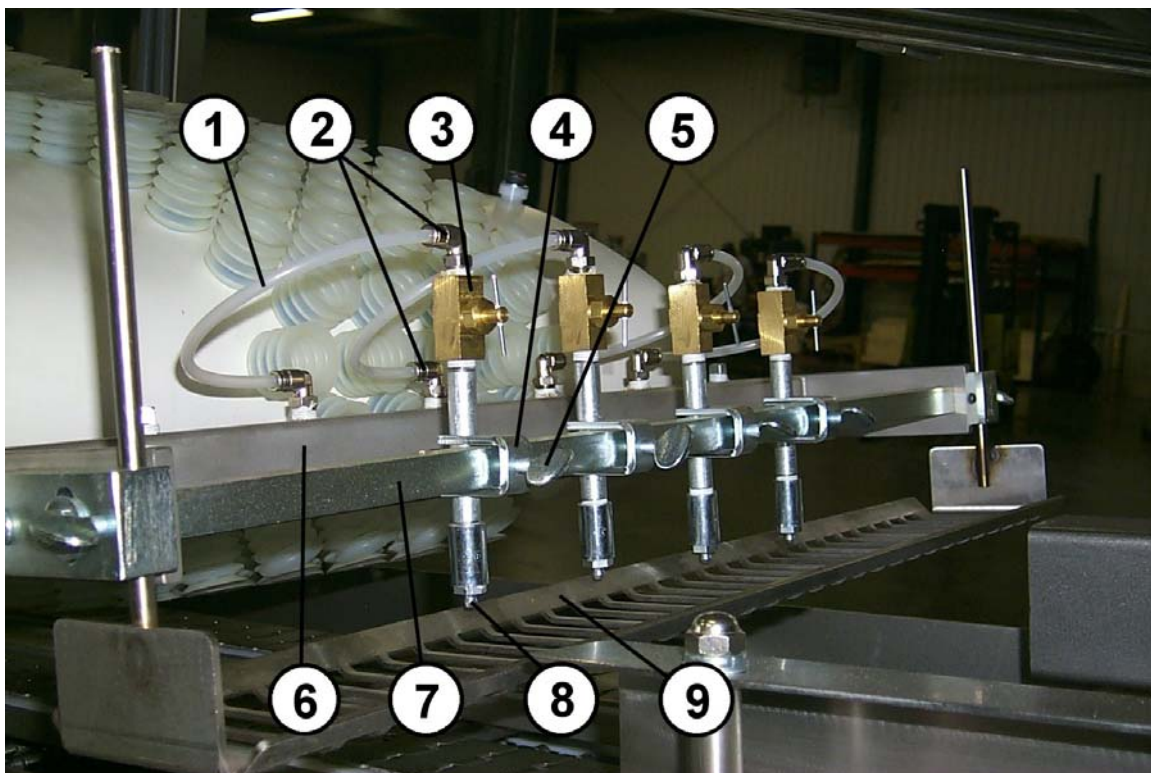
(DRAWING NUMBER D-400-2994-24)



POS	DESCRIPTION	PART/DRAWING NUMBER
1	HOLD DOWN GRILL	B-400-2997-24
2	MODIFIED HANDWHEEL	A-400-2687
3	AIR NOZZLE MOUNTING BRACKET	OOD-4000-5841
4	THUMBSCREW	M8 x 12L
5	NEEDLE VALVE	A852-0002
6	GREASE FITTING	A862-0015
7	ROUND AIR TUBING	A854-0003
8	AIR NOZZLE MOUNTING BLOCK	OOD-4000-5851
9	HANDWHEEL SHAFT	B-400-2375-24
10	FLOAT-A-SHAFT MOUNT	B-400-2996-24
11	ADJUSTING ROD	A-400-2586
12	GAS SPRINGS	#FT-GA-1220
13	90° ELBOW ADAPTER	A856-0002
14	RUBBER CURTAIN ASSEMBLY	B-400-2587-24

AIR JETS ASSEMBLY

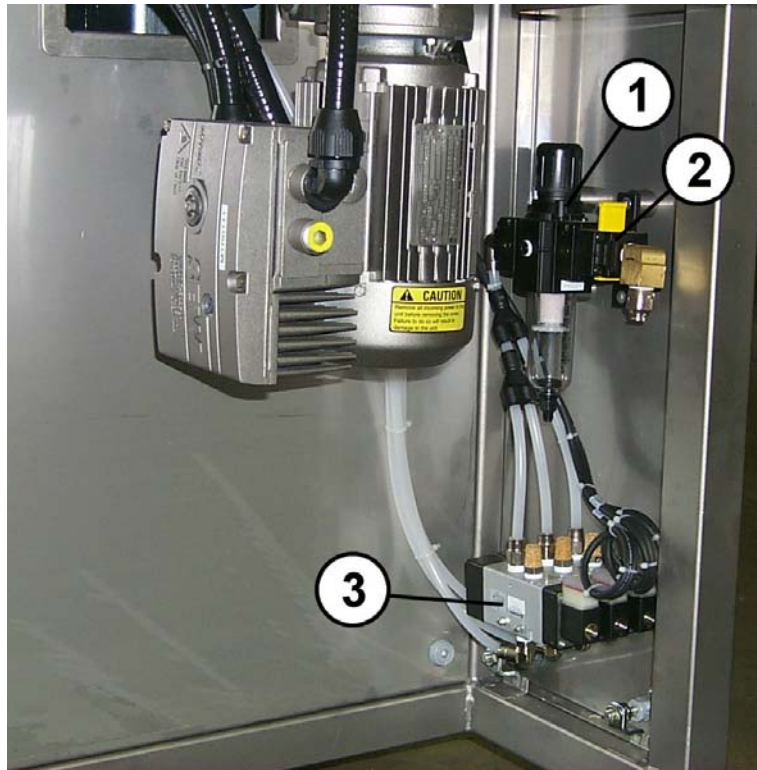
(DRAWING NUMBER C-400-2545-24)



POS	DESCRIPTION	PART/DRAWING NUMBER
1	ROUND AIR TUBING	A854-0003
2	90° ELBOW ADAPTER	A856-0002
3	NEEDLE VALVE	A852-0002
4	AIR NOZZLE MOUNTING BRACKET	OOD-400-5841
5	THUMBSCREW	M8 X 12L
6	AIR NOZZLE SUPPORT L.H.C.	C-400-0582-24
7	MOUNTING BLOCK	OOD-4000-5851
8	GREASE FITTING	A862-0015
9	HOLD DOWN GRILL	OOD-4004-0000

AIR CONTROL

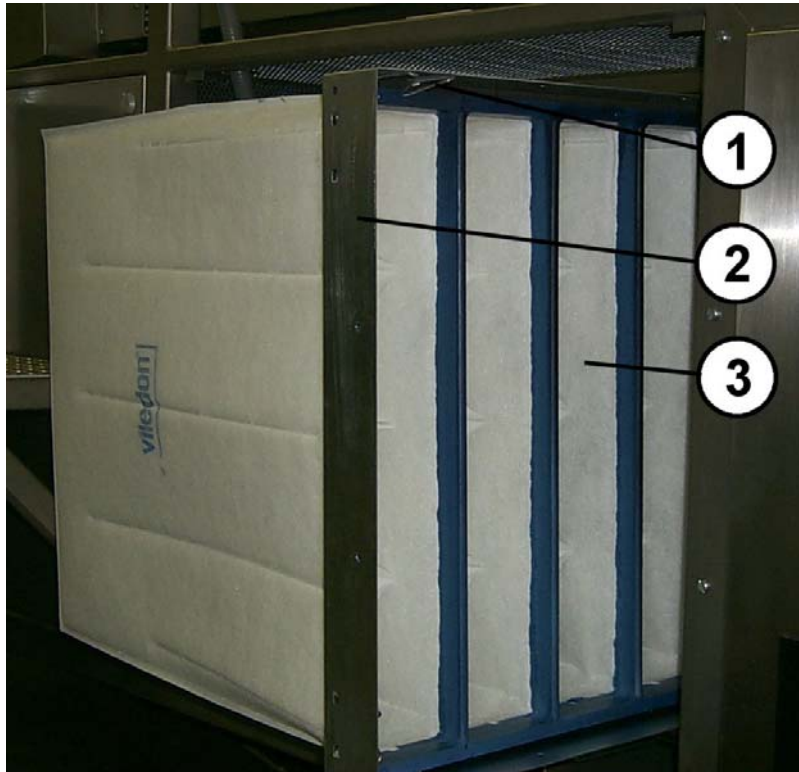
(DRAWING NUMBER B-400-2744)



POS	DESCRIPTION	PART/DRAWING NUMBER
1	FILTER REGULATOR W/GAGE	#B73G-3AK-QT1-RMG NORGREN
2	LOCKOUT VALVE	#T73E-4AA-PIN NORGREN
3	SOLENOID VALVE	#V62S417AA313JA NORGREN

FILTER ASSEMBLY

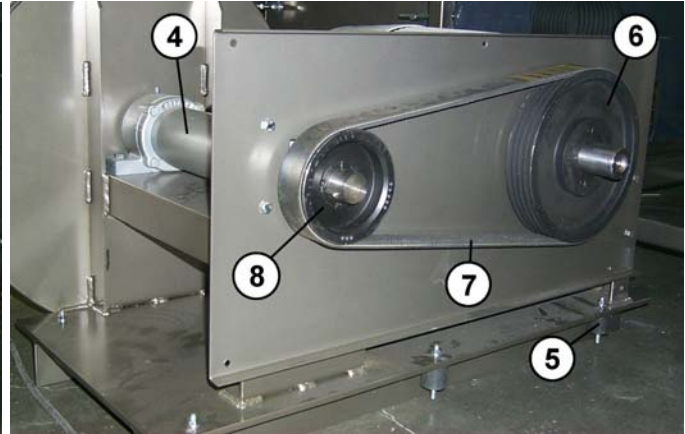
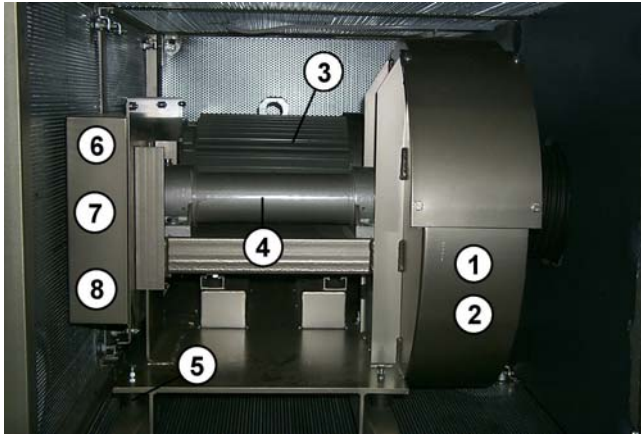
(DRAWING NUMBER 400-0936)



POS	DESCRIPTION	PART/DRAWING NUMBER
1	FILTER CLIP	OOD-3811-0001
2	FILTER FRAME	OOD-3812-0000
3	FILTER	OOD-3811-0000

BLOWER ASSEMBLY

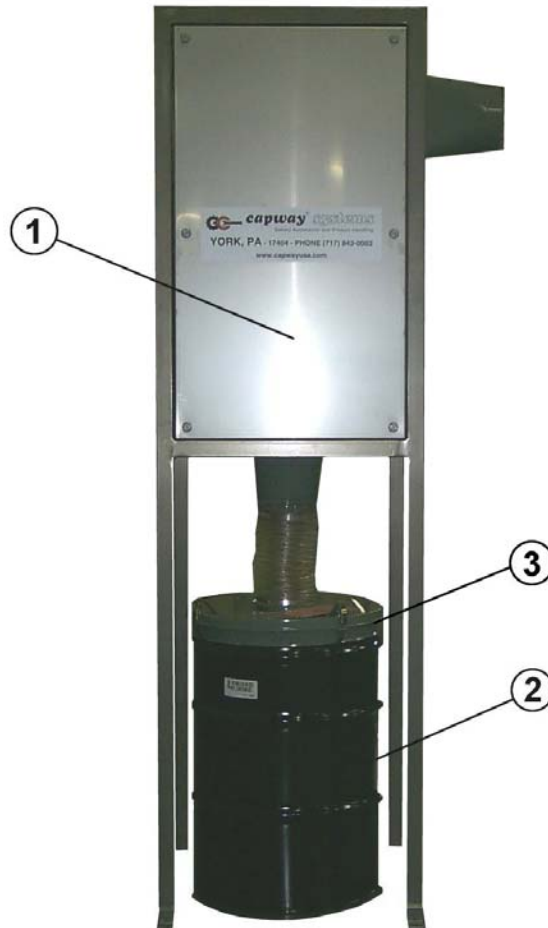
(DRAWING NUMBER D-400-2050-2)



POS	DESCRIPTION	PART/DRAWING NUMBER
1	BLOWER WELDMENT	OOD-4000-000L
2	FAN WHEEL (INSIDE GUARD)	OOD-4000-0001
3	BLOWER MOTOR	SEE MOTOR SHEET
4	BLOWER SHAFT ASSEMBLY #BLV40	OOD-4000-BLV4
5	VIBRATION DAMPER	OOD-4000-0005
6	TAPERLOCK SHEAVE MOTOR	OOD-0003-V690
7	TORQUE TEAM V-BELT	OOD-VBLT-0560
8	TAPERLOCK SHEAVE BLOWER	OOD-0003-V450

CYCLONE SEPARATOR

(DRAWING NUMBER C-400-0567-2)



POS	DESCRIPTION	PART/DRAWING NUMBER
1	CYCLONE SEPARATOR (BEHIND PANELS)	OOD-DEPA-CYCL #203S-D1-SP
2	55 GALLON DRUM	#4115T7 McMASTER CARR
3	BARREL LID RING	B-400-2079