

Attachment A

MODIFIED DOOR SCHEDULE

(ALTERNATE BID ITEM #3)

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Attachment A: **Modified** Door and Frame Schedule ~ Use for **Base Bid**.

Door No.	Room		Door			
	From	To	Nominal	Type	Mat'l	Fin
First Floor						
First Floor Fire Station						
001	STAIR 1	ARCADE	3'-0" X 6'-8"	001	Alum	AD
002	FIRE STATION	EXTERIOR	3'-0" X 6'-8"	001	Alum	AD
101a	FIRE STATION	EXTERIOR	13'-0 X 13'10"	009	Alum	AD
101b	FIRE STATION	EXTERIOR	13'-0 X 13'10"	009	Alum	AD
101c	FIRE STATION	EXTERIOR	13'-0 X 13'10"	009	Alum	AD
102	FIRE STATION	STORAGE	2'-6" X 8'-0" (Pair)	005	FRP	MFR
103	RESTROOM	FIRE STATION	3'-0" X 6'-8"	003	FRP	MFR
104	FIRE STATION	LAUNDRY	3'-0" X 6'-8"	003	FRP	MFR
Public Restrooms						
105a	EXTERIOR	WOMENS	3'-0" X 6'-8"	003	FRP	MFR
105b	WOMENS	STALL	2'-8" X 5'-0"	006	FRP	MFR
105c	WOMENS	STALL	2'-8" X 5'-0"	006	FRP	MFR
105d	WOMENS	STALL	2'-8" X 5'-0"	006	FRP	MFR
105e	WOMENS	ADA STALL	3'-0" X 5'-0"	007	FRP	MFR
106a	EXTERIOR	MENS	3'-0" X 6'-8"	003	FRP	MFR
106b	MENS	STALL	2'-8" X 5'-0"	006	FRP	MFR
106c	MENS	ADA STALL	3'-0" X 5'-0"	007	FRP	MFR
107	JANITOR	MENS	3'-0" X 6'-8"	003	FRP	MFR
108	JANITOR	WOMENS	3'-0" X 6'-8"	003	FRP	MFR
Second Floor Fire department						
201	LIVING AREA	STAIR	3'-0" X 8'-0"	003	HM	PTD
202	ENTRY	EXTERIOR	3'-0" X 8'-0"	001	ALUM	AD
203	DINING	BALCONY	3'-0" X 8'-6"	002	ALUM	AD
204	DINING	BALCONY	3'-0" X 8'-6"	002	ALUM	AD
205a	DINING	OFFICE	3'-0" X 6'-8"	003	WD	PTD
205b	BEDROOM	OFFICE	3'-0" X 6'-8"	003	WD	PTD
206	DINING	BEDROOM 1	3'-0" X 6'-8"	003	WD	PTD
207	HALLWAY	BEDROOM 2	3'-0" X 6'-8"	003	WD	PTD
208	HALLWAY	BEDROOM 3	3'-0" X 6'-8"	003	WD	PTD
209	HALLWAY	BEDROOM 4	3'-0" X 6'-8"	003	WD	PTD
210	HALLWAY	BEDROOM 5	3'-0" X 6'-8"	003	WD	PTD
211	HALLWAY	BEDROOM 6	3'-0" X 6'-8"	003	WD	PTD
212	JANITOR	HALLWAY	2'-6" X 6'-8" (PAIR)	005	WD	PTD
213	DINING	HALLWAY	3'-0" X 6'-8"	003	WD	PTD
214a	HALLWAY	BATHROOM	3'-0" X 6'-8"	003	WD	PTD
214b	BATHROOM	STALL	3'-0" X 6'-8"	003	WD	PTD
215	BATHROOM	HALLWAY	3'-0" X 6'-8"	003	WD	PTD
216	HALLWAY	LAUNDRY	3'-0" X 6'-8"	003	WD	PTD
217	HALLWAY	ENTRY	3'-0" X 6'-8"	003	WD	PTD
218	EXERCISE ROOM	ENTRY	3'-0" X 8'-0"	003	WD	PTD
219	DATA	ENTRY	3'-0" X 6'-8"	003	WD	PTD
220	STORAGE	EXERCISE ROOM	3'-0" X 6'-8"	003	WD	PTD
221	MECHANICAL	OPEN STORAGE	3'-0" X 8'-0"	003	WD	PTD
222	ELECTRICAL	OPEN STORAGE	3'-0" X 8'-0" (PAIR)	004	WD	PTD
223	OPEN STORAGE	ENTRY	3'-0" X 8'-0"	003	WD	PTD

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Attachment B

ROLL-UP BAY DOORS

(ALTERNATE BID ITEM #4)

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SPIRAL[®] LH[®]-HZ[®]

HIGH PERFORMANCE LOW HEADROOM HURRICANE ZONE DOOR

Low Headroom and High Security Join Forces Against Hurricanes

The Spiral Low Headroom Hurricane Zone Door brings high speed and high security to applications with unique space limitations in high velocity hurricane zones. Whether headroom is severely limited because of low ceilings, joists or other overhead obstructions, the LH-HZ is engineered for all types of low lintel challenges.

Clean lines and a refined structural design give the Spiral LH-HZ door a stylish and high-tech look. With 192 powder coat options, the door can be customized to compliment any color palette. Even without the custom colors, the anodized aluminum slats will not corrode, so you can count on that look to last for many years even under the worst weather conditions, including hurricanes.



Miami-Dade NOA - Certified independent testing and Notice of Acceptance (NOA) from Miami-Dade County Building Code Compliance Office - approved for use in High Velocity Hurricane Zones (HVHZ).

Low Headroom - The low lintel design requires only 11 inches of clearance.

High Security - Rigid, aluminum slat construction and optional integrated locking system provide unparalleled security.

Fast and Smooth - Opens effortlessly at up to 60 inches per second for improved traffic flow and greater access control. Counterbalance incorporates custom-engineered springs without bungee cords.

Lower Energy Costs - The fast opening and closing speeds minimize the air exchanged between climate controlled environments. A durable rubber membrane covers the reinforced hinges providing a tight seal.

Quiet Operation - The high performance technology and low headroom angled track offer a quiet and unobtrusive operation.

Total Digital Control - The highly advanced System 4™ door controller enables precise door positioning, infinite speed adjustments and total control of all door functions.



SPIRAL[®] LH[®]-HZ[®]

HIGH PERFORMANCE LOW HEADROOM HURRICANE ZONE DOOR

Model Name

- Rytec[®] Spiral[®] LH[®]-HZ[®] Door

Certification

- Spiral SSN-HZ
Miami-Dade, Florida NOA No. 08-1024.03, 11/8/2012
Florida Building Code: FL# FL6833

Size and Dimensions

- Up to 16'W x 16'H
- Multiple door configurations based on door size.

Safety

- Thru-beam photo eyes
- Control-reliable electronic reversing edge

Warranty

- One year limited warranty on materials and workmanship.

Hurricane Tested



Heavy-duty panel built to withstand missile impacts in high velocity wind zones.

- Rytec hurricane doors are independently tested and certified to withstand missile impacts in high velocity wind zones.
- Certified to withstand hurricane force winds of up to 149 mph.

Unique Track Design

- Special track design allows you to fit the low headroom door in areas with as little as 11 inches of clearance above door opening.
- Compact, variable speed motor with soft acceleration and deceleration and braking for smooth starts and stops.

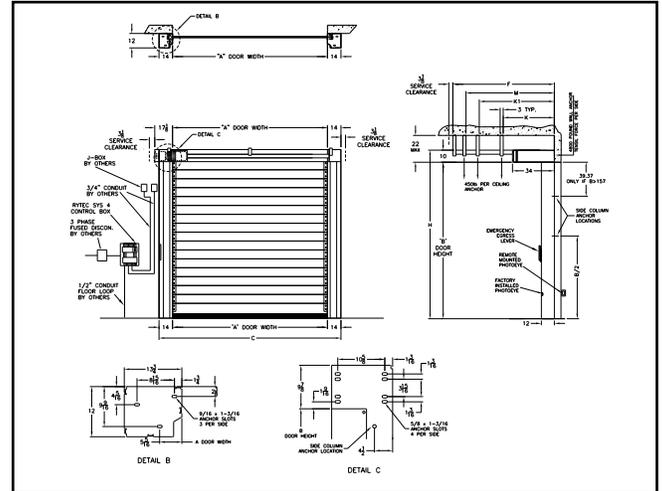


Electrical Controls



System 4 shown with optional rotary disconnect

- System 4™ controller housed in a NEMA 4X rated enclosure with factory set parameters.
- Intelligent processor monitors and controls power consumption.
- Advanced self-diagnostics for troubleshooting.



Panel Design

- Integral rubber weatherseal between the slats provides a tight weatherseal across the entire panel.
- Rubber weatherseal is replaceable for easy maintenance.
- Patented hinge design allows for removal and replacement of single slat without disassembling the door panel.



Integral rubber weatherseal

Counterbalance System

- Up to six extension springs in each side column, depending on the size of the door.
- The springs assist the motor in opening, reducing motor wear and increasing the longevity of mechanical components.
- Mechanical egress lever on the side column allows the door to be opened in the event of a power failure.

Travel Speed

- Opens at up to 60 inches per second.



888-GO-RYTEC RytecDoors.com
Tel 262-677-9046 Fax 262-677-2058
One Cedar Parkway Jackson, WI 53037-0403



DEPARTMENT OF REGULATORY AND ECONOMIC RESOURCES (RER)
BOARD AND CODE ADMINISTRATION DIVISION
NOTICE OF ACCEPTANCE (NOA)

MIAMI-DADE COUNTY
PRODUCT CONTROL SECTION
11805 SW 26 Street, Room 208
Miami, Florida 33175-2474
T (786) 315-2590 F (786) 315-2599
www.miamidade.gov/economy

Rytec Corporation
One Cedar Parkway
Jackson, WI 53037

SCOPE:

This NOA is being issued under the applicable rules and regulations governing the use of construction materials. The documentation submitted has been reviewed and accepted by Miami-Dade County RER-Product Control Section to be used in Miami Dade County and other areas where allowed by the Authority Having Jurisdiction (AHJ).

This NOA shall not be valid after the expiration date stated below. The Miami-Dade County Product Control Section (In Miami Dade County) and/or the AHJ (in areas other than Miami Dade County) reserve the right to have this product or material tested for quality assurance purposes. If this product or material fails to perform in the accepted manner, the manufacturer will incur the expense of such testing and the AHJ may immediately revoke, modify, or suspend the use of such product or material within their jurisdiction. RER reserves the right to revoke this acceptance, if it is determined by Miami-Dade County Product Control Section that this product or material fails to meet the requirements of the applicable building code.

This product is approved as described herein, and has been designed to comply with the Florida Building Code, including the High Velocity Hurricane Zone.

DESCRIPTION: Model Spiral HZ Aluminum Roll-up Door up to 16'-0" Wide

APPROVAL DOCUMENT: Drawing No. **9B963-R5**, titled "Spiral Rollup Door, Model Spiral HZ", Sheets 1 through 4 of 4, dated 10/02/2006, with revision dated 07/27/2012, prepared by HR Engineering, Inc, signed and sealed by Allen N. Reeves, P.E., bearing the Miami-Dade County Product Control renewal stamp with the Notice of Acceptance number and expiration date by the Miami-Dade County Product Control Section.

MISSILE IMPACT RATING: Large and Small Missile Impact Resistant

LABELING: A permanent label with the manufacturer's name or logo, city, state, model/series number, the positive and negative design pressure rating, indicate impact rated if applicable, installation instruction drawing reference number, approval number (NOA), the applicable test standards, and the statement reading 'Miami-Dade County Product Control Approved' is to be located on the door's side track, bottom angle, or inner surface of a panel.

RENEWAL of this NOA shall be considered after a renewal application has been filed and there has been no change in the applicable building code negatively affecting the performance of this product.

TERMINATION of this NOA will occur after the expiration date or if there has been a revision or change in the materials, use, and/or manufacture of the product or process. Misuse of this NOA as an endorsement of any product, for sales, advertising or any other purposes shall automatically terminate this NOA. Failure to comply with any section of this NOA shall be cause for termination and removal of NOA.

ADVERTISEMENT: The NOA number preceded by the words Miami-Dade County, Florida, and followed by the expiration date may be displayed in advertising literature. If any portion of the NOA is displayed, then it shall be done in its entirety.

INSPECTION: A copy of this entire NOA shall be provided to the user by the manufacturer or its distributors and shall be available for inspection at the job site at the request of the Building Official.

This NOA **renews NOA # 10-0913.03** and consists of this page 1 and evidence page E-1, as well as approval document mentioned above.

The submitted documentation was reviewed by **Carlos M. Utrera, P.E.**



[Signature]
11/27/2012

NOA No. 12-0917.05
Expiration Date: November 8, 2017
Approval Date: December 6, 2012
Page 1

NOTICE OF ACCEPTANCE: EVIDENCE SUBMITTED

A. DRAWINGS

1. Drawing No. **9B963-R5**, titled "Spiral Rollup Door, Model Spiral HZ", Sheets 1 through 4 of 4, dated 10/02/2006, with revision dated 07/27/2012, prepared by HR Engineering, Inc, signed and sealed by Allen N. Reeves, P.E.

B. TESTS

1. Test report on Forced Entry Resistance Test per FBC, TAS 202-94 of a Model SST-S Roll up Door, prepared by Architectural Testing, Inc., Test Report No. **C1821.01-602-18**, dated 09/04/2012, signed and sealed by Shawn G. Collins, P.E.

"Submitted under NOA # 06-1017.07"

2. Test report on Large Missile Impact Test per FBC, TAS 201-94, Cyclic Wind Pressure Test per FBC, TAS 203-94 and Uniform Static Air Pressure Test per FBC, TAS 202-94 of Series/ Model Spiral-HZ overhead doors, prepared by ETC Laboratories, Test Report No. **ETC-05-844-16366.0**, dated 04/17/2006, signed and sealed by Joseph Labora Doldan, P.E.
3. Test report on Smoke Density per ASTM D2843, Rate of Burning per ASIM D 635 and Self Ignition per ASTM D 1929 of door plastic materials, prepared by ETC Laboratories, Test Report No. **ETC-06-844-17497.1**, dated 05/09/2006, signed and sealed by Joseph Labora Doldan, P.E.
4. Test report on Tension per ASTM E8, of door aluminum skin, prepared by ETC Laboratories, Test Report No. **ETC-06-844-17585.0**, dated 05/08/2006, signed and sealed by Joseph Labora Doldan, P.E.

C. CALCULATIONS *"Submitted under NOA # 08-1024.03"*

1. Calculations for Roll-up Door, Spiral SST-HZ, prepared HR Engineering, Inc, dated 10/31/2008, sheets 1 through 5, signed and sealed by Allen N. Reeves, P.E.

D. QUALITY ASSURANCE

1. Miami-Dade Department of Regulatory and Economic Resources (RER)

E. MATERIAL CERTIFICATIONS

1. Notice of Acceptance No. **11-0926.07**, issued to Dyplast Products LLC, for their Expanded Polystyrene Block Type Insulation, approved on 11/10/2011 and expiring on 01/11/2017.

F. STATEMENTS

1. Statement letter of code conformance to 2010 FBC issued by HR Engineering, Inc., dated 07/30/2012, signed and sealed by Allen N. Reeves, P.E.
2. Statement letter of no financial interest issued by HR Engineering, Inc., dated 07/27/2012, signed and sealed by Allen N. Reeves, P.E.



11/27/2012

Carlos M. Utrera, P.E.

Product Control Examiner

NOA No. 12-0917.05

Expiration Date: November 8, 2017

Approval Date: December 6, 2012

GENERAL NOTES

1) THE RYTEC SPIRAL DOOR SHOWN ON THIS PRODUCT APPROVAL DOCUMENT HAS BEEN DESIGNED IN ACCORDANCE WITH THE FLORIDA BUILDING CODE 2010. REQUIRED DESIGN WIND LOADS SHALL BE DETERMINED AS PER SECTION 1620 OF THE FBC, AND IN ACCORDANCE WITH ASCE 7-10 STANDARD.

THE SPIRAL DOOR'S ADEQUACY FOR IMPACT AND FATIGUE RESISTANCE HAS BEEN VERIFIED IN ACCORDANCE WITH SECTION 1626 OF THE FBC PER PROTOCOLS TAS-201, TAS-202, & TAS-203 STANDARDS.

MAXIMUM DESIGN PRESSURE ARE +50.0, -50.0 PSF.

2) PANEL SLATS TO BE EXTRUDED ALUMINUM ALMgSi0.5 F-22 (6063-T6). 0.07 NOMINAL WALL THICKNESS, CLEAR ANNOXIDIZED WITH A MINIMUM YIELD STRENGTH 25KSI.

3) SIDE COLUMNS TO BE 11 GAGE GALVANIZED STEEL ASTM A-446 WITH A GALVANIZED COATING OF G90.

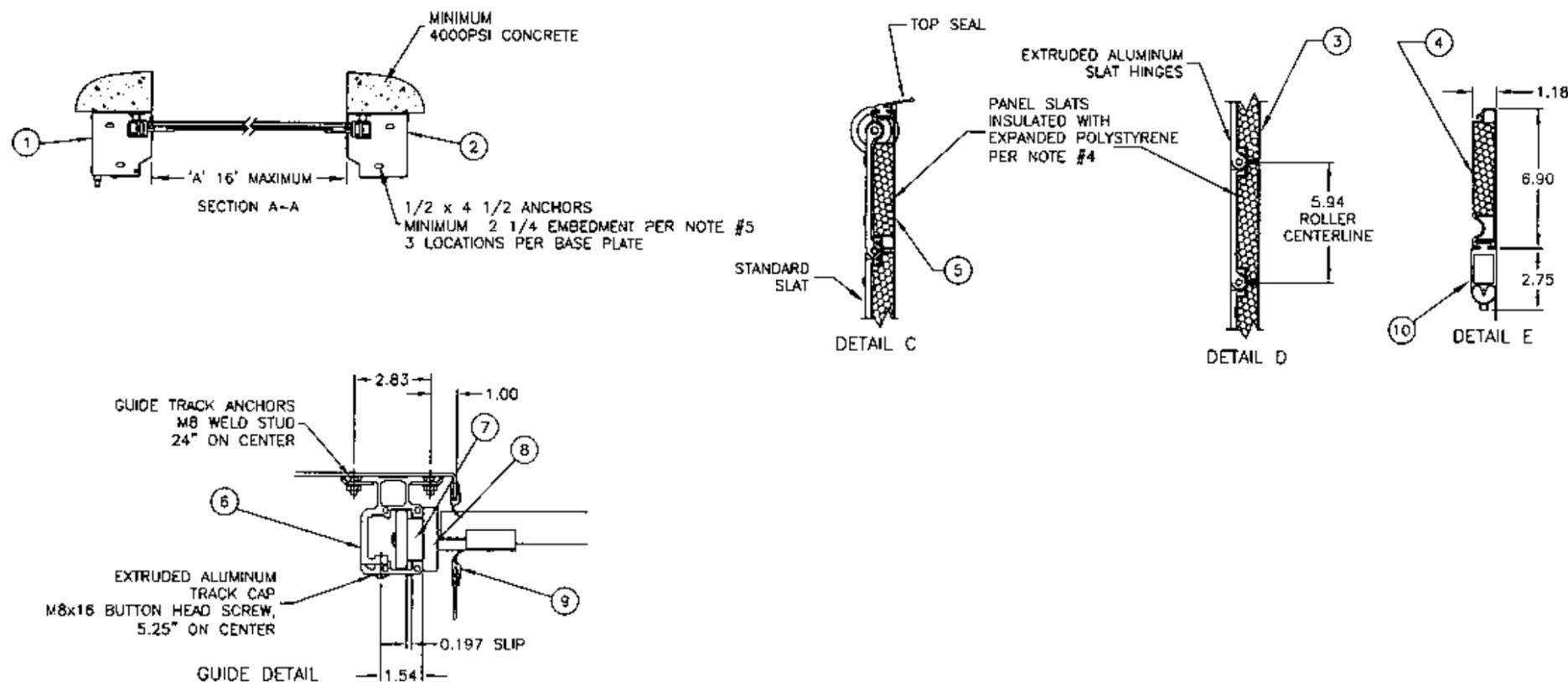
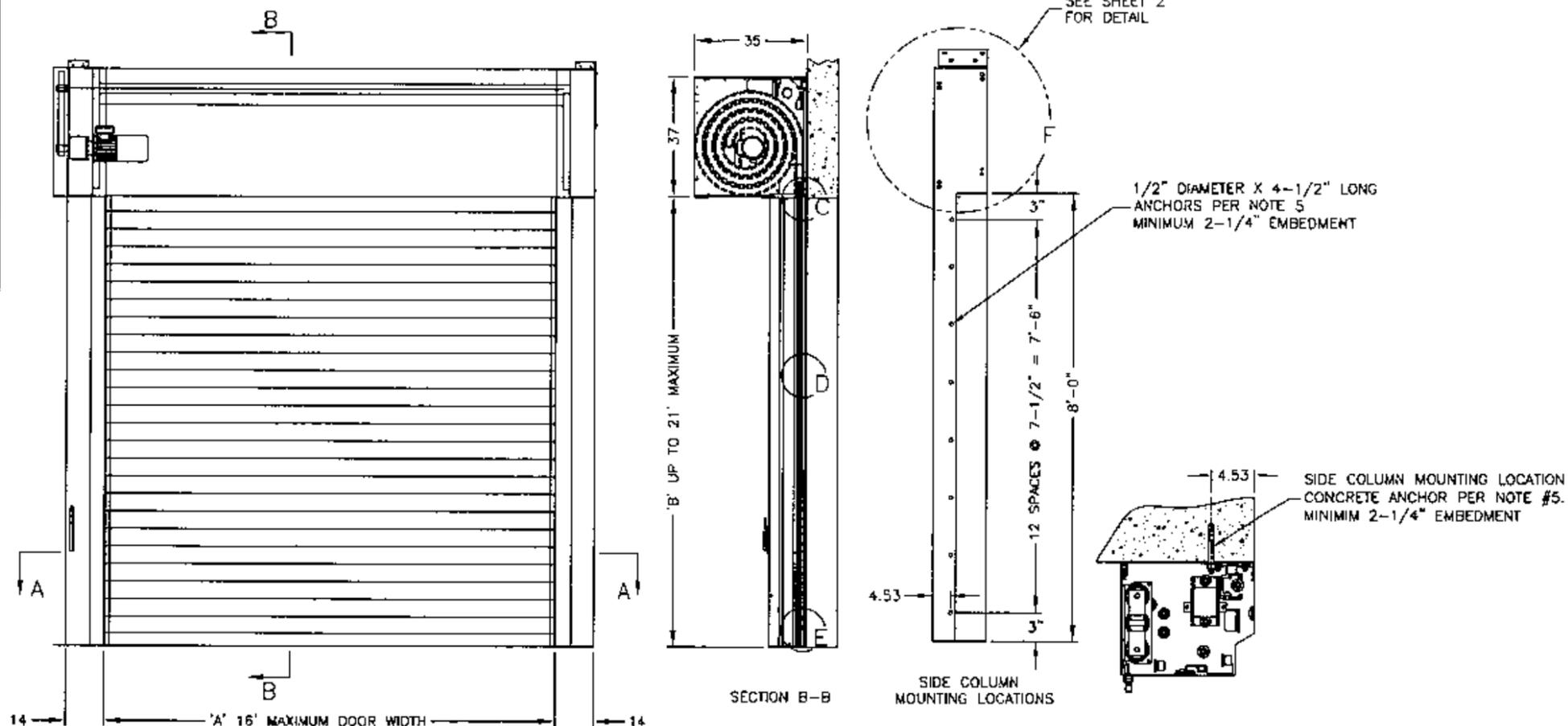
4) OPTIONAL PANEL SLAT INSULATION TO BE EPS - EXPANDED POLYSTYRENE FOAM. MANUFACTURED BY MIAMI-DADE APPROVED DYNAPLAST PRODUCTS.

5) CONCRETE ANCHORS TO BE 1/2" DIAMETER x 4-1/2" LONG RED HEAD ITW TRUBOLT WEDGE OR HILTI KWIK BOLT II EXPANSION ANCHORS, AND SHALL BE INSTALLED FOLLOWING ALL OF THE RECOMMENDATIONS AND SPECIFICATIONS OF THE ANCHOR MANUFACTURER. ANCHORS TO BE INSTALLED IN MINIMUM 4000PSI CONCRETE.

6) IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THAT THE EXISTING STRUCTURE IS DESIGNED TO SUPPORT V_x AND V_y FORCES AT BOTH JAMBS. MAX $V_x=1650\text{LB/FT}$ AND MAX $V_y = 400\text{LB/FT}$

7) FOR DOOR HEIGHTS OTHER THEN 8'-0", CONCRETE ANCHOR SPACING TO BE A MAXIMUM OF 7'-1/2", BEGINNING AT 3" FROM SILL AND HEAD.

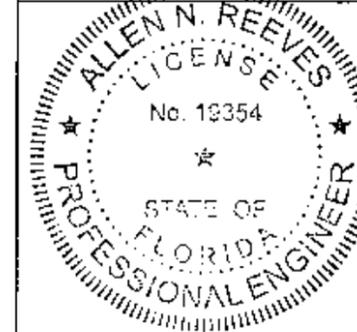
B) ALL DIMENSIONS ON DRAWING WITHOUT INDICATORS ARE IN INCHES.



Manufacturer:
RYTEC CORPORATION
 ONE CEDAR PARKWAY
 JACKSON, WI 53037
 PH:262-677-9046
 FX:262-677-2058
 www.rytecdors.com

Product:
 SPIRAL ROLLUP DOOR
 MODEL: SPIRAL HZ

Engineering:
HR Engineering, Inc.
 1541 East Market St.
 YORK, PA 17403
 PH:717-846-3747
 FX:717-846-0355
Allen N. Reeves
 11 SEPTEMBER 2012
 Allen N. Reeves, P.E.
 Structural Engineer
 Florida License #19354



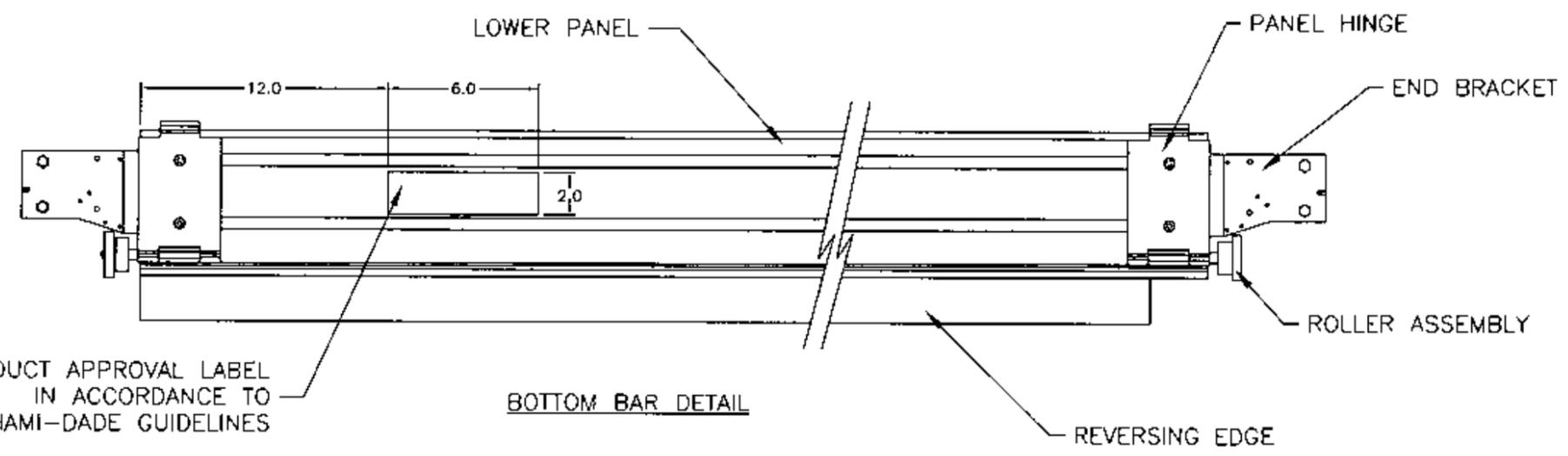
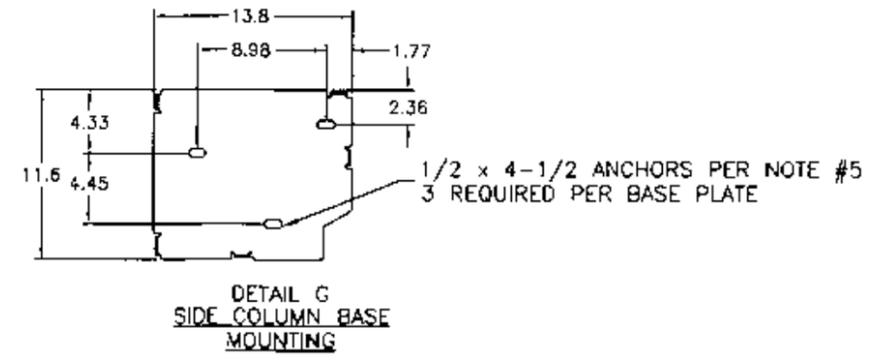
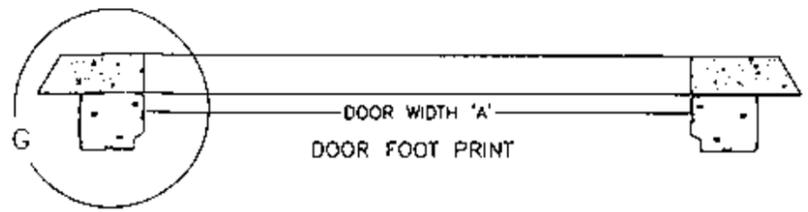
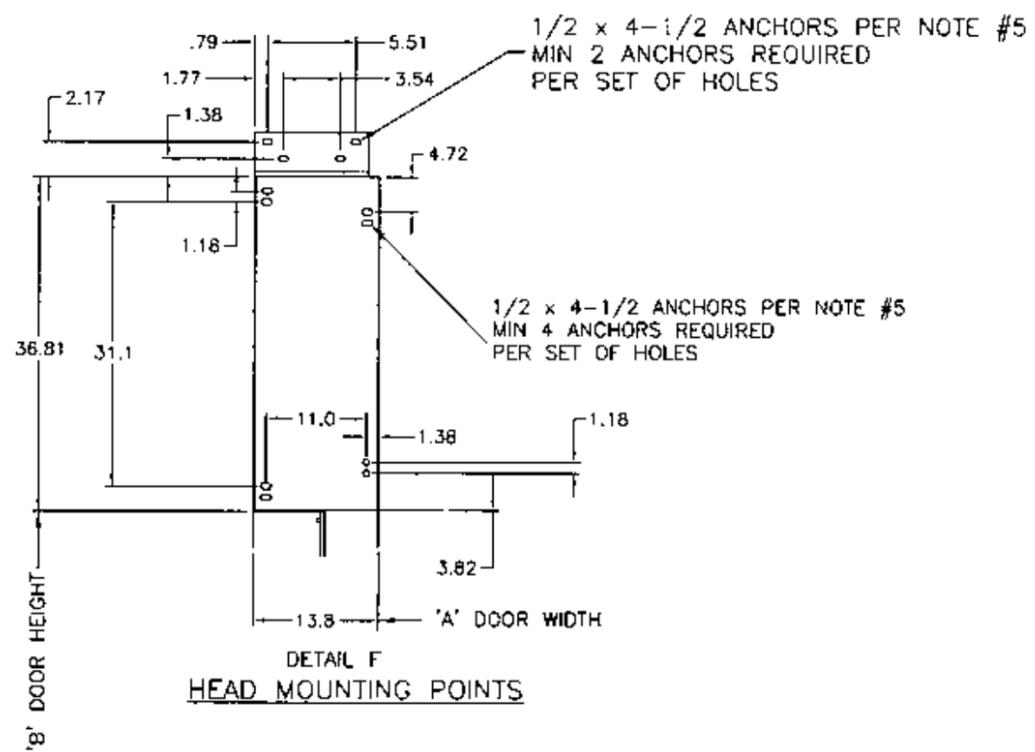
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 Drawn Date: 10/2/06
 Scale: Not to scale
 Revised: 7/27/2012

PRODUCT RENEWED
 as complying with the Florida
 Building Code
 Acceptance No. 12-0917.05
 Expiration Date 11/08/2017
 By: *[Signature]*
 Miami/Dade Product Control

Drawing Number
 9B963-R5

Sheet
 1 of 4

REV	DESCRIPTION	DATE	BY
6	MODIFIED PER ASCE 7-10 REQUIREMENTS.	7/27/12	RS
5	ASCE 7-05 WAS ASCE 7-98	7/20/10	DAS
4	FBC WAS 2004; CONCRETE WAS 5000PSI	11/24/08	DAS
3	ADDED SHEETS 3&4 FOR SSN-HZ	10/1/08	DAS



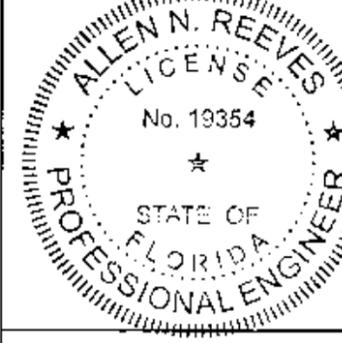
BILL OF MATERIAL			
ITEM NO.	DESCRIPTION	QTY	MATERIAL
1	SIDE COLUMN, LH	1	GALVANIZED STEEL, ASTM A-446
2	SIDE COLUMN, RH	1	GALVANIZED STEEL, ASTM A-446
3	STANDARD PANEL SLAT	AS REQ.	ALUMINUM, 6063-T6
4	LOWER PANEL SLAT	1	ALUMINUM, 6063-T6
5	UPPER PANEL SLAT	1	ALUMINUM, 6063-T6
6	GUIDE TRACK	2	ALUMINUM, 6063-T6
7	ROLLER	AS REQ.	UHMW-PE (2) 6900ZZ RADIAL BEARINGS
8	GUIDE ROLLER	4	NYLON
9	WEATHERSEAL	4	TPE
10	REVERSING EDGE	1	EPDM

DESIGN PRESSURE RATING	IMPACT RATING
+50 PSF, -50 PSF	LARGE AND SMALL MISSILE IMPACT RESISTANT

Manufacturer:
RYTEC CORPORATION
 ONE CEDAR PARKWAY
 JACKSON, WI 53037
 PH:262-677-9046
 FX:262-677-2058
 www.rytecdoors.com

Product:
 SPIRAL ROLLUP DOOR
 MODEL: SPIRAL HZ

Engineering:
HR Engineering, Inc.
 1541 East Market St.
 YORK, PA 17403
 PH:717-846-3747
 FX:717-846-0355
Allen N. Reeves
 11 SEPTEMBER 2012
 Allen N. Reeves, P.E.
 Structural Engineer
 Florida License #19354



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Sheet
 2 of 4

GENERAL NOTES

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MAXIMUM DESIGN PRESSURE ARE +50.0, -50.0 PSF.

2) PANEL SLATS TO BE EXTRUDED ALUMINUM ALMgSi0.5 F-22 (6063-T6). 0.07 NOMINAL WALL THICKNESS, CLEAR ANNOZIDED WITH A MINIMUM YIELD STRENGTH 25KSI.

3) SIDE COLUMNS TO BE 11 GAGE GALVANIZED STEEL ASTM A-446 WITH A GALVANIZED COATING OF G90.

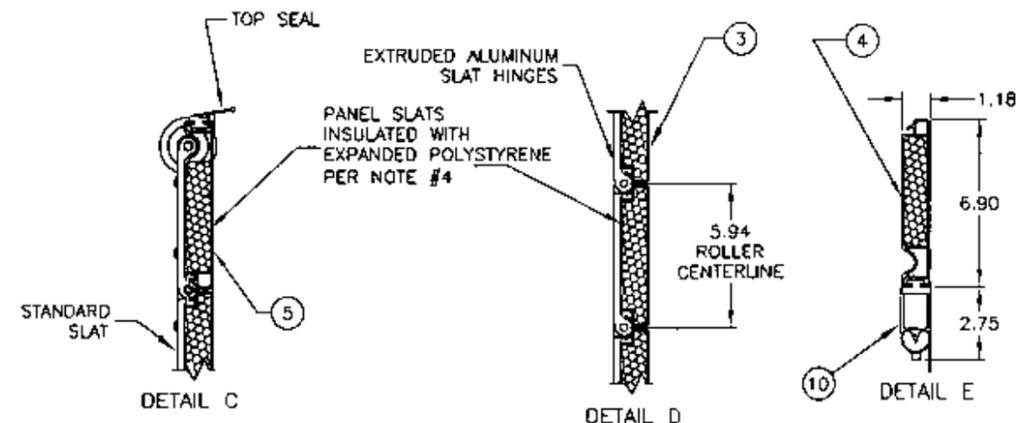
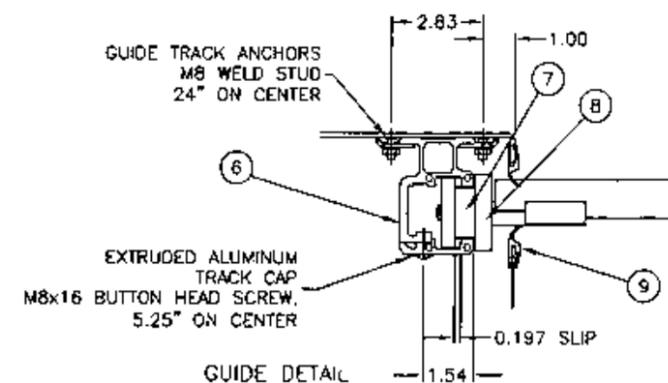
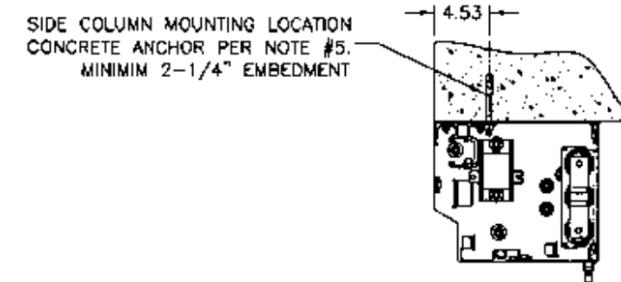
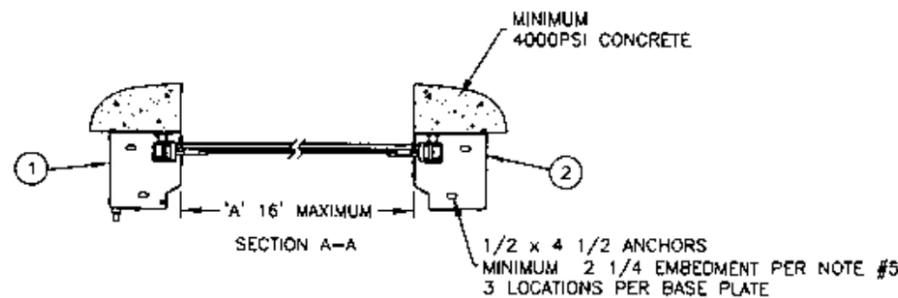
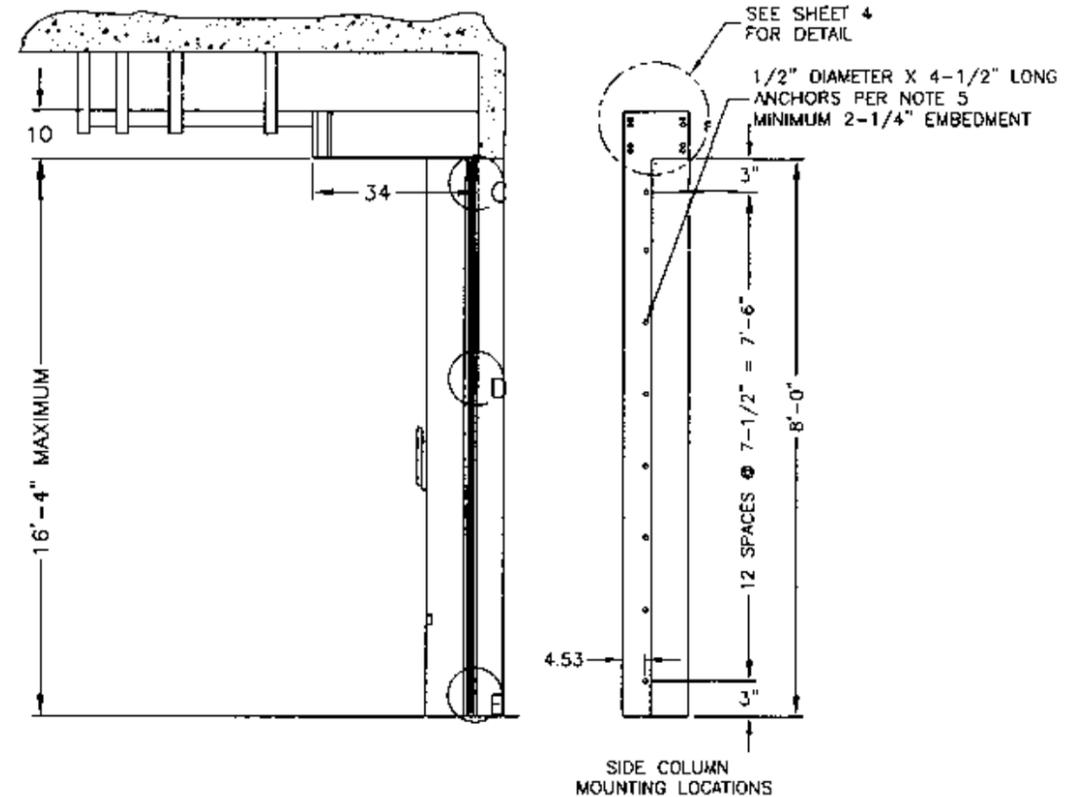
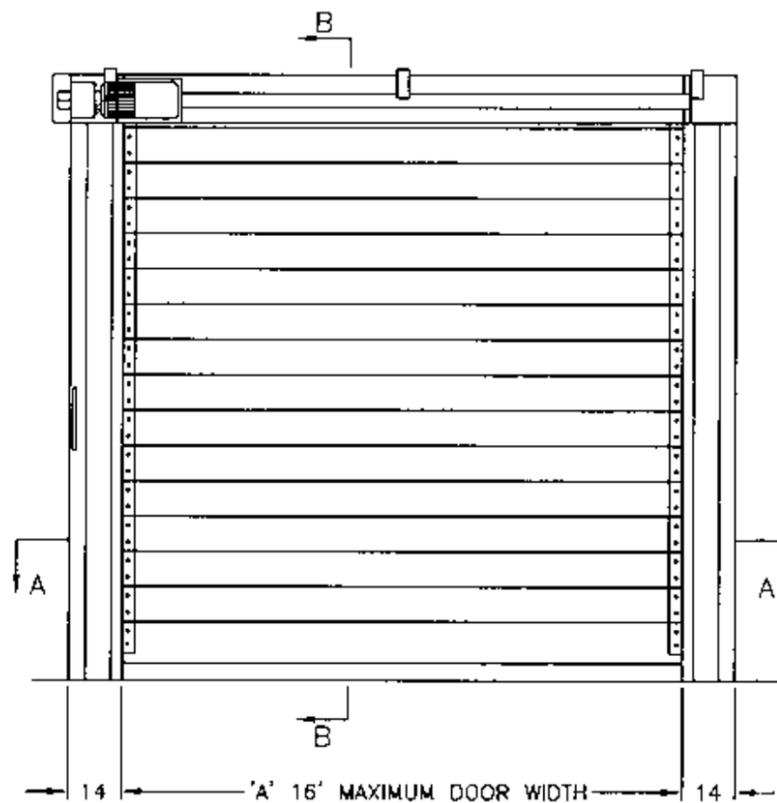
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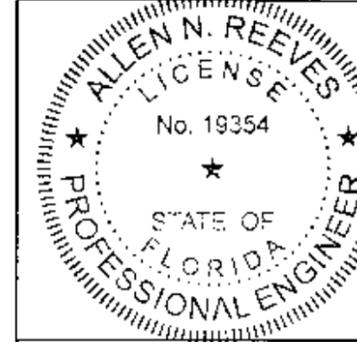
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PRODUCT RENEWED
 as complying with the Florida
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 By: *[Signature]*
 Miami Dade Product Control

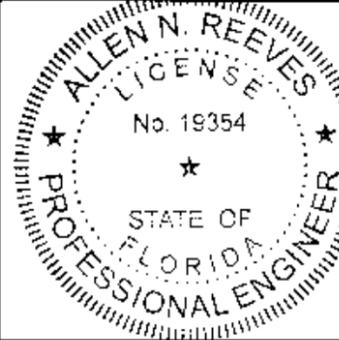
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9B963-R5

Sheet
 3 of 4

Manufacturer:
RYTEC CORPORATION
 ONE CEDAR PARKWAY
 JACKSON, WI 53037
 PH:262-677-9046
 FX:262-677-2058
 www.rytecdoors.com

Product:
 SPIRAL ROLLUP DOOR
 MODEL: SPIRAL HZ

Engineering:
HR Engineering, Inc.
 1541 East Market St.
 YORK, PA 17403
 PH:717-846-3747
 FX:717-846-0355
Allen N. Reeves
 11 SEPTEMBER 2012
 Allen N. Reeves, P.E.
 Structural Engineer
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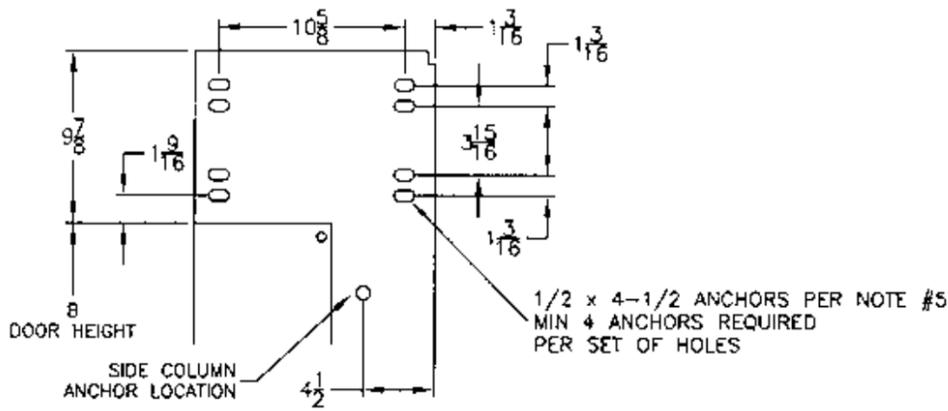


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 Drawn Date: 10/2/06
 Scale: Not to scale
 Revised: 7/27/2012

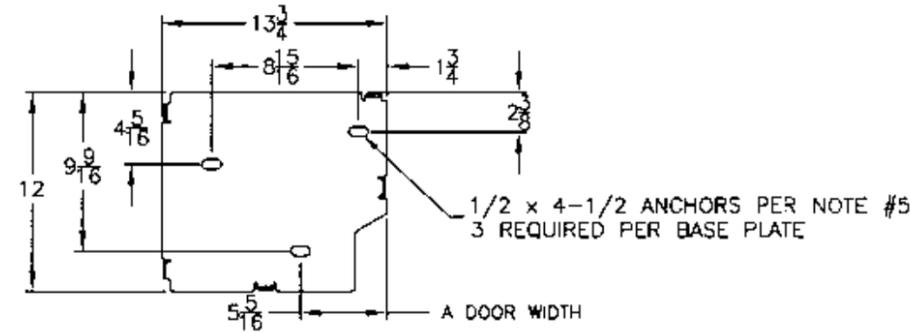
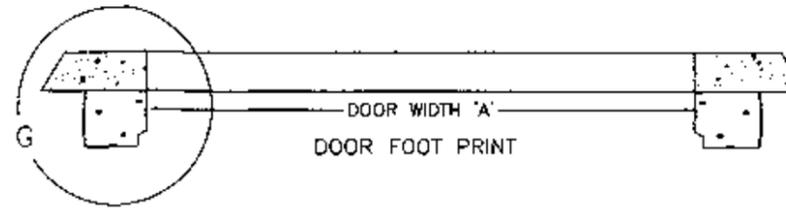
PRODUCT RENEWED
 as complying with the Florida
 Building Code
 Acceptance No *12-0917-05*
 Expiration Date *11/08/2017*
 By *[Signature]*
 Miami Dade Product Control

Drawing Number
9B963-R5

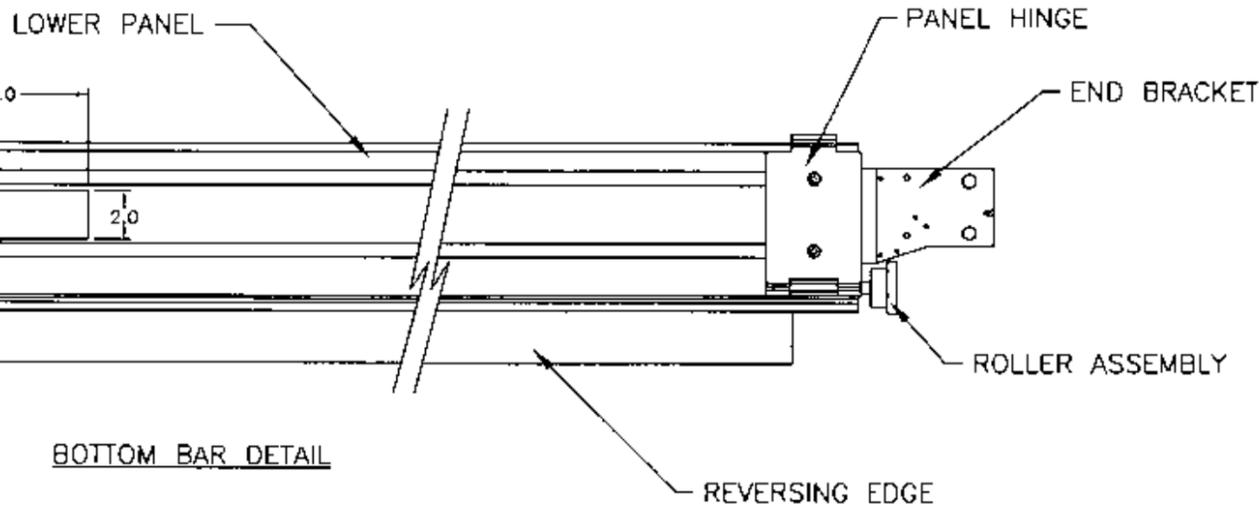
Sheet
 4 of 4



DETAIL F
 HEAD MOUNTING POINTS



DETAIL G
 SIDE COLUMN BASE
 MOUNTING



BOTTOM BAR DETAIL

PRODUCT APPROVAL LABEL
 IN ACCORDANCE TO
 MIAMI-DADE GUIDELINES

BILL OF MATERIAL			
ITEM NO.	DESCRIPTION	QTY	MATERIAL
1	SIDE COLUMN, LH	1	GALVANIZED STEEL, ASTM A-446
2	SIDE COLUMN, RH	1	GALVANIZED STEEL, ASTM A-446
3	STANDARD PANEL SLAT	AS REQ.	ALUMINUM, 6063-T6
4	LOWER PANEL SLAT	1	ALUMINUM, 6063-T6
5	UPPER PANEL SLAT	1	ALUMINUM, 6063-T6
6	GUIDE TRACK	2	ALUMINUM, 6063-T6
7	ROLLER	AS REQ.	UHMW-PE (2) 6900ZZ RADIAL BEARINGS
8	GUIDE ROLLER	4	NYLON
9	WEATHERSEAL	4	TPE
10	REVERSING EDGE	1	EPDM

DESIGN PRESSURE RATING	IMPACT RATING
+50 PSF, -50 PSF	LARGE AND SMALL MISSILE IMPACT RESISTANT



SECTION 08300
HIGH SPEED ROLLING DOORS

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. High-speed roll-up doors.
- B. Wiring from electric circuit disconnect to operator to control station.

1.02 RELATED SECTIONS

- A. None

1.03 REFERENCES

- A. NEMA - National Electrical Manufacturers Association.
- B. LED - Light Emitting Diode.

1.04 SYSTEM DESCRIPTION

- A. Motor type: AC drive, and variable speed with soft acceleration and braking. Mechanical release lever on side column allows door to be easily opened in the event of a power failure.

1.05 SUBMITTALS

- A. Submit the following:
 - 1. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.
 - 2. Product Data: Provide general construction, component connections and details, and electrical equipment, operation instructions, and information.
 - 3. Samples: Submit samples of door slat material.
 - 4. Manufacturer's Installation: Indicate installation sequence and procedures, adjustment, and alignment procedures.



1.06 MAINTENANCE DATA

- A. Scheduled maintenance program available to include lubrication requirements and frequency, periodic adjustments required, scheduled maintenance suggested, manufacturer data sheets, and equipment inter-connection diagrams.

1.07 REGULATORY REQUIREMENTS

- A. Electrical components UL listed.
- B. Electrical control panel NEMA approved.

1.08 QUALITY ASSURANCE

- A. Furnish high-speed roll doors and all components and accessories by one manufacturer.
- B. Specific door model used must have a proven track record of successful installations in similar applications of no less than 3 years. References to be provided upon request.

1.09 FIELD MEASUREMENTS

- A. Verify field measurements are as indicated on shop drawings.

1.10 COORDINATION

- A. Coordinate the work with installation of electric power and locations and sizes of conduit.

1.11 WARRANTY

- A. One year parts, one year labor.

PART 2 - PRODUCTS

2.01 PRODUCTS

- A. Rytec Corporation Spiral LH-HZ Door.
- B. No substitutions permitted.

2.02 MATERIALS

- A. Door Panel: Double-walled, insulated, aluminum slats are 6 inches high by 1-3/16 inches thick. Integral rubber weatherseal between each of the panels. Door slats are connected by a reinforced hinge system to provide additional rigidity and security to door panel. Door curtain does not require a tensioning system for additional wind/pressure resistance. Doors which require the use of a tensioning system for additional wind/pressure resistance will not be accepted.



- B. Side Frames: Galvanized steel side frames with full height weatherseal on both sides to seal against door panel. Dual thru-beam photo-eyes mounted within door jamb.
- C. Bottom Bar: Extruded aluminum bottom bar with electric, reversing edge that reverses the door upon contacting an object. Doors using an external coil cord will not be accepted.
- D. Counterbalance: Up to six extension springs in each side column, depending on the size of the door. Springs assist the motor in opening the door. Mechanical release lever on side column allows door to be easily opened in the event of a power failure. Doors using torsion springs for counterbalance or doors with springs located within a barrel will not be accepted.
- E. Drive system: Minimum 2 HP motor with variable speed AC drive which allows for soft acceleration and deceleration. Doors using a motor with a clutch or pump will not be accepted.
- F. Travel Speed: Opens at up to 60 inches per second.
- G. Electrical Controls
 1. Rytec controller housed in a UL/cUL Listed NEMA 4X-rated enclosure with factory set parameters.
 2. Parameter changes and all door configurations can be made from the face of the control box, no exposure to high voltage. Control panels that require opening of the control box and reaching inside to make parameter changes will not be accepted.
 3. Controls include a variable speed AC drive system capable of infinitely variable speed control in both directions.
 4. Programmable inputs and outputs accommodate special control applications (traffic lights, horns, actuation devices, timing sequences, etc.) without the need for additional electrical components.
 5. Self-diagnostic scrolling two-line vacuum fluorescent display provides expanded informational messages for straightforward installation, control adjustments and error reporting.
 6. Complete history of door, at least two years, is logged and encrypted onto a USB flash drive. All errors have a time and date stamp for reference. Control panels not logging up to two years of door history will not be accepted.
- H. Door to use rotary encoder to regulate door travel limits. Limits to be self-adjusting without the use of tools from floor level at the control panel. Doors using mechanical limits switches or doors that require tools to set the limits will not be accepted.
- I. Door Track: Requires no more than 11 inches of vertical headroom to install and features no metal-to-metal slat contact which results in whisper-quiet, low maintenance operation and eliminates wear and tear on panel slats. Doors that roll up on a barrel or whose track design allows metal-to-metal contact will not be accepted.
- J. Windload: Door to be approved by Miami-Dade County and be issued a valid Notice of Acceptance (NOA) for use in a high velocity hurricane zones. Doors without valid NOA from Miami-Dade County will not be accepted.



- K. All components factory finished.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that opening sizes, tolerances, and conditions are acceptable.

3.02 INSTALLATION

- A. Install door unit assembly in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Fit and align assembly including hardware; level to plumb to provide smooth operation.
- D. Coordinate installation of electrical service. Complete wiring from disconnect to unit components.

3.03 ADJUSTING

- A. Adjust door and operating assemblies.
- B. Test and adjust door(s), if necessary, for proper operation.

3.04 CLEANING

- A. Clean door and components.

END OF SECTION

R Y T E C

Spiral LH[®]

Owner's Manual



P.O. Box 403, One Cedar Parkway, Jackson, WI 53037
Phone: 262-677-9046 Fax: 262-677-2058
Parts Fax: 262-677-6588

[Revision: September 30, 2008, 0915014, ©Rytec Corporation 2006]

WARRANTY

The Spiral High-Speed Door purchased by you (Buyer) should not be installed or operated before you read all associated product manuals explaining the proper method of installing, operating, and maintaining the equipment.

Rytec Corporation (Seller) warrants that the Spiral LH Door (Product) sold to the Buyer will be free of defects in materials and workmanship under normal use for a period of twelve (12) months from the date of shipment of the Product from the Seller's plant. Electrical components are warranted for a period of ninety (90) days from the date of shipment. If within the applicable period any Products shall be proved to the Seller's satisfaction to be defective, such Products shall be repaired or replaced at the Seller's option. Such repair or replacement shall be the Seller's sole obligation and the Buyer's exclusive remedy hereunder and shall be conditioned upon the Seller receiving written notice of any alleged defect within ten (10) days after its discovery and, at the Seller's option, return of such Product to the Seller, f.o.b. its factory. THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER REPRESENTATION AND WARRANTIES, EXPRESS OR IMPLIED, AND THE SELLER EXPRESSLY DISCLAIMS AND EXCLUDES ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE.

PARTS AND ASSEMBLIES sold separately by Rytec Corporation that fail due to defects in material or workmanship within ninety (90) days from the date of shipment will be replaced under warranty provided installation has been carried out in accordance with all Rytec procedures. This warranty is limited to providing a replacement part only. This warranty does not cover freight, special charges, or any costs associated with the installation of the replacement part.

Any description of the Product, whether in writing or made orally by the Seller or the Seller's agents, specifications, samples, models, bulletins, drawings, diagrams, engineering or similar materials used in connection with the Buyer's order, are for the sole purpose of identifying the Product and shall not be construed as an express warranty. Any suggestions by the Seller or the Seller's agents regarding the use, application, or suitability of the Product shall not be construed as an express warranty unless confirmed to be such in writing by the Seller.

The Seller's liability with respect to the Product sold to the Buyer shall be limited to the warranty provided herein. THE SELLER SHALL NOT BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES, WHETHER ARISING OUT OF BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR OTHER THEORIES OF LAW, WITH RESPECT TO PRODUCTS SOLD OR SERVICES RENDERED BY THE SELLER, OR ANY UNDERTAKINGS, ACTS, OR OMISSIONS RELATING THERETO. Without limiting the generality of the foregoing, the Seller specifically disclaims any liability for property or personal injury damages, penalties, special or punitive damages, damages for lost profits or revenues, services, downtime, shutdown, or slowdown costs, or for any other types of economic loss, and for claims of the Buyer's customers or any third party for any such damages. THE SELLER SHALL NOT BE LIABLE FOR AND DISCLAIMS ALL CONSEQUENTIAL, INCIDENTAL, AND CONTINGENT DAMAGES WHATSOEVER.

This warranty shall be void in its entirety if the failure of any product shall be caused by any installation, operation, or maintenance of the Product which does not conform with the requirements set forth by the Seller in the applicable product manuals or is the result of any cause other than a defect in the material or workmanship of the Product.

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INTRODUCTION

The information contained in this manual will allow you to operate and maintain your Rytec Spiral LH[®] (Low Headroom) Door in a manner that will ensure maximum life and trouble-free operation.

Any unauthorized changes in procedure, or failure to follow the steps as outlined in this manual, will automatically void our warranty. Any changes in the working parts, assemblies, or specifications as written that are not authorized by Rytec Corporation will also cancel our warranty. The responsibility for the successful operation and performance of this door is yours.

DO NOT OPERATE OR PERFORM MAINTENANCE ON THIS DOOR UNTIL YOU HAVE READ AND UNDERSTOOD THE INSTRUCTIONS CONTAINED IN THIS MANUAL.

If you have any questions, contact your Rytec representative or call the Rytec Customer Support Department at 800-628-1909. Always refer to the serial number of the door when calling the representative or Customer Support. The serial number plate is located on the left side column, at approximately eye level.

The wiring connections and schematics in this manual are for general information purposes only. A wiring schematic is provided with each individual door specifically covering the control panel and electrical components of that door.

DOOR SERIAL NUMBER(S)

To obtain your **DOOR SERIAL NUMBER**, there are three universal locations that this information can be found. These are at the inside of either side column (approximately eye level), on the drive motor, and on the inside door of the System 3 control panel. (See Figure 1.)

IMPORTANT: *When installing multiple doors of the same model but in different sizes, verify the serial number in the control panel with the one in the side column.*

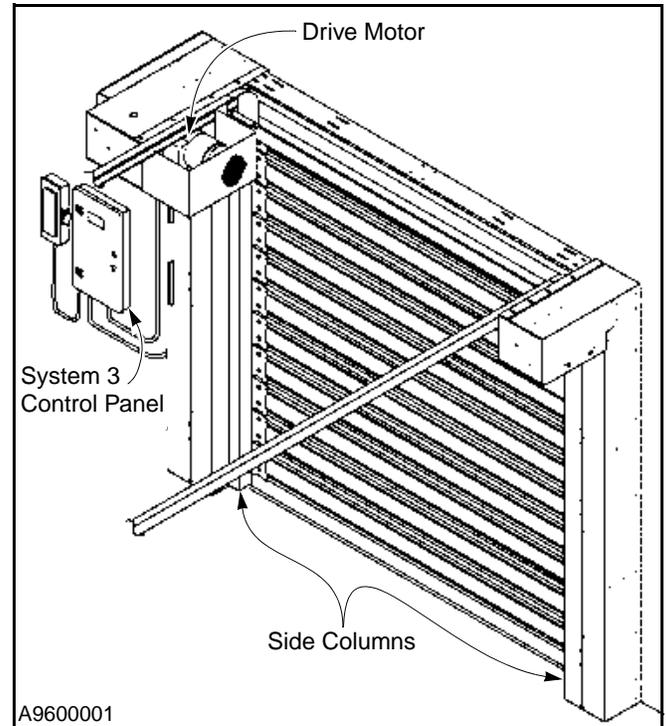


Figure 1

HOW TO USE MANUAL

Throughout this manual, the following key words are used to alert the reader of potentially hazardous situations, or situations where additional information to successfully perform the procedure is presented:



WARNING is used to indicate the potential for personal injury, if the procedure is not performed as described.



CAUTION is used to indicate the potential for damage to the product or property damage, if the procedure is not followed as described.

IMPORTANT: *IMPORTANT is used to relay information that is CRITICAL to the successful completion of the procedure.*

NOTE: *NOTE is used to provide additional information to aid in the performance of the procedure or operation of the door, but not necessarily safety related.*

OPERATION—GENERAL ARRANGEMENT OF DOOR COMPONENTS

GENERAL ARRANGEMENT OF DOOR COMPONENTS

Figure 1 shows the location of the major components of the door and the general placement of the associated control sub-assemblies for a typical installation.

This illustration is provided for informational purposes only. It should not be relied upon solely for the operation and maintenance of your door and its sub-assemblies.

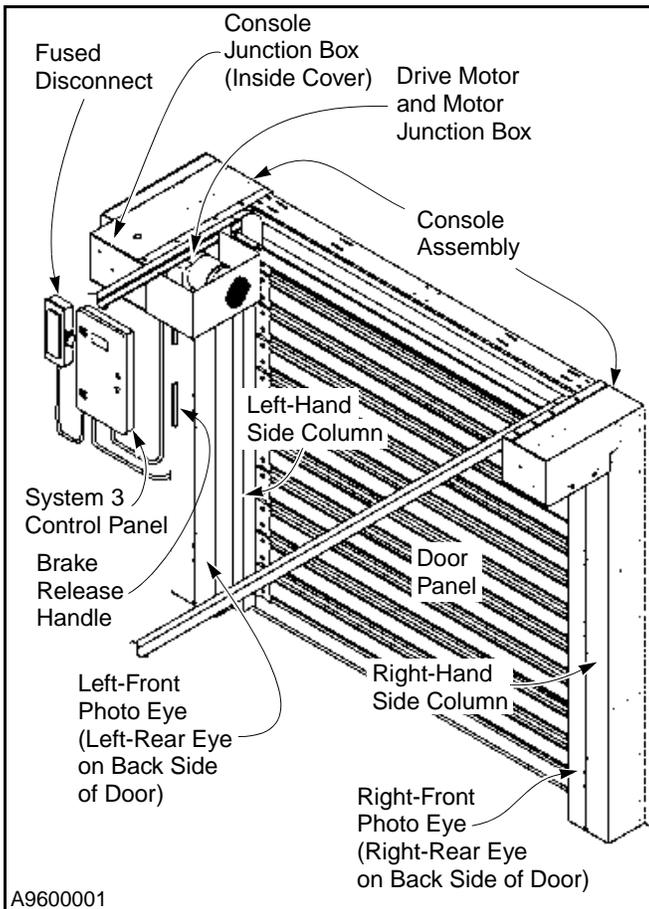


Figure 1

NOTE: The above illustration shows the front side of the door. Left and right are determined when viewing the front side of the door.

OPERATION

CONTROL PANEL

The Spiral LH Door offers high-speed operation with the advantage of providing a secure barrier. All operator inputs and control functions are carried out by the “System 3” drive and control system. (See Figure 2.)



Figure 2

Modes of Operation

AUTOMATIC MODE

If a *momentary* contact activator such as a push-button, pull cord or radio control is used to activate the door:

- The door will open when the device is activated.
- A timer, internal to the control system, will start up once the door is at the full open position.
- When the internal timer clocks out, the door will automatically begin to close.

If a *maintained* contact activator device such as a floor loop or motion detector is used to activate the door:

- The door will open and remain open for as long as the device is active.
- Once the device becomes inactive, the internal timer will start up.
- When the internal timer clocks out, the door will automatically begin to close.

In the automatic mode, while the timer is running, at any time the activator device or another activator in the system is enabled, the timer will reset and the door will not be allowed to close. It is only when the timer clocks out that the door will begin to close. (To change the timer setting, see the “System 3 Drive & Control” manual.)

In summary, in the automatic mode, an externally installed activator device is used to open the door and an internal timer is used to close the door.

NON-AUTOMATIC MODE

If a momentary contact activator such as a push-button, pull cord or radio control is used to operate the door:

- The door will open when the device is activated.
- A similar type of device must also be used to close the door.

In summary, in the non-automatic mode, a manually operated activator is used to open and close the door.

General

For more operating instructions including Control Panel System Inputs, Modes of Operation, Accessing Parameters and Miscellaneous Inputs, see the “System 3 Drive & Control” manual.

PHOTO EYES

Your Rytec Spiral LH Door is equipped with two sets of photo eyes that monitor the front and back sides of the door. The purpose of these photo eyes is to hold the door open or, if the door is closing, reverse the direction of the door if a person or object crosses the path of either photo eye beam. After the obstruction breaking the photo eye beam is removed:

- If the door was originally opened by an automatic activator, the door will close automatically.
- If the door was originally opened by a non-automatic activator, the door will remain open until it is closed by the non-automatic activator.

NOTE: Two sets of photo eyes are included with the Spiral LH Door. These photo eyes are used as a safety device. They prevent the door from closing if an object is in the path of either photo eye light beam. The photo eyes are not meant to be used as activators to open or close the door.

Each set of photo eyes consists of an emitter module and a receiver module. The set of factory-installed eyes is mounted in the side columns. The set of customer-installed eyes is mounted on the back side of the door. (See Figure 3.)

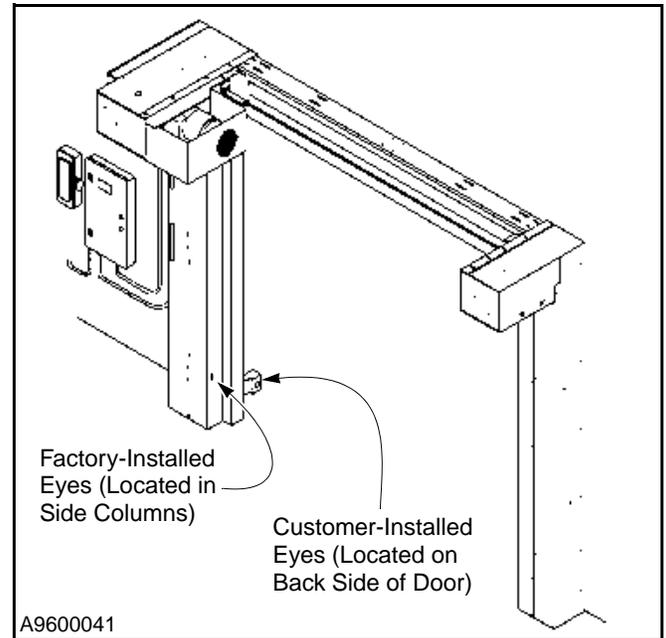


Figure 3

System Reset — Photo Eyes

If either set of photo eyes detects that an object has entered the door opening while the door is closing, the door will immediately reverse direction and move to the fully open position. The door will remain parked in this position until the object has been removed from within the opening. If the front set of photo eyes detects the interruption, the display will read “**Photoeye - Fr**”. If the rear set of eyes detects the interruption, the display will read “**Photoeye - Rr**”.

The door will remain parked in the fully open position for as long as the object is in the path of the door opening. If the timer is set, the door will close when the timer clocks out. If the timer is off, the door close (▼) button must be pressed.

After the door is closed, the display will read “**Spiral Door**” and the control system will wait for operator input.

REVERSING EDGE

An electrically operated reversing edge is mounted along the bottom edge of the door. If this pressure-sensitive edge comes in contact with an object as the door is closing, the control system will immediately reverse the door and move it to the fully open position, where it will remain parked until the control system is reset.

(See Figure 4.)

OPERATION—POWER DRIVE SYSTEM

NOTE: Anytime the reversing edge is activated, the “System 3” control panel will read “F.361”. After the object in the door opening is removed, the control panel will require a manual reset before the door will operate again. To reset the control system, press and hold the enter (⏻) button for approximately three or four seconds.

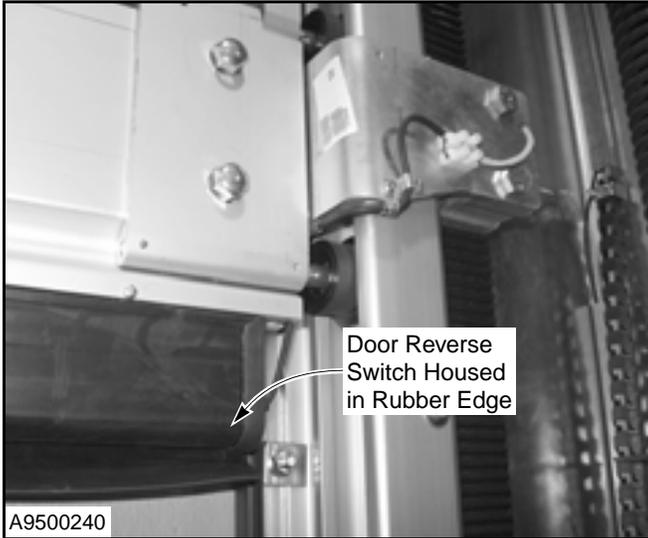


Figure 4

System Reset — Door Reversing Edge

Anytime the door is closing and the reversing edge along the bottom bar makes contact with an object, the display will read “F.361” (Edge Trip) and the door will immediately move to the fully open position. With “F.361” displayed, the door will remain parked and locked in the fully open position until the control system is reset.

1. To reset the control system with “F.361” displayed, first make sure the area directly below the path of the door is clear of all objects and personnel.
2. Then press and hold the enter (⏻) button on the control panel to reset the control system and move the door to the fully closed position. (See Figure 2.)

POWER DRIVE SYSTEM

The Spiral LH Door power drive system consists of an electric motor/brake system, encoder, and a gearbox. (See Figure 5.)

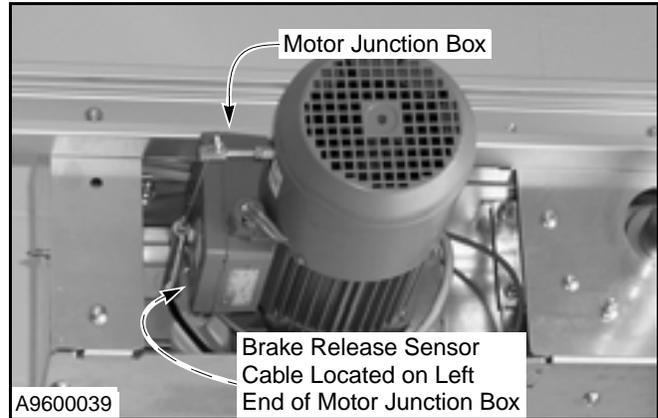


Figure 5

The power drive system incorporates an electric brake used to stop the door travel when electrical power to the door is shut off. A manual brake release is provided to manually open or close the door should there be a power failure, or when routine maintenance requires power to be disconnected.

The encoder generates electrical signals that are used by the electronic control system to track the position of the door. Once the door and control system are synchronized, they will remain synchronized.

The drive motor is connected to the drive shaft pulley by way of the primary drive belt. Tension on the drive belt is adjusted by repositioning the drive motor on its mounting bracket. (See Figure 6.)

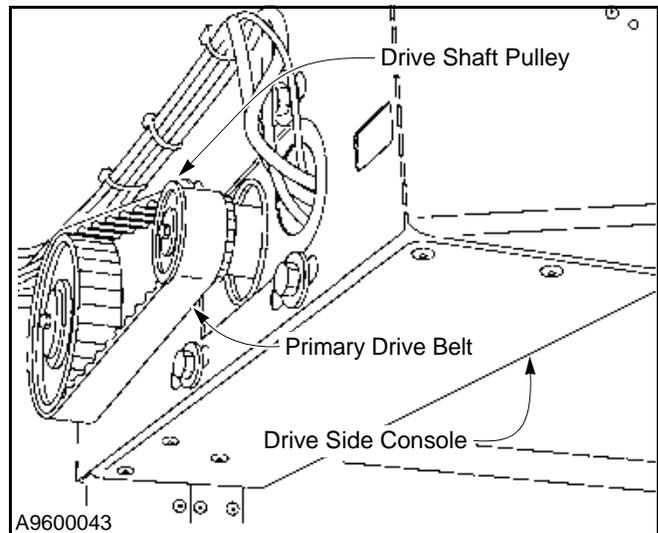


Figure 6

LIFT SYSTEM

Secondary Drive Belts

Near each end of the drive shaft is a secondary drive pulley. Installed on each pulley is a secondary drive belt. Each drive belt runs down through its adjoining side column, to a small guide pulley mounted in the base of each column. (See Figure 7.)

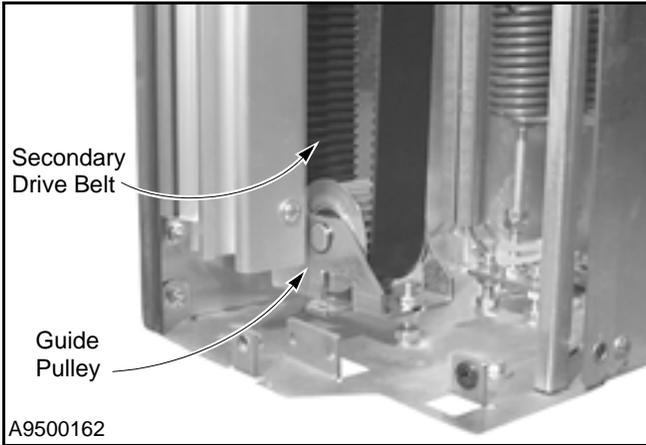


Figure 7

End brackets in the bottom corners of the door connect the door to the secondary drive belts. A clamp on the end of each bracket locks the belt to the door. Depending on the direction the drive system turns the drive shaft, the secondary drive belts will rotate up or down, to lift or lower the door. (See Figure 8.)

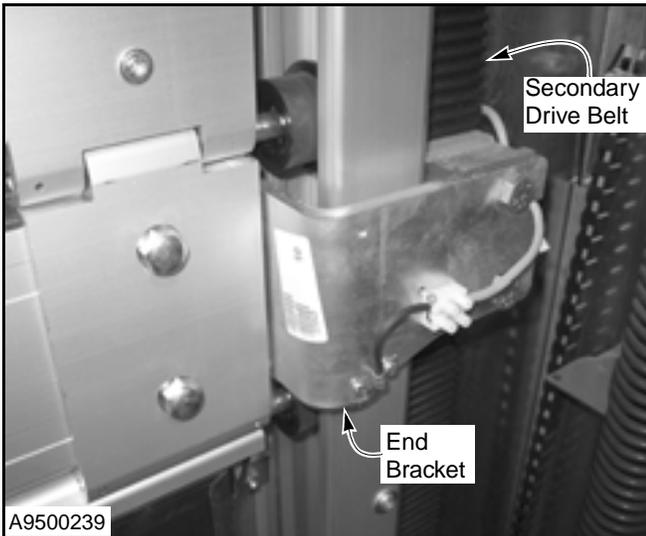


Figure 8

Springs

The springs assist the power drive system with lifting the door. Depending on the size of your door, up to three springs can be used.

Depending on the size of your door, up to three springs are used. Springs are arranged in spring pack assemblies consisting of one, two, or three springs. A nylon strap attached to the upper end of each spring pack connects the pack to the drive shaft located in the console assembly. (See Figure 9.)

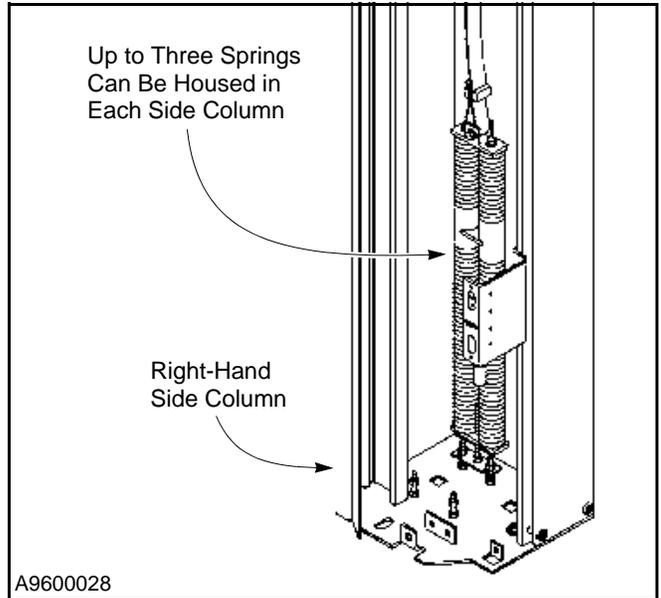


Figure 9

When the door is closed, the spring strap connected to the end of each spring pack is wound tightly around the drive shaft, which in turn stretches the spring pack. When the door is opened, the stored tension in each spring is released. The retracting springs pull on the spring straps to assist the drive motor with turning the drive shaft.

PLANNED MAINTENANCE—RECOMMENDED INSPECTION SCHEDULE

PLANNED MAINTENANCE

RECOMMENDED INSPECTION SCHEDULE

Action Items	Frequency
Visual Damage Inspection	Daily
Door Operation Inspection	Daily
Reversing Edge Inspection	Daily
Photo Eye Inspection	Daily
Electrical Inspection	Quarterly
Console Assembly Inspection	Quarterly
Rear Spreader Inspection	Quarterly
Weather Seal Inspection	Quarterly
Side Column Inspection	Quarterly
Door Panel Inspection	Quarterly

IMPORTANT: *The design of this door is such that it does not require any lubrication.*

DO NOT lubricate any parts, components, or assemblies of this door. This includes the door panel rollers, guides, and track. Lubricants will attract dust and dirt, which can cause the door panel to bind.

Also, the gearbox used with this Spiral LH Door is a sealed unit — it does not require any lubrication.

DAILY INSPECTION

Visual Damage Inspection

Visually inspect the door for damaged components such as a dented door panel, dented side column, torn or damaged reversing edge, damaged or bent photo eyes. (See Figure 10.)

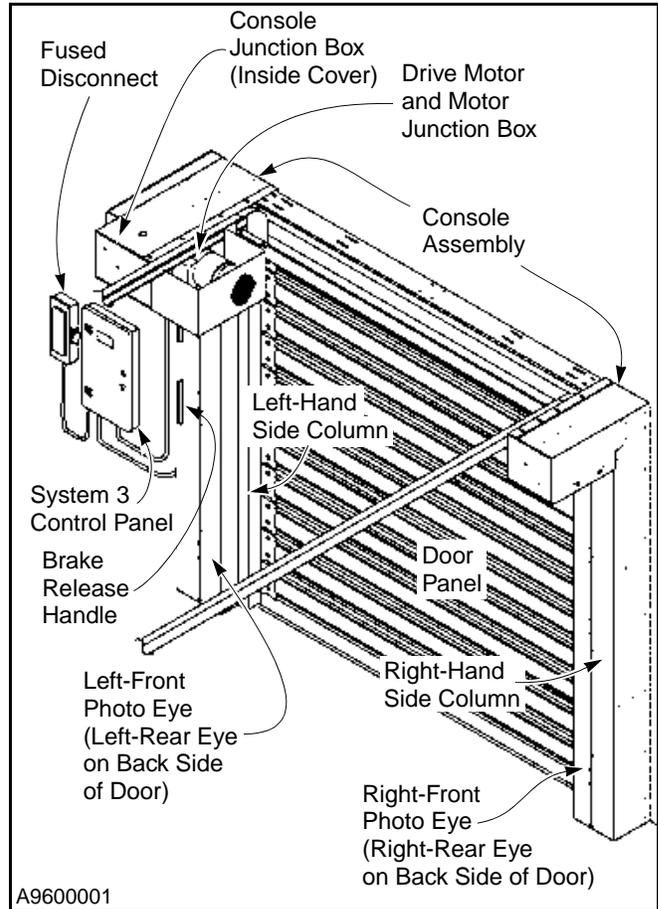


Figure 10

Console Assembly: Inspect for dents or damage that may prevent the door from opening or closing properly.

Door Panel: Inspect for dents, holes, and worn areas. If equipped with windows, inspect them for damage or dirt that may impair vision — clean or replace as required.

Side Columns and Covers: Inspect for damage that may prevent the door from operating properly.

Springs, Straps, and Drive Belts: Inspect for damage and wear that may prevent the door from operating properly.

Photo Eyes: Inspect the lens of each photo eye for damage or dirt that may prevent the photo eyes from working properly — clean or replace as required.

Reversing Edge: Inspect the entire length of the reversing edge for damage such as tears and holes, and for missing or loose hardware. Inspect the edge itself.

Door Operation Inspection

Run the door through four or five complete cycles to make sure it is operating smoothly and efficiently. Also make sure there is no binding or unusual noise.

DO NOT continue to operate the door if it is not working properly because this could further complicate the problem.

Reversing Edge Inspection



DO NOT stand under the door when performing the following test. If the reversing edge sensor is not working properly, the door could strike the person performing the procedure. DO NOT use the door if the sensor is not working properly.

1. Move the door to the open position by pressing the door open (▲) button located on the control panel.
2. Press the door close (▼) button.
3. When the door is a few feet from the fully closed position, hit the rubber reversing edge that runs along the bottom edge of the door. Stand outside the photo eyes to avoid activating the photo eye circuit. (See Figure 11.)

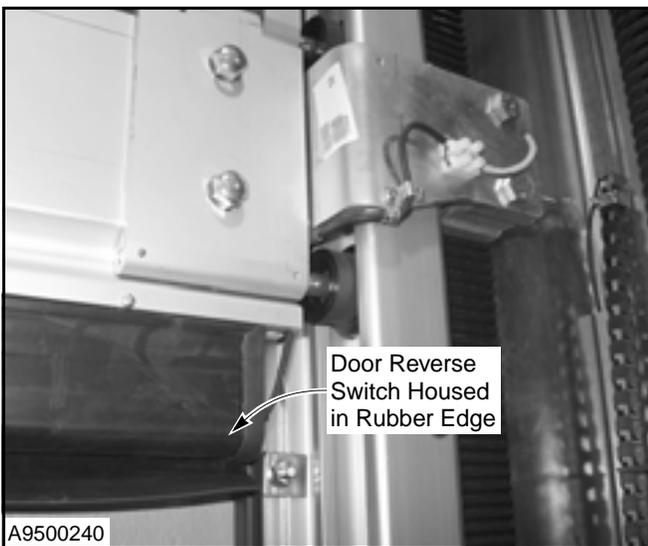


Figure 11

If the reversing edge sensor is working correctly, the door will immediately reverse direction and move to the fully open position, where it will remain parked until a system reset is performed.

To reset the control system, see “System Reset — Door Reversing Edge” on page 4.

If the reversing edge sensor is not working properly, the control system will only allow the door to open and the control panel will display the associated error code.

NOTE: A normal resistance measurement across the reversing edge sensor will read approximately 8.2 kilo ohms. With the rubber edge compressed, the resistance will drop to about zero ohms.

4. Check the wires from the E-chain cable and the reversing edge cable that go to the terminal block. Make sure that they are tight and secure. Inspect terminal block for damage and replace any missing or damaged hardware. (See Figure 12.)

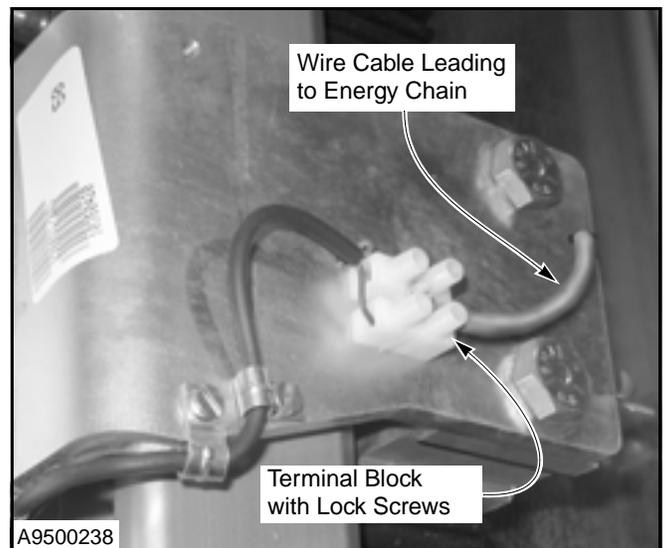


Figure 12

5. Inspect the rubber reversing edge. It should be in good condition with no visible holes, cracks, or tears. Replace the rubber reversing edge if necessary.

To replace the reversing edge, see “REVERSING EDGE REPLACEMENT” on page 34.

Photo Eye Inspection

To prevent the front and rear sets of eyes from interfering with each other, the emitter and receiver modules of each set are mounted diagonally across from each other. The emitters are mounted in the right-front and left-rear corners of the door. The receiver modules are located in the left-front and right-rear corners.

When the door is open and an object breaks either beam of light, the door will remain open until the beam is restored (object removed). If the door is closing at the time either beam is broken, the door will immediately reverse direction and move back to the fully open position, where it will remain parked until the beam of light is restored (object removed).

PLANNED MAINTENANCE—DAILY INSPECTION

It is important to note that the two sets of photo eyes are not interchangeable. Each set performs the same function, but operates with a different set of indicator lights.

FRONT SET OF EYES

The photo eyes that make up the front set of eyes each have one indicator light. The eyes are receiving power and are aligned when the indicator on the emitter module (right-front eye) is green and the indicator on the receiver module (left-front eye) is red. If both indicators are green, the eyes are not aligned. (See Figure 13.)

When the eyes are aligned and the beam of light between them is interrupted, the receiver module indicator will switch from red to green. Restoring the beam of light will cause the indicator to switch back to red.

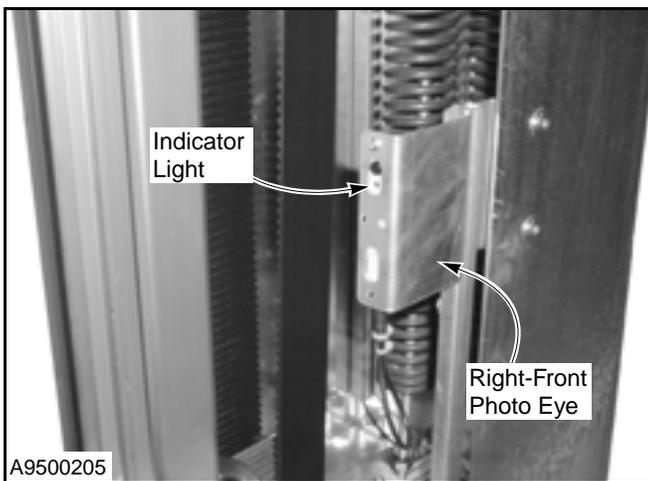


Figure 13

REAR SET OF EYES

The rear set of eyes is receiving power when the power indicator on each eye is green. The eyes are aligned when the alignment indicator on the receiver module is yellow. When the beam of light is interrupted, the alignment indicator will go out. Restoring the beam relights the indicator. (See Figure 14.)

NOTE: Photo eyes have been joined together for photo purpose only.

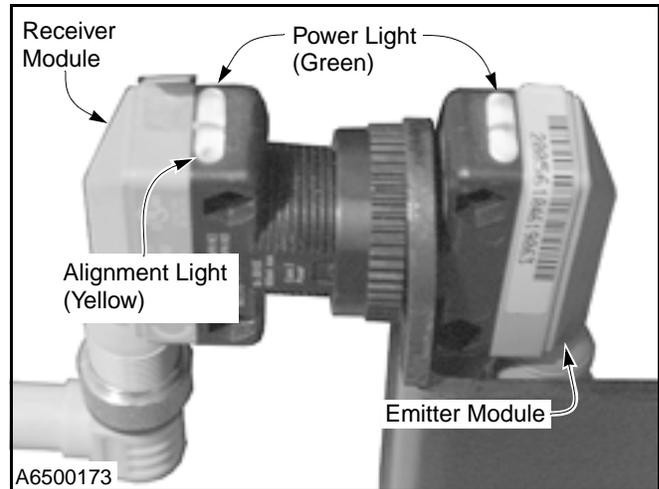


Figure 14

NOTE: Avoid interrupting both beams of light when testing one, or the other, set of photo eyes. Interrupt only one beam of light at a time.



Personnel and objects should not be in the path of the door when the following inspection is performed. If the photo eyes are not working properly, the door could strike the personnel or object in its path.

1. Move the door to the fully open position by pressing the door open (▲) button located on the control panel.
2. Place an object between the front set of photo eyes to interrupt the beam of light between the eyes.
3. Press the door close (▼) button on the control panel. The door should not operate.
4. If the photo eyes do not operate properly, the lens may be dirty. Clean as required using window cleaner and a clean, soft cloth. Then retest the front set of eyes. If cleaning does not resolve the problem, align or replace the photo eyes as required.

To align the photo eyes, see “PHOTO EYE ALIGNMENT” on page 20. To replace the eyes, see “PHOTO EYE REPLACEMENT” on page 34.

5. Repeat the above procedure on the rear set of photo eyes only after verifying that the front set of eyes is working properly.

QUARTERLY INSPECTION

Electrical Inspection

CONTROL PANEL

1. Remove power to the control panel by placing the fused disconnect in the OFF position.



The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

2. Open the door to the control panel. (See Figure 15.)



Figure 15

3. Inspect all electrical lines leading to the control panel. Check all electrical connections inside the control panel. All connections must be tightly secured.
4. Check for pinched, cracked, or damaged wires and insulation. Repair or replace wires as needed.

DOOR HEAD JUNCTION BOX

1. Move the door to the closed position.
2. Remove power to the control panel by placing the fused disconnect in the OFF position.



The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

3. Remove the cover from the door head junction box located above the drive motor assembly. (See Figure 16.)

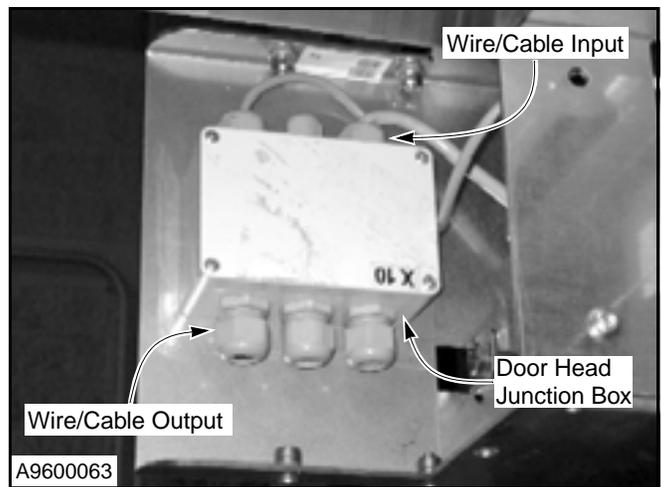


Figure 16

4. Inspect all electrical connections in the door head junction box. All connections must be tightly secured.
5. Check for pinched, cracked, or damaged wires and insulation. Repair or replace wires as needed.
6. Replace the cover.

UPPER JUNCTION BOX

NOTE: The upper junction box is an optional item that may have been installed during the installation of your door. If an upper junction box was installed, it was most likely mounted on the wall, just above the control panel. If your door has an upper junction box, it must be inspected.

1. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

- Remove the cover from the upper junction box located near the left side column. (See Figure 17.)

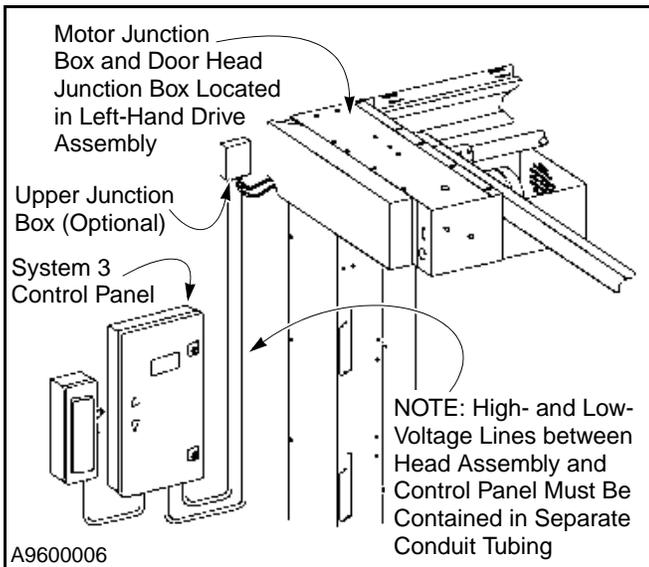


Figure 17

- Inspect all electrical connections in the upper junction box. All connections must be tightly secured.
- Check for pinched, cracked, or damaged wires and insulation. Repair or replace wires as needed.
- Replace the cover.

Console Assembly Inspection

- Move the door to the closed position.
- Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

- Remove the end cap and the primary drive cover from the console drive assembly. (See Figure 18.)

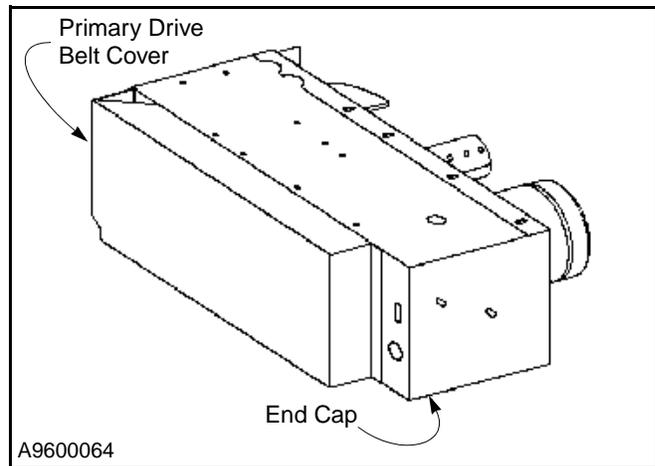


Figure 18

- Inspect the hex head cap screws used to secure the console assembly to the side columns. Replace any missing or damaged hardware. (See Figure 19.)

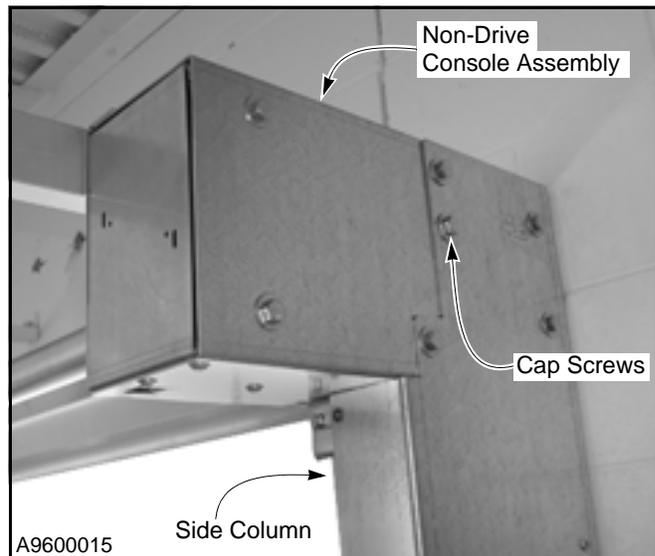


Figure 19

- Inspect the hardware used to clamp the connection shaft to the left and right drive consoles. Tighten the hardware as required. Replace any missing or damaged hardware. (See Figure 20.)

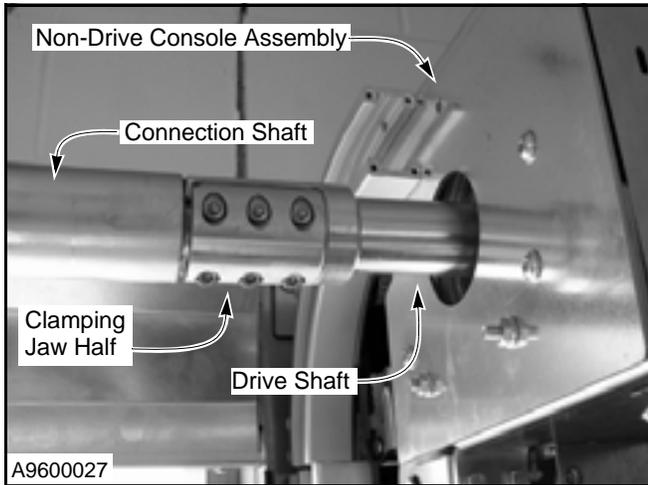


Figure 20

6. Release the electric brake mechanism by pulling the brake release lever. Then manually move the door to the fully open position.
7. Inspect the hardware used to attach the secondary drive pulleys to the left and right drive shafts. Tighten the hardware as required. Replace any missing or damaged hardware. (See Figure 21.)
8. Inspect the clamp plate securing the upper end of each spring strap to its respective drive shaft. Tighten the hardware as required. Replace any missing or damaged hardware. (See Figure 21.)

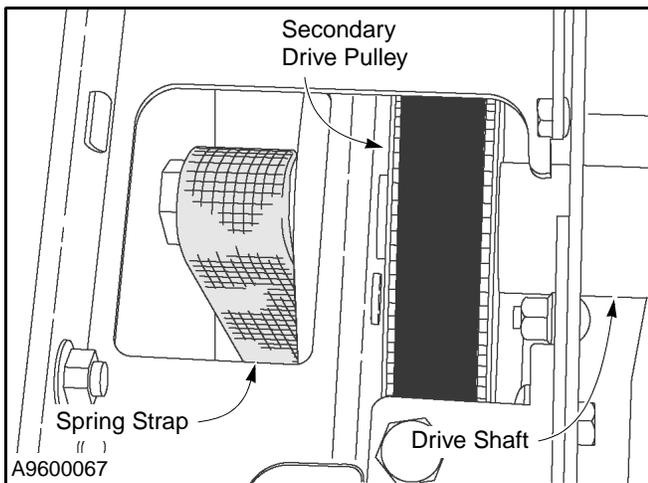


Figure 21

PRIMARY DRIVE BELT INSPECTION

1. Inspect the primary drive belt. The belt should not be frayed, cracked, worn, or damaged. Also check for any damaged or missing teeth. Replace the drive belt if necessary. (See Figure 22.)

To replace the belt, see “PRIMARY DRIVE BELT REPLACEMENT” on page 21.

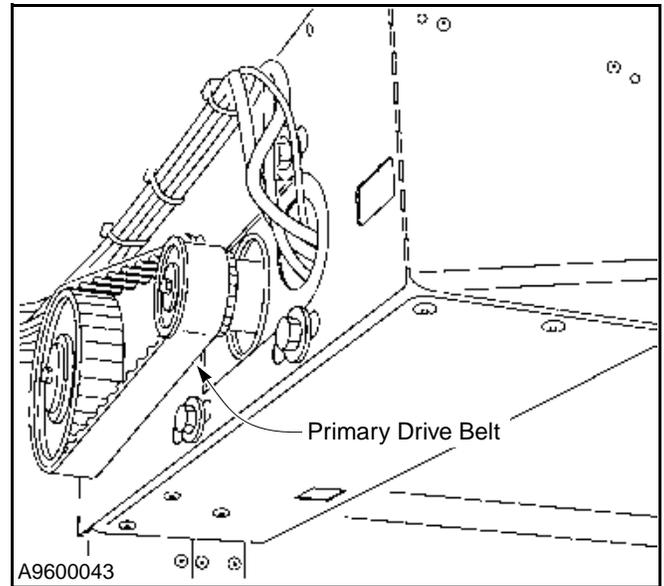


Figure 22

2. The motor drive belt must be tensioned. Final tensioning must be carried out with the door closed. For this the low tension side must be measured. With a testing force of 22.5 lbf, the deflection of the belt should be 0.393 in. (See Figure 23.)

To adjust the belt tension, see “PRIMARY DRIVE BELT ADJUSTMENT” on page 15.

IMPORTANT: Excessive belt tension can result in accelerated belt wear. Inadequate belt tension can cause the belt to jump a cog on the gear-box pulley.

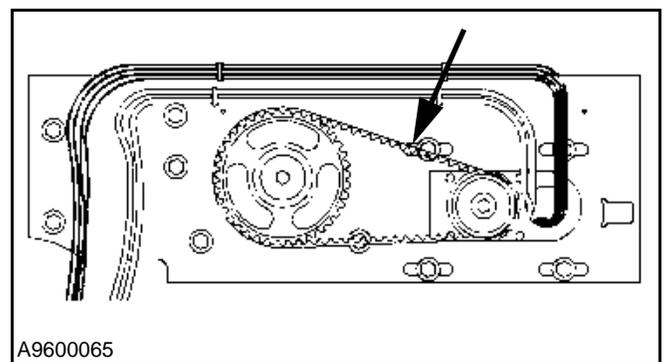


Figure 23

3. Inspect the hardware securing the drive motor assembly to the left drive assembly. Tighten any loose hardware. Replace any missing or damaged hardware as required. (See Figure 23.)
4. Install the belt guard.

PLANNED MAINTENANCE—QUARTERLY INSPECTION

Rear Spreader Inspection

1. Move the door to the open position.
2. Remove power to the control panel by placing the fused disconnect in the OFF position.



The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

3. Inspect the hardware used to attach the spreader bar to the side columns. Tighten the hardware as required. Replace any missing or damaged hardware. (See Figure 24.)

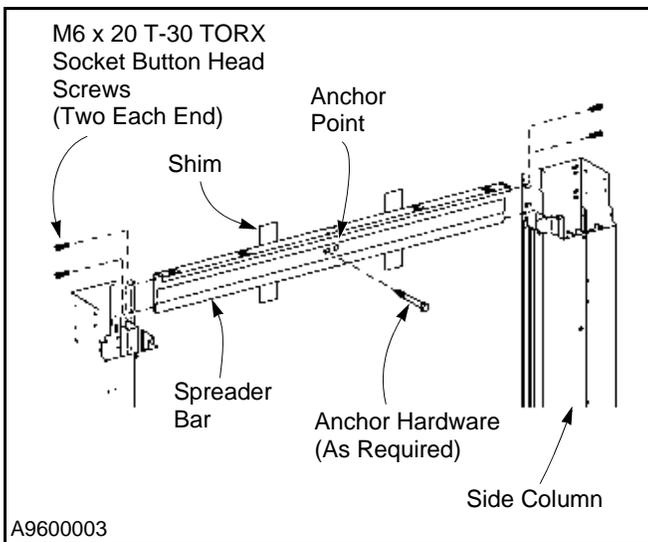


Figure 24

Weather Seal Inspection

1. Move the door to the closed position.
2. Remove power to the control panel by placing the fused disconnect in the OFF position.



The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

3. Inspect the weather seals on both side columns. Check for wear and tear, and check for a good, tight fit between the door panel and the seal. Replace if necessary.

To replace the weather seal, see “WEATHER SEAL REPLACEMENT” on page 26.

Side Column Inspection

SIDE COLUMN HARDWARE INSPECTION

1. Move the door to the open position.
2. Remove power to the control panel by placing the fused disconnect in the OFF position.



The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

3. Remove the side cover from each side column.
4. Inspect all nuts, through bolts, threaded rods, and anchors used to secure the side columns to the wall and floor. Tighten any loose hardware. Replace any missing or damaged hardware as required.
5. Inspect the hardware used to attach the vertical track sections to the left hand and right hand side columns. Tighten the hardware as required. Replace any missing or damaged hardware. (See Figure 25.)

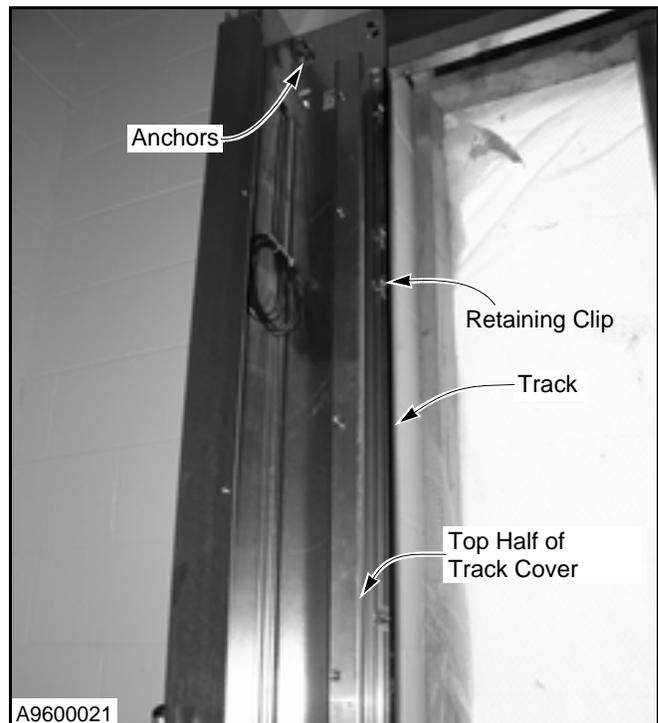


Figure 25

BRAKE RELEASE INSPECTION

1. Remove power to the control panel by placing the fused disconnect in the OFF position.



The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

2. Remove the side cover from the left-hand side column.
3. Make sure the brake release handle is in good, working order and securely fastened to the left-hand side column. Replace any missing or damaged hardware as required. (See Figure 26.)

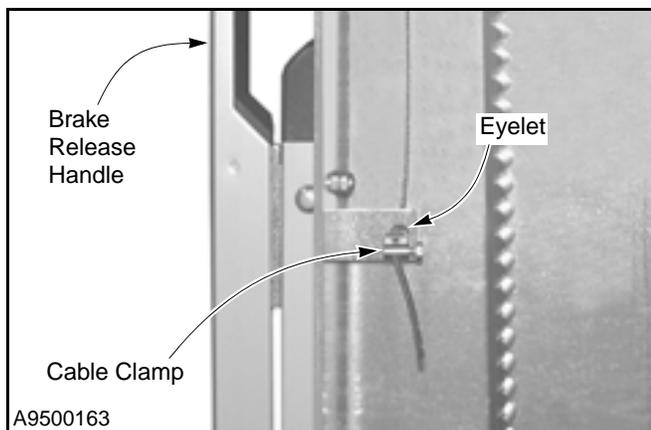


Figure 26

4. Inspect the entire length of the brake release cable running from the brake release handle to the electric brake mechanism located on the drive motor assembly. The cable should not be frayed, worn, or damaged. Replace if necessary. (See Figure 27.)

To replace the brake cable, see “BRAKE RELEASE CABLE REPLACEMENT” on page 23.



Figure 27

5. Make sure the upper end of the cable is securely fastened to the electric brake mechanism.
6. Inspect the cable clamp on the lower end of the cable to ensure it is securely fastened to the brake release handle. (See Figure 26.)
7. Test the cable by pulling on the brake release handle. Verify the electric brake mechanism is disengaged by repositioning the door.

The tension on the cable should be tight enough to disengage the brake when the handle is pulled, but not so tight that the brake mechanism will not re-engage once the handle is placed back against the side column. Adjust the cable as required.

To adjust the brake release cable, see “BRAKE RELEASE CABLE ADJUSTMENT” on page 19.

SPRING STRAP INSPECTION

1. Remove power to the control panel by placing the fused disconnect in the OFF position.



The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

2. Remove the side cover from each side column.
3. Inspect the hardware securing each spring strap to the drive shaft (be sure to check both the left and right drive shafts). Tighten the hardware as required. Replace any missing or damaged hardware.
4. Inspect the entire length of each spring strap. The straps should not be frayed, worn, or damaged. Replace if necessary.

To replace a spring strap, see “SPRING STRAP REPLACEMENT” on page 27.

5. Inspect the hardware securing each spring strap to its spring pack. Tighten the hardware as required. Replace any missing or damaged hardware. (See Figure 28.)

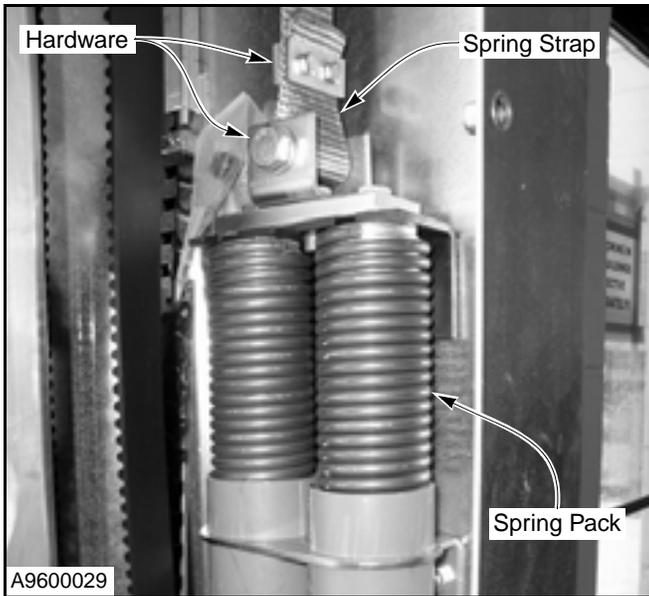


Figure 28

NOTE: Visually inspect the tracking of the spring strap as it spools around the drive shaft. It should be smooth and straight.

SPRING PACK INSPECTION

1. Remove power to the control panel by placing the fused disconnect in the OFF position.



The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

2. Remove the side cover from each side column.
3. Inspect each spring pack assembly. Springs should not be stretched, worn, or damaged. Replace if necessary. Tighten the hardware as required. Replace any missing or damaged hardware. (See Figure 29.)

To replace a spring pack, see “SPRING PACK REPLACEMENT” on page 31.

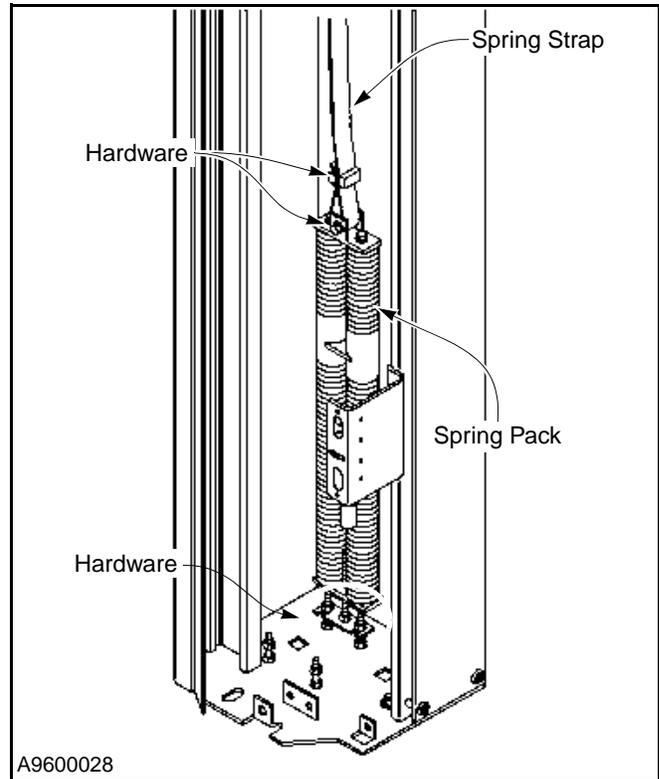


Figure 29

4. Inspect the hex nuts securing each spring pack to the mounting posts. Tighten the nuts as required. Replace any missing or damaged hardware.
5. Inspect the TORX® head screws securing the inside spring pack to the side column. Tighten the screws as required. Replace any missing or damaged hardware.

SECONDARY DRIVE BELT INSPECTION

1. Remove power to the control panel by placing the fused disconnect in the OFF position.



The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

2. Inspect the entire length of both secondary drive belts. The belts should not be frayed, cracked, worn, or damaged. Also check for any damaged or missing teeth. Replace secondary drive belts if necessary. (See Figure 30.)

To replace a drive belt, see “SECONDARY DRIVE BELT REPLACEMENT” on page 22.

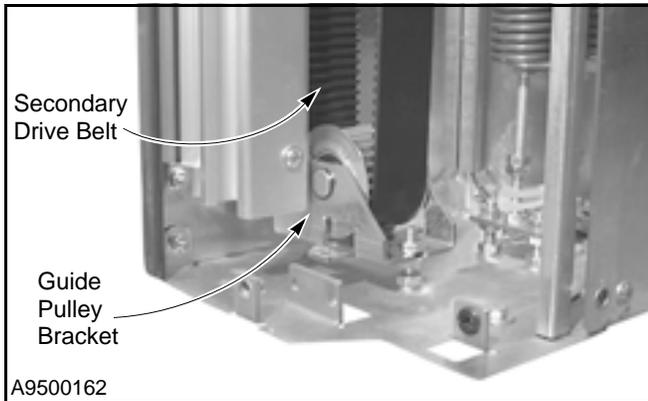


Figure 30

3. Make sure the tension on both secondary drive belts is snug. Adjust the belt tension if necessary.

To adjust belt tension, see “SECONDARY DRIVE BELT ADJUSTMENT” on page 16.

IMPORTANT: Excessive belt tension can result in accelerated belt wear. Inadequate tension can cause the belt to jump a cog on the drive pulley.

Door Panel Inspection

1. Move the door to the closed position.
2. Remove power to the control panel by placing the fused disconnect in the OFF position.



The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

3. Remove the side covers from the side columns.
4. Inspect the entire door panel assembly. Check for damaged or missing hardware. Replace as needed. Also check for loose hardware. Tighten as required.
5. Check for any damaged door panels. Replace as necessary.

To replace a door panel, see “DOOR PANEL REPLACEMENT” on page 24.

6. Inspect for damaged or worn rollers and guides. Replace as needed. (See Figure 31.)

To replace a roller, see “DOOR ROLLER REPLACEMENT” on page 33.

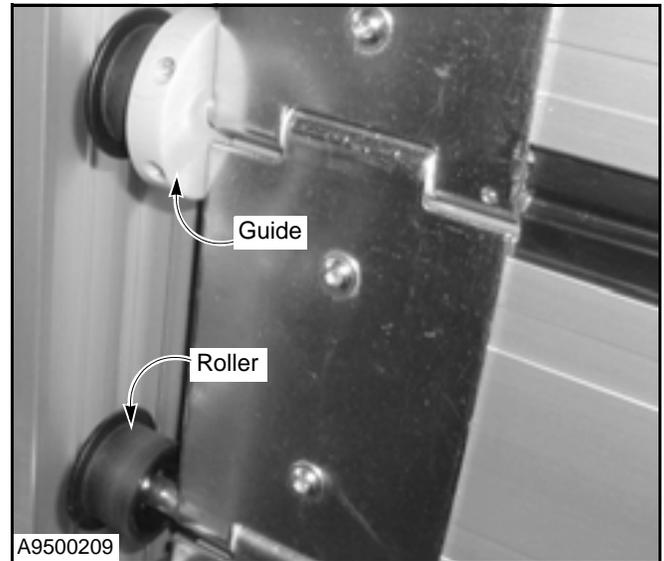


Figure 31

7. Check that the door panel is level along the bottom edge of the panel.

IMPORTANT: DO NOT check the door for level by how it rests on the floor. With the side columns plumb, square, and level, the door will be level when the bottom edge of the panel is perpendicular to the side columns.

A door panel up to 16 feet in width is considered level when the ends of the bottom edge are within ¼ in. of each other. A door panel 16 to 28 feet in width is considered level when the ends are within ⅜ in. of each other.

To level the door panel, see “DOOR PANEL ADJUSTMENT” on page 19.

8. After all inspections are complete, reattach all panels and covers.

ADJUSTMENTS

PRIMARY DRIVE BELT ADJUSTMENT

The primary drive belt that runs from the gearbox pulley to the primary drive shaft pulley is behind the drive belt guard located on the drive end of the console assembly. (See Figure 32.)

ADJUSTMENTS—SECONDARY DRIVE BELT ADJUSTMENT

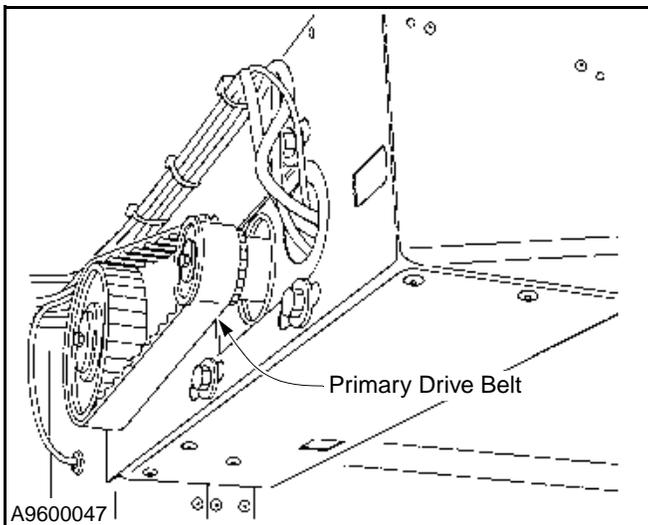


Figure 32

1. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

2. Remove the belt guard from the console assembly.
3. Loosen the four hex head screws securing the drive motor assembly to the drive side console. (See Figure 33.)

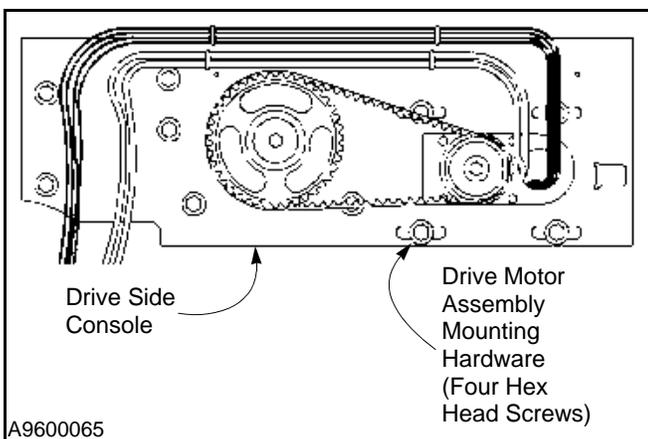


Figure 33

4. Adjust the primary drive belt tension by sliding the drive motor assembly left or right to decrease or increase the belt tension. (See Figure 33.)

IMPORTANT: Excessive belt tension can result in accelerated belt wear. Inadequate belt tension can cause the belt to jump a cog on the gear-box pulley.

5. Measure the deflection in the belt to verify that the belt tension is properly set.

NOTE: With a testing force of 22.5 lbf, the deflection of the belt should be 0.393 in.

6. Tighten all four hex head screws to lock in the adjustment.

⚠ WARNING

Take precautions to prevent someone else from operating the door as you perform the following procedure. Also, be cautious around the moving parts exposed in the head assembly.

7. Restore power to the control panel.
8. Cycle the door several times to work the drive belt.
9. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

10. Measure the deflection in the drive belt to make sure it is properly tensioned. Readjust the tension as necessary.
11. After all adjustments are complete, install the belt guard.
12. Restore power to the control panel.

SECONDARY DRIVE BELT ADJUSTMENT

There are two secondary drive belts. Each runs from the drive shaft assembly down through its respective side column. Belt tension is set by a guide pulley located in the bottom of the side column.

1. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

2. Remove the side cover from each side column.
3. Belt tension should just be snug. It is adjusted by repositioning the guide pulley bracket on the front mounting post. Moving the pulley closer to the base plate will increase belt tension. Moving the pulley away from the base plate will decrease belt tension. (See Figure 34.)

IMPORTANT: Excessive belt tension can result in accelerated belt wear. Inadequate tension can cause the belt to jump a cog on the drive pulley.

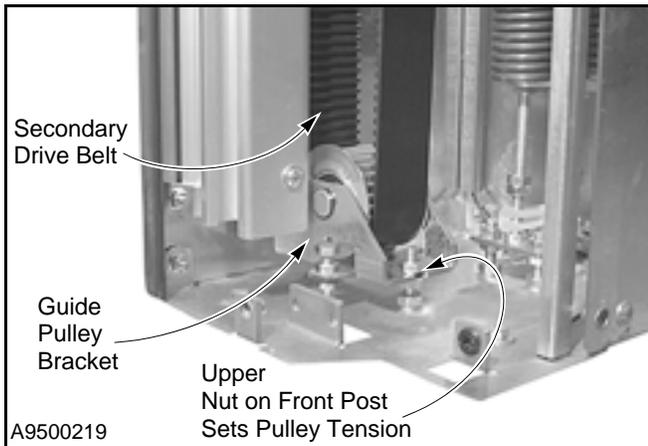


Figure 34

4. Lock in belt tension by tightening the lower nut against the bottom of the pulley bracket.
5. Belt should be centered on the guide pulley. To adjust the belt to the right or left, use the bolt and nuts located on the tabs. To move the belt to the right, adjust the left tab down, and to move the belt to the left, adjust the right tab down. Recheck belt tension when finished.

⚠ WARNING

Take precautions to prevent someone else from operating the door as you perform the following procedure. Also, be cautious around the moving parts exposed in the side columns.

6. Restore power to the control panel.

7. Cycle the door several times to work each drive belt.
8. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

9. Measure the deflection in each drive belt to make sure they are both properly tensioned. Readjust the belt tension as necessary.
10. Check the door panel for level and adjust the panel if necessary. (See “DOOR PANEL ADJUSTMENT” on page 19.)

NOTE: Because the door is connected directly to the secondary drive belts, it is important to check the door for level after adjusting either drive belt.

11. After all adjustments are complete, install the side column covers.
12. Restore power to the control panel.

Console Guide Pulley Trolley Adjustment

The drive belt guide pulley trolley within a drive or non-drive console can be adjusted fore and aft. This allows extra slack in the drive belt system if the guide belt pulley in the bottom of a side column cannot be installed. This should not be construed as the proper procedure for adjusting the drive belt.

NOTE: Doors that are 13 ft. x 13 ft. and smaller have only one adjusting screw for the trolley. Any doors larger than 13 ft. x 13 ft. have two adjusting screws for the trolley.

For consoles that have two adjusting screws, both screws should be adjusted. After adjustment, both screws should have contact with the pads on the trolley.

After the installation of the baseplate pulley bracket, the tension on the guide pulley in the console should be re-applied.

CONSOLE—SINGLE ADJUSTING SCREW (L-SERIES)

1. Remove front cover to non-drive console.

NOTE: The drive console has no panel to remove to access the adjusting screw.

2. Loosen the two nuts on the side of the console. (See Figure 35.)

ADJUSTMENTS—SECONDARY DRIVE BELT ADJUSTMENT

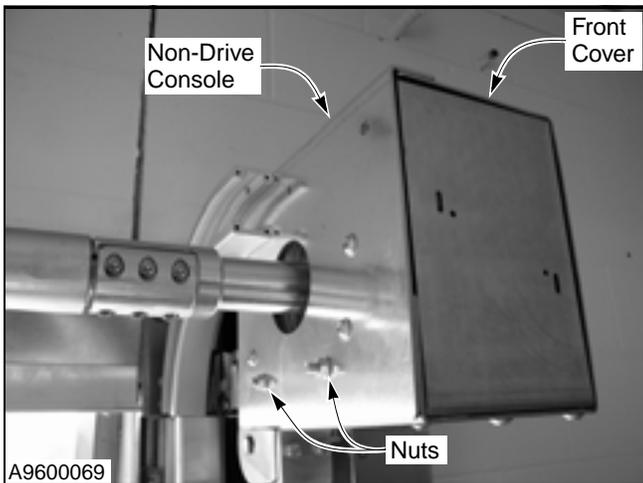


Figure 35

3. Loosen the two TORX® socket button head screws on the bottom of the console. (See Figure 36.)

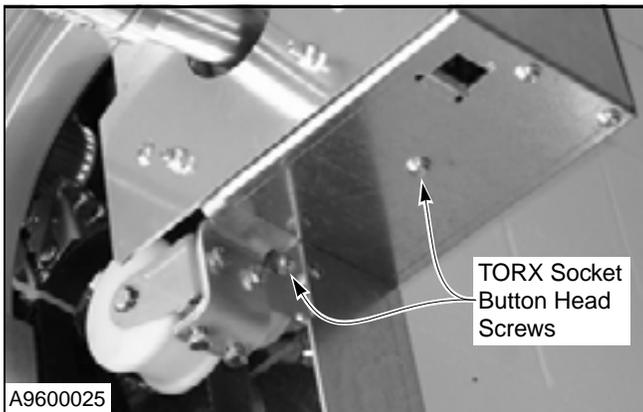


Figure 36

4. Turn cap screw to adjust guide pulley trolley. (See Figure 37.)

NOTE: Turn cap screw clockwise to move trolley toward the wall. Turn cap screw counter-clockwise to move the trolley away from the wall or toward the front of the console.

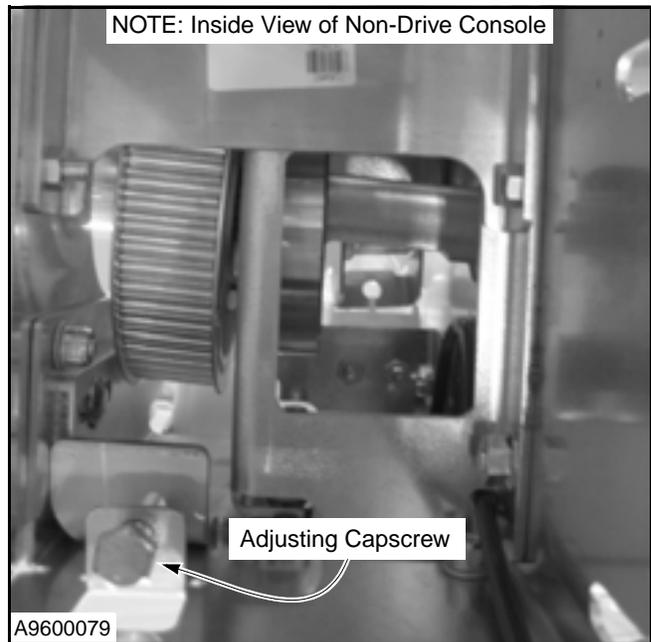


Figure 37

5. When the desired position of the trolley has been achieved, tighten the hardware and reinstall the front cover.

CONSOLE—DUAL ADJUSTING SCREW (S-SERIES)

1. Remove front cover to non-drive console.

NOTE: The drive console has no panel to remove to access the adjusting screw. The belt cover needs to be removed to access the bolts for the guide pulley trolley.

2. Loosen the two nuts on the side of the console. (See Figure 38.)

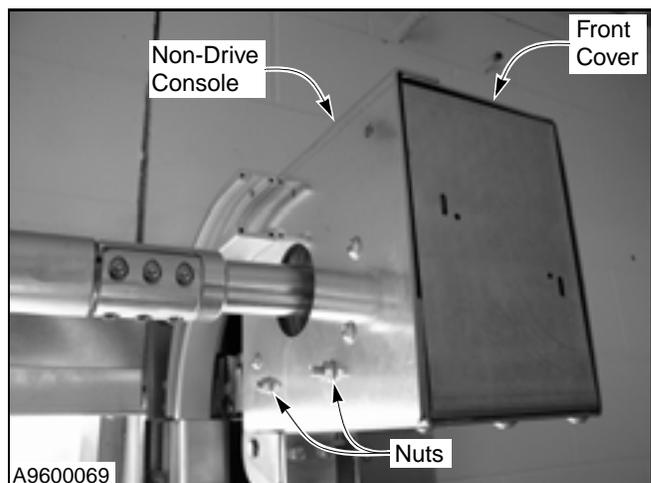


Figure 38

3. Locate the two access holes on the opposite side of the console and loosen bolts to the guide pulley trolley.

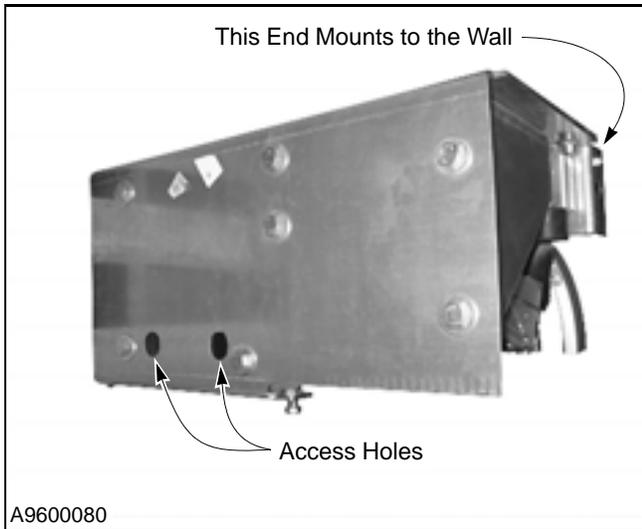


Figure 39

NOTE: On the drive console, remove the belt cover to locate the two access holes and loosen the bolts to the guide pulley trolley. (See Figure 40.)

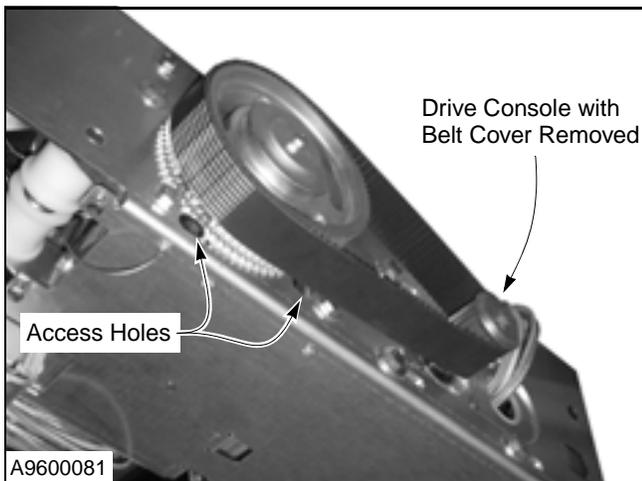


Figure 40

4. Turn the two cap screws and adjust the guide pulley trolley.

NOTE: Turn capscrew clockwise to move the trolley toward the wall. Turn capscrew counterclockwise to move the trolley away from the wall or toward the front of the console.

5. When the desired position of the trolley has been achieved, tighten the hardware and reinstall the front cover.

BRAKE RELEASE CABLE ADJUSTMENT

The cable that connects the brake mechanism to the brake release handle is located in the left-hand side column.

1. Remove power to the control panel by placing the fused disconnect in the OFF position.



The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

2. Remove the cover from the left-hand side column.
3. Locate the end of the cable passing through the brake release handle.
4. With the brake handle fully extended or at 90 degrees, loosen the cable clamp and pull on the free end of the cable to remove any slack. Then slide the cable clamp against the eyelet and tighten the clamp. (See Figure 41.)

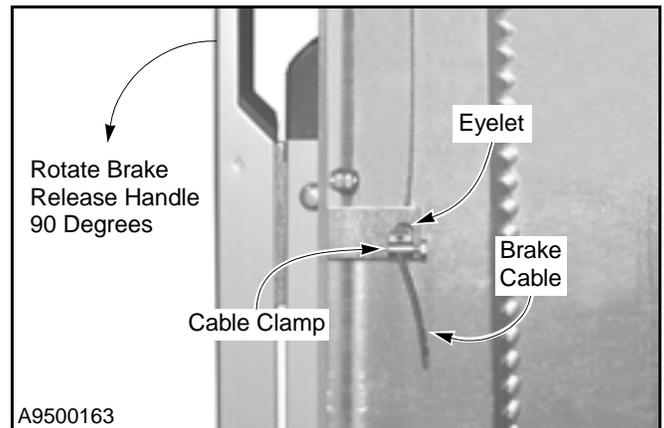


Figure 41

5. Check the tension of the cable by pulling on the brake release handle.
6. Manually position the door panel to verify that the electric brake disengages when the handle is pulled. (The door should slide freely and smoothly.)
7. Return the handle to the side column to re-engage the brake and lock the door.
8. Attempt to manually move the door to verify that the brake mechanism is set and working properly. (The door should remain locked in place.)
9. After all adjustments are complete, reattach the side column cover.
10. Restore power to the control panel.

DOOR PANEL ADJUSTMENT

To ensure the door operates smoothly and efficiently, the door panel must be level between the side columns.

1. Move the door to the fully open position.

ADJUSTMENTS—PHOTO EYE ALIGNMENT

2. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

3. Remove the cover from the side column adjacent to the corner of the door to be lowered.

NOTE: Always lower the high side (corner) of the door panel. Never raise the panel.

4. Release the tension on the secondary drive belt by disconnecting the guide pulley bracket from the front mounting post. (See Figure 42.)

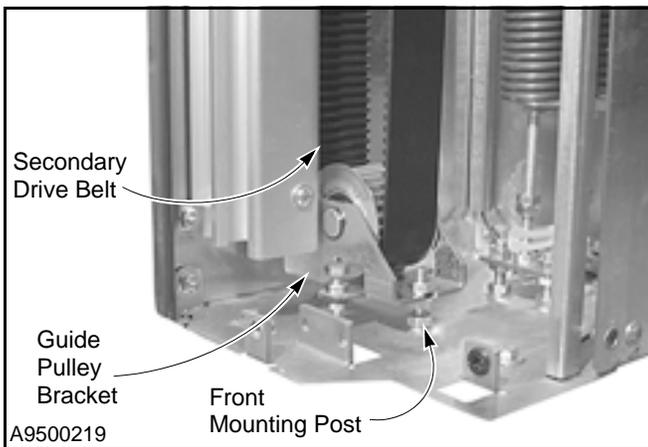


Figure 42

5. Level the door panel by re-indexing the secondary drive belt on the upper drive pulley. To do this, lift and move the drive belt toward the front side of the door panel. (See Figure 43.)

NOTE: Reposition the drive belt no more than one notch (tooth) at a time.

⚠ WARNING

Take care not to get your fingers caught or pinched between the upper drive pulley and the secondary drive belt.

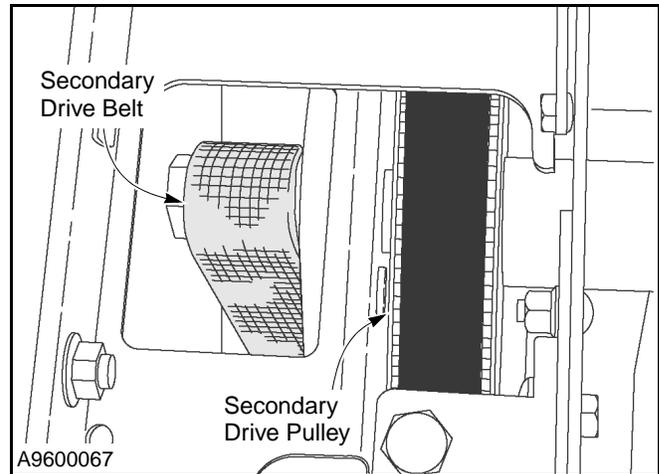


Figure 43

6. Reconnect the guide pulley bracket to the mounting post and set the belt tension. (See "SECONDARY DRIVE BELT ADJUSTMENT" on page 16.)

⚠ WARNING

Take precautions to prevent someone else from operating the door as you perform the following procedure. Also, be cautious around the moving parts exposed in the head assembly.

7. Restore power to the control panel.
8. Cycle the door several times.
9. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

10. Check the door panel for level. Repeat the above procedure, as required, until the panel is level.
11. After all adjustments are complete, reattach the side column cover.
12. Restore power to the control panel.

PHOTO EYE ALIGNMENT

1. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

2. If aligning the front set of photo eyes, remove the side column covers.
3. To align a photo eye, reposition the bracket the photo eye is mounted on, as required.
To determine when the photo eyes are properly aligned, see "Photo Eye Inspection" on page 7. If photo eye replacement is necessary, see "PHOTO EYE REPLACEMENT" on page 34.
4. After all adjustments are complete, reattach the side column covers.
5. Restore power to the control panel and synchronize the door.

REPLACEMENT PROCEDURES

PRIMARY DRIVE BELT REPLACEMENT

The primary drive belt that runs from the gearbox pulley to the primary drive shaft pulley is located behind the belt guard, on the drive end of the console assembly. (See Figure 44.)

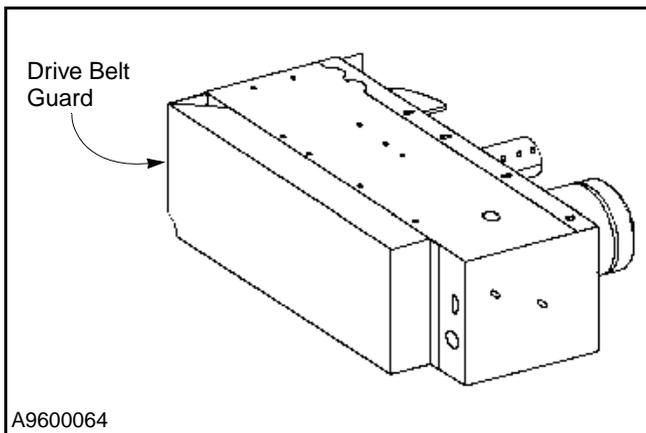


Figure 44

1. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

2. Remove the belt guard from the console assembly.

3. Loosen the four hex head screws securing the drive motor assembly to the drive side console. (See Figure 45.)

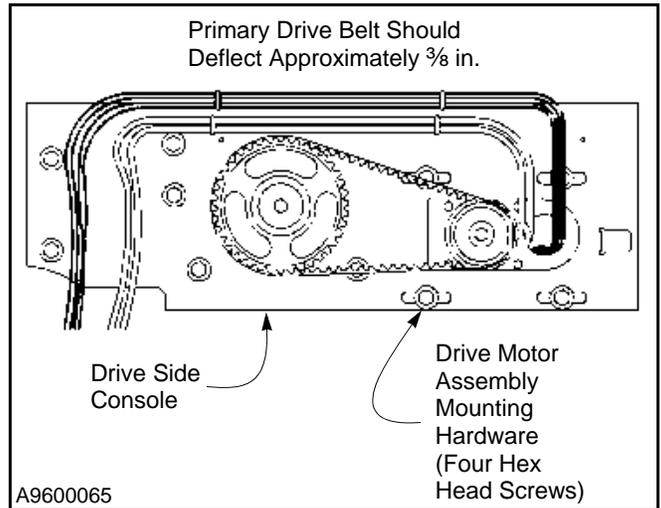


Figure 45

4. Slide the drive motor assembly to the left or toward the drive shaft to release the tension in the drive belt. Tighten one hex nut to temporarily lock the drive motor assembly in place.
5. Remove and replace the drive belt.
6. Loosen the hex nut and apply tension against the new drive belt.
7. To adjust belt tension, see "PRIMARY DRIVE BELT ADJUSTMENT" on page 15.

⚠ WARNING

Take precautions to prevent someone else from operating the door as you perform the following procedure. Also, be cautious around the moving parts exposed in the head assembly.

8. Restore power to the control panel.
9. Cycle the door several times to work the new drive belt.
10. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

11. Reinspect the drive belt to make sure it is properly

REPLACEMENT PROCEDURES—SECONDARY DRIVE BELT REPLACEMENT

tensioned. (See Figure 45.)

12. After all adjustments are complete, install the belt guard.
13. Restore power to the control panel.

SECONDARY DRIVE BELT REPLACEMENT

1. Position the door panel so that the bottom edge of the door is approximately five feet off the floor.
2. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

3. Remove the cover from the side column containing the belt to be replaced.
4. Place clamps across the exposed door track to secure the door and prevent it from accidentally falling once belt tension is released. (See Figure 46.)

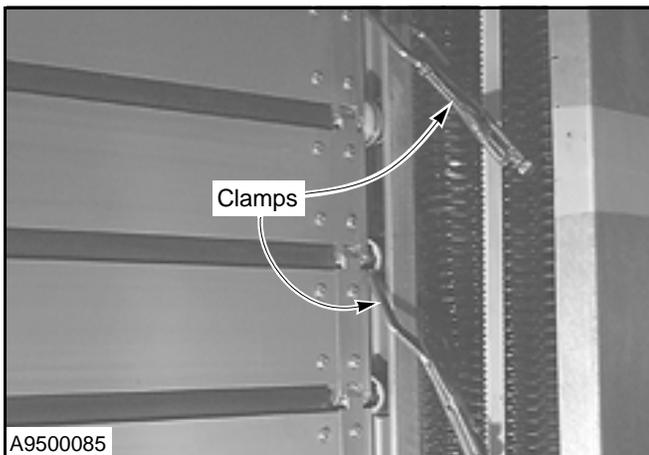


Figure 46

5. Release the tension from the secondary drive belt by removing the guide pulley bracket from the mounting posts. The pulley bracket is held in place by a pair of nuts threaded onto the mounting posts. (See Figure 47.)

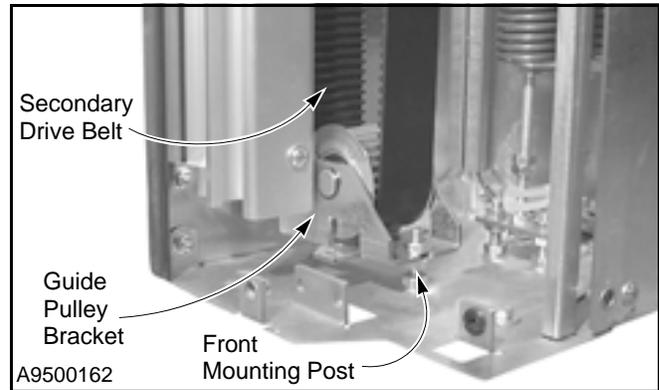


Figure 47

6. Loosen the hex head bolts on the end bracket to release the drive belt from the splice block. (See Figure 48.)

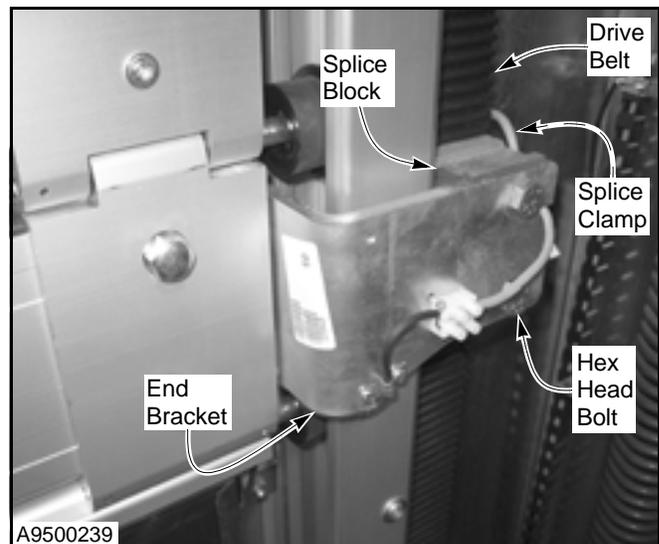


Figure 48

7. Remove the old drive belt from around the upper drive pulley and the guide pulley. Discard the old belt.
8. Install the new secondary drive belt in the same manner as the old belt.
9. Place the ends of the new drive belt between the splice block and splice clamp. Then tighten the TORX® head bolts to clamp the belt to the end bracket.
10. Connect the guide pulley bracket to the mounting posts. Adjust the belt tension. (See “SECONDARY DRIVE BELT ADJUSTMENT” on page 16.)
11. Remove all clamps securing the door panel.
12. Release the electric brake mechanism by pulling the brake release lever. Manually move the door up and down several times to rotate the drive belt.

13. Inspect the belt for normal action as the door travels up and down. Check the tension of the belt. Readjust if necessary.

⚠ WARNING

Take precautions to prevent someone else from operating the door as you perform the following procedure. Also, be cautious around the moving parts exposed in the side columns.

14. Restore power to the control panel.
15. Cycle the door several times to work the drive belt.
16. Verify the new drive belt is working correctly.
17. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

18. Check the tension of the drive belt and readjust if necessary.
19. Check that the door is level and adjust as needed. (See “DOOR PANEL ADJUSTMENT” on page 19.)
20. After all adjustments are complete, reattach the side column cover.
21. Restore power to the control panel.

BRAKE RELEASE CABLE REPLACEMENT

1. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

2. Remove the side cover from the left-hand side column.
3. Disconnect the old brake release cable from the electric brake mechanism by removing the cable clamps, washers, and spring. Save all hardware. (See Figure 49 and Figure 51.)

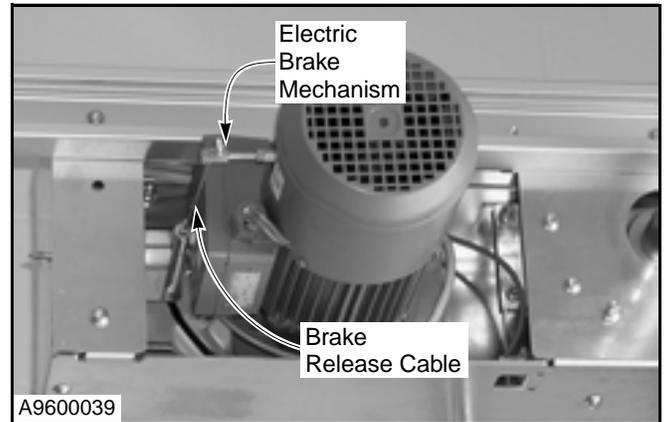


Figure 49

4. Remove and save the cable clamp at the handle end of the cable. Pull the old cable out of the head assembly and side column. Discard the old cable. (See Figure 50.)

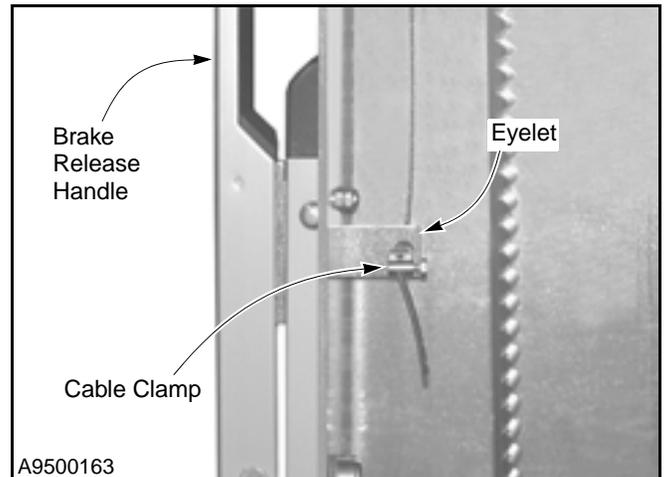


Figure 50

5. Install the new brake release cable, taking the same path as the old cable. Be sure to feed the cable through the cable jacket that runs between the side column and the motor gearbox. (See Figure 51.)

REPLACEMENT PROCEDURES—DOOR PANEL REPLACEMENT

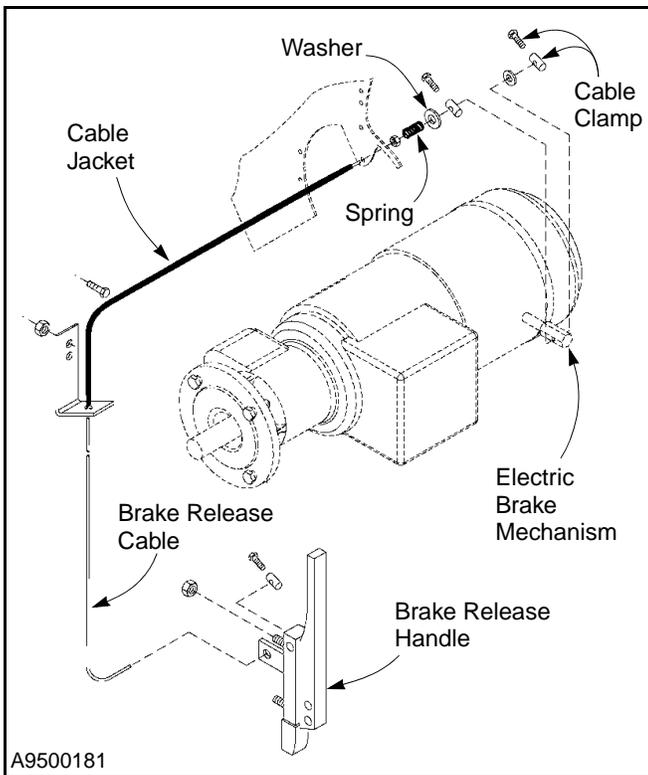


Figure 51

- Using the saved hardware, connect the upper end of the cable to the electric brake mechanism in the reverse order the old cable was removed.
- With the brake release handle fully extended or at 90 degrees, feed the cable through the eyelet in the bottom of the handle. Slide a crimp nut over the end of the cable with the nut tight against eyelet. Then tighten down the set screw — with the majority of slack removed from the cable. (See Figure 52.)

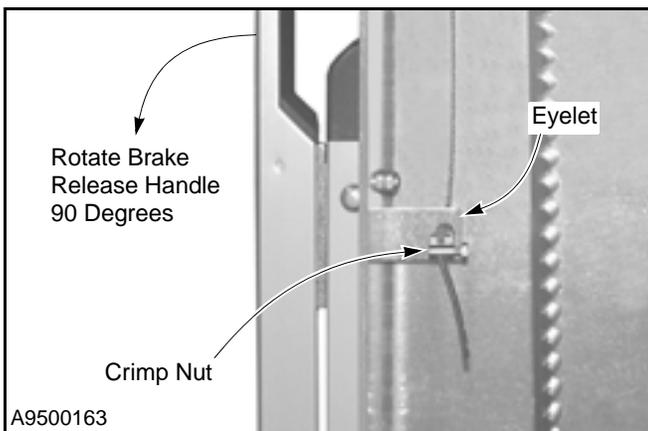


Figure 52

- Pull the handle several times to work the new cable. Check the action of the electric brake mechanism for proper travel. Verify that the door can be repositioned when the brake release handle is pulled. Reposition the cable clamp if necessary.
- After all adjustments are complete, cut the cable to final length, an inch or two past the cable clamp.
- Install the side column cover.
- Restore power to the control panel.

DOOR PANEL REPLACEMENT

- Move the door panel to a comfortable working height by pressing the door open (▲) button located on the control panel.
- Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

- Remove the cover from each side column.

⚠ CAUTION

Use two clamps on each end to prevent upward or downward movement. Serious injury may result from improper procedure.

- Once the door is positioned, set the brake and clamp both sides of the door to the vertical track. Position clamps along both edges of the door, above and below the panel to be removed, to prevent the remaining panels from moving. (See Figure 53.)

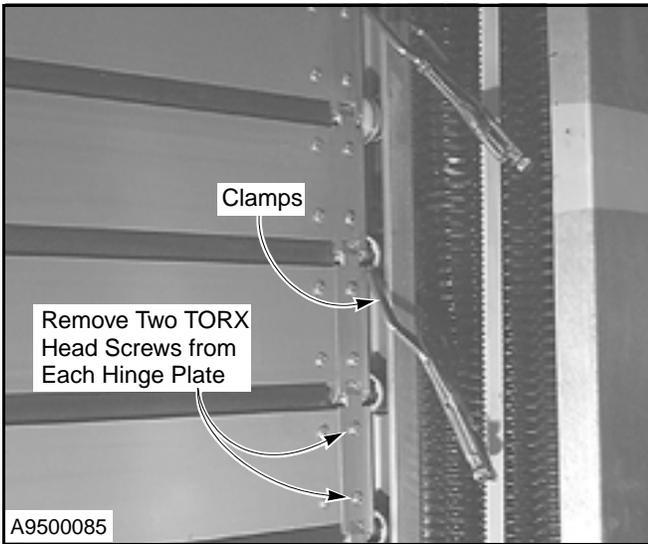


Figure 53

5. At the ends of the door panel to be replaced, remove the two TORX® head screws, securing each hinge plate to the panel. (See Figure 53.)
6. Carefully break free the rubber seal from between the adjoining panels.
7. Slip the panel to be removed out through the back side of the door opening. (Sliding the panel to the left or right will allow the panel to clear the track.)
8. Install the new door panel in the reverse order the old panel was removed.
9. After screwing the hinge plates to the new panel, reattach the rubber seals.
10. Remove clamps.
11. Release the brake by pulling the brake release lever. Manually move the door up and down several times. Verify that the door panel and spring packs function normally. Make any necessary adjustment.

⚠ WARNING

Take precautions to prevent someone else from operating the door as you perform the following procedure. Also, be cautious around the moving parts exposed in the side columns.

12. Restore power to the control panel.
13. Operate the door several times to verify that the door panel and spring packs function normally.
14. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

15. After all adjustments are complete, reattach the side column covers.
16. Restore power to the control panel.

ENERGY CHAIN REPLACEMENT

1. Open door to a comfortable working position that will ease the disassembly on the E-chain between the end block and side column.
2. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

3. Loosen screws on the right side of the terminal block and remove wires.
4. Loosen cable clamp and remove cable from end block.
5. Remove nylon lock nut and E-chain from the mounting bolt. (See Figure 54.)

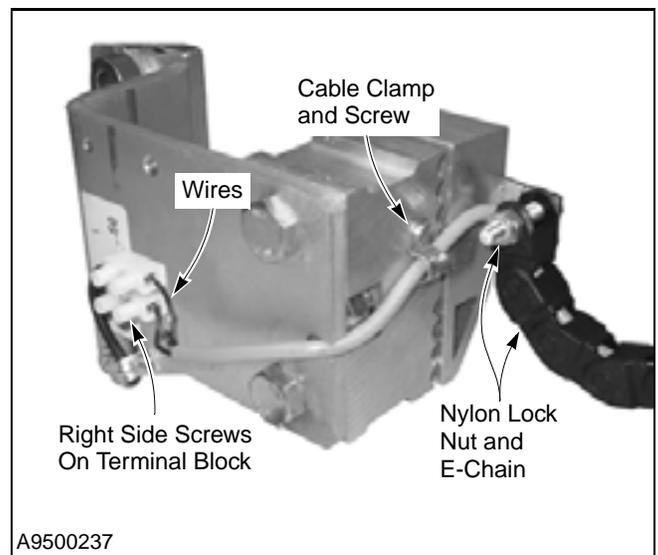


Figure 54

6. Loosen nuts to E-chain bracket clamp. (See Figure 55.)

REPLACEMENT PROCEDURES—WEATHER SEAL REPLACEMENT

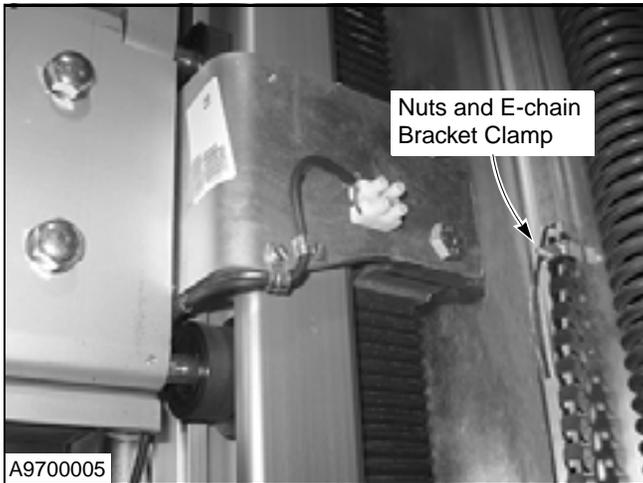


Figure 55

7. Pull old E-chain from cable.

NOTE: For replacement purposes, measure the length of the E-chain prior to removal.

8. Inspect cable for wear and tear. Replace if necessary.
9. Route new E-chain over cable.

IMPORTANT: The E-chain should be the same original length or longer. Additional plastic links can be added if needed.

10. Position E-chain between bracket and clamp and tighten nuts. (See Figure 55.)

NOTE: Do not over tighten clamp. Make sure E-chain swivels without it falling out of the bracket.

11. Connect E-chain and nylon lock nut on the mounting bolt.

NOTE: Tighten nylon lock nut only enough for the E-chain to swivel.

12. Secure cable to the side of the end block with cable clamp and route cable to front of the end block.
13. Insert wires into terminal block and tighten screws. (See Figure 56.)

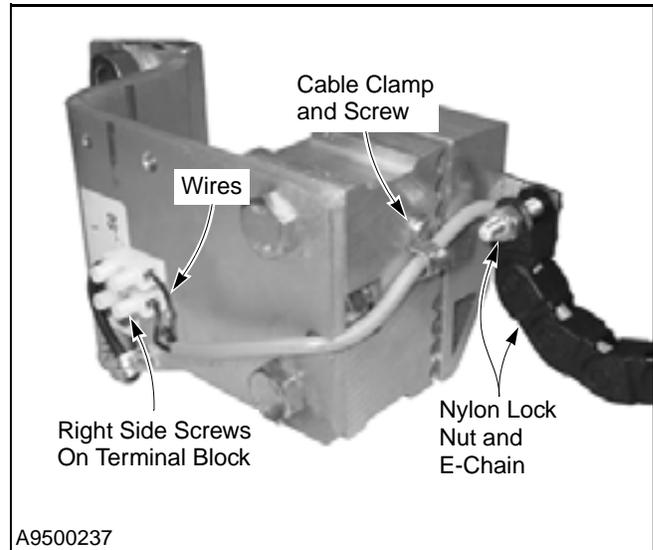


Figure 56

14. Re-check all hardware and connections.
15. Restore power to door.
16. Place the door in JOG MODE by pressing the STOP and DOWN ARROW keys at the same time. The display will read JOG MODE.
17. Jog the door completely up and completely down checking for proper length of the E-chain. Adjust length of E-chain if required.
18. Return door to normal operation.
19. Operate door and check E-chain for smooth operation.

WEATHER SEAL REPLACEMENT

1. Remove power to the control panel by placing the fused disconnect in the OFF position.



The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

2. Remove the side cover from the side column.
3. There is a length of weather seal on both the side column cover and the side column. Each weather seal can be removed by pulling on either end of the seal while working toward the opposite end.
4. Attach the new weather seal in the same manner the old seal was attached. Make sure the seal is firmly seated along the edge.
5. Attach the side cover to the side column.
6. Restore power to the control panel.

SPRING STRAP REPLACEMENT

Drive Side Console

1. Move the door to the fully open position by pressing the door open (▲) button located on the control panel.
2. Remove power to the control panel by placing the fused disconnect in the OFF position.



The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

3. Remove the cover from the side column.
4. Remove the primary belt guard from the drive side console.
5. Loosen the four hex head cap screws, move the motor toward the wall, and remove the primary drive belt. (See Figure 57.)

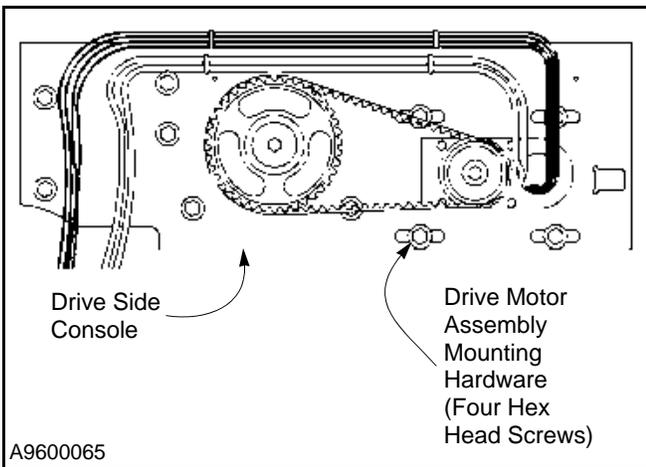


Figure 57

6. Move the motor away from the wall and tighten the hardware to keep the motor in place.
7. Disconnect the associated spring pack assembly from the base plate. To retain the preload setting of the spring pack, loosen only the lower hex nut on each mounting post. (See Figure 58.)

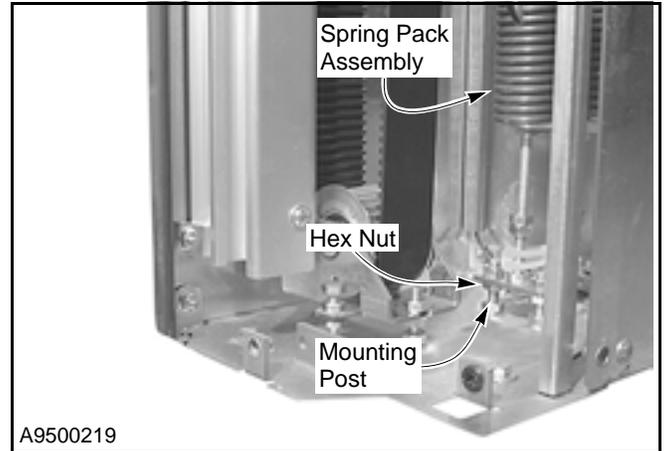


Figure 58

8. To release the strap from the spring pack, remove the hex head screw and the shoulder nut passing through the clevis bracket at the top of the spring pack. Save all hardware. (See Figure 59.)

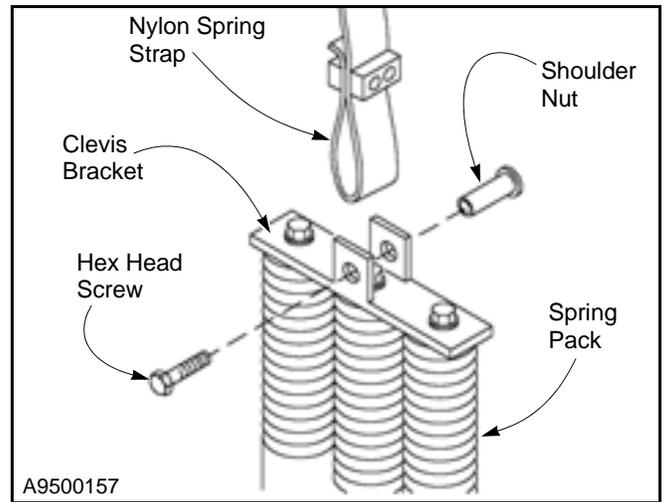


Figure 59



It is critical for you to remember the exact number of times the old spring strap is “dead wrapped” around the drive shaft. Otherwise, if the new strap is not dead wrapped exactly as the old strap, severe damage to the drive system can result.

REPLACEMENT PROCEDURES—SPRING STRAP REPLACEMENT

- To release the spring strap from the drive shaft, first unwind the strap from around the drive shaft.
- Then remove the steel plate and all associated hardware used to clamp the strap to the shaft. Save all hardware. (See Figure 60.)

NOTE: Depending on the rotated position of the drive shaft, you might not have direct access to the hardware securing the spring strap to the drive shaft. To expose the mounting hardware, first release the electric brake mechanism and then manually reposition the door until the drive shaft rotates the mounting hardware toward the opening you are working through. Reset the brake once the mounting hardware is rotated toward the opening.

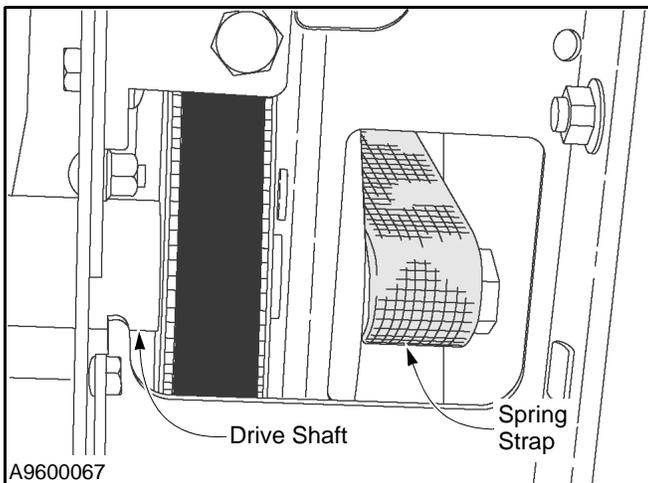


Figure 60

- Attach the new strap to the drive shaft using the saved hardware. The hardware must be securely fastened to ensure that the spring strap does not disconnect from the drive shaft.
- “Dead wrap” the new strap around the drive shaft. Make sure the strap comes off the front of the shaft. Wrap the new strap around the drive shaft the same number of times the old strap was dead wrapped around the shaft. (If the door was moved to rotate the clamp plates, move the door back to its original position to ensure the belt is wrapped correctly.)

CAUTION

It is critical that the new spring strap be “dead wrapped” around the drive shaft the correct number of times. It is equally important that the strap be wrapped so that it comes off the front of the drive shaft. Otherwise, the door will not open or close properly and damage to the drive system could result.

- Attach the loop end of the new spring strap to the spring pack using the saved hardware. Make sure the strap is not twisted. (See Figure 61.)

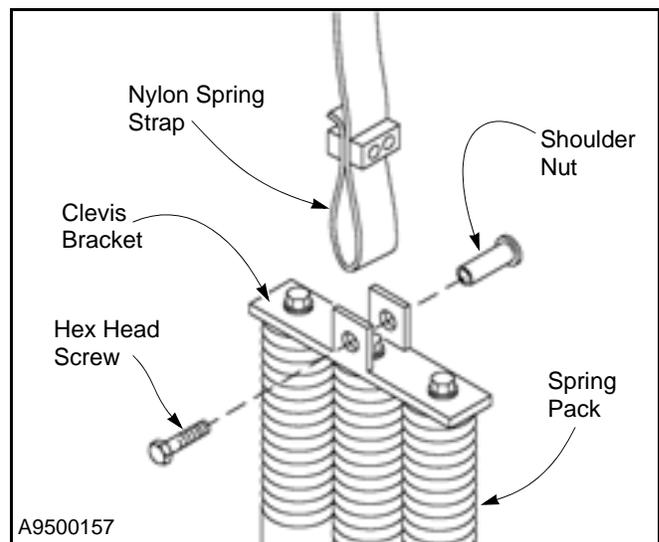


Figure 61

- Attach the spring pack to the mounting posts on the base plate. Tighten the *lower nuts* against the bottom of the mounting plate to retain the preload setting of the spring pack. (See Figure 62.)

NOTE: If more than one spring pack is used, face the forked mounting plates toward each other and use plastic cable ties to help pull the mounting plates tight against the posts.

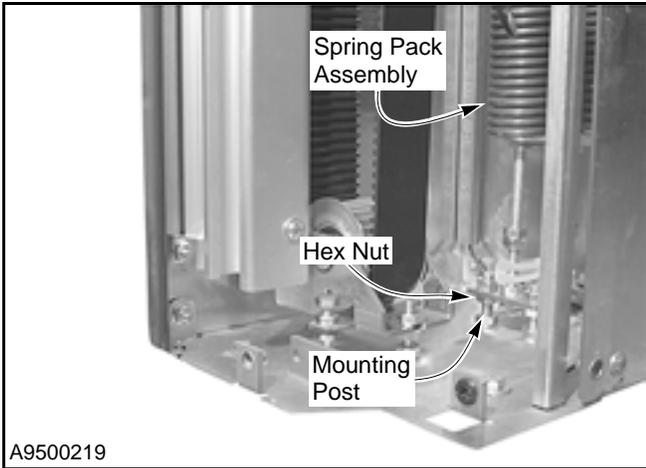


Figure 62

15. Release the electric brake mechanism by pulling the brake release lever. Manually move the door up and down several times to work the new strap.
16. Inspect the spring strap for normal action as the door travels up and down.

⚠ WARNING

Take precautions to prevent someone else from operating the door as you perform the following procedure. Also, be cautious around the moving parts exposed in the head assembly.

17. Restore power to the control panel.
18. Cycle the door several times. Verify that the new spring strap is working correctly.
19. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

20. After all adjustments are complete, attach the end cap and the side column cover.
21. Restore power to the control panel.

Non-Drive Side Console

1. Move the door to the fully open position by pressing the door open (▲) button located on the control panel.
2. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

3. Remove the cover from the side column.
4. Remove the end cap from the console assembly to expose the upper end of the spring strap. (See Figure 63.)

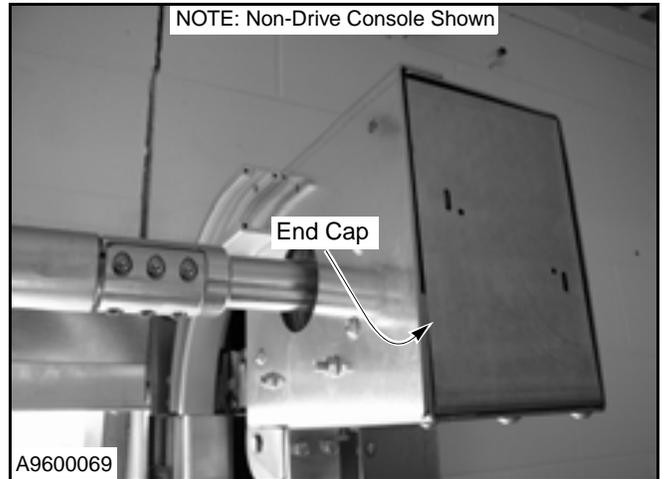


Figure 63

5. Disconnect the associated spring pack assembly from the base plate. To retain the preload setting of the spring pack, loosen only the lower hex nut on each mounting post. (See Figure 64.)

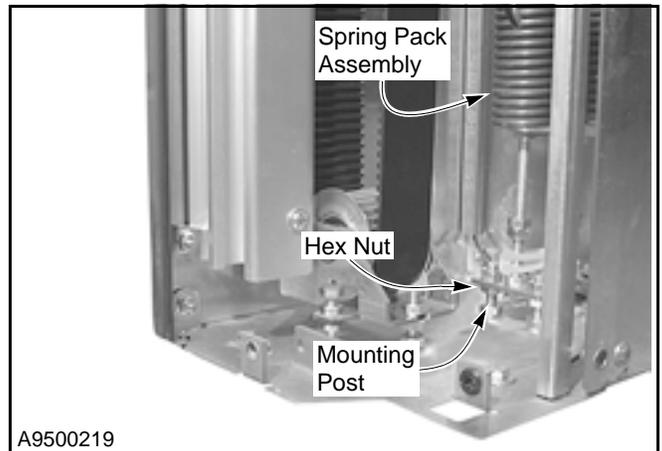


Figure 64

6. To release the strap from the spring pack, remove the hex head screw and the shoulder nut passing through the clevis bracket at the top of the spring pack. Save all hardware. (See Figure 65.)

REPLACEMENT PROCEDURES—SPRING STRAP REPLACEMENT

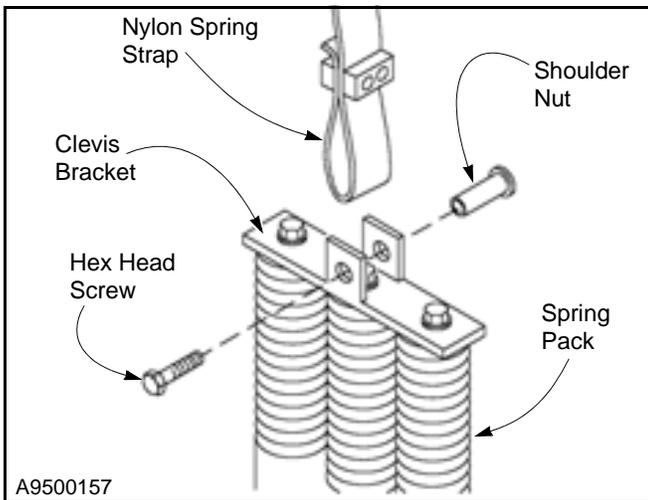


Figure 65

CAUTION

It is critical for you to remember the exact number of times the old spring strap is “dead wrapped” around the drive shaft. Otherwise, if the new strap is not dead wrapped exactly as the old strap, severe damage to the drive system can result.

7. To release the spring strap from the drive shaft, first unwind the strap from around the drive shaft.
8. Then remove the steel plate and all associated hardware used to clamp the strap to the shaft. Save all hardware. (See Figure 66.)

NOTE: Depending on the rotated position of the drive shaft, you might not have direct access to the hardware securing the spring strap to the drive shaft. To expose the mounting hardware, first release the electric brake mechanism and then manually reposition the door until the drive shaft rotates the mounting hardware toward the opening you are working through. Reset the brake once the mounting hardware is rotated toward the opening.

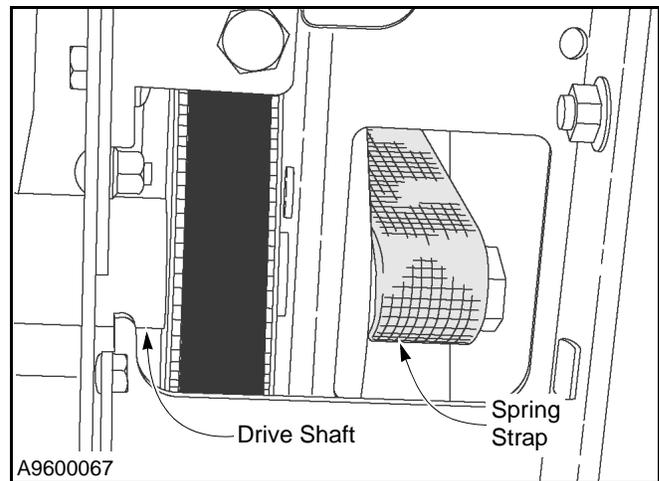


Figure 66

9. Attach the new strap to the drive shaft using the saved hardware. The hardware must be securely fastened to ensure that the spring strap does not disconnect from the drive shaft.
10. “Dead wrap” the new strap around the drive shaft. Make sure the strap comes off the front of the shaft. Wrap the new strap around the drive shaft the same number of times the old strap was dead wrapped around the shaft. (If the door was moved to rotate the clamp plates, move the door back to its original position to ensure the belt is wrapped correctly.)

CAUTION

It is critical that the new spring strap be “dead wrapped” around the drive shaft the correct number of times. It is equally important that the strap be wrapped so that it comes off the front of the drive shaft. Otherwise, the door will not open or close properly and damage to the drive system could result.

11. Attach the loop end of the new spring strap to the spring pack using the saved hardware. Make sure the strap is not twisted. (See Figure 67.)

REPLACEMENT PROCEDURES—SPRING PACK REPLACEMENT

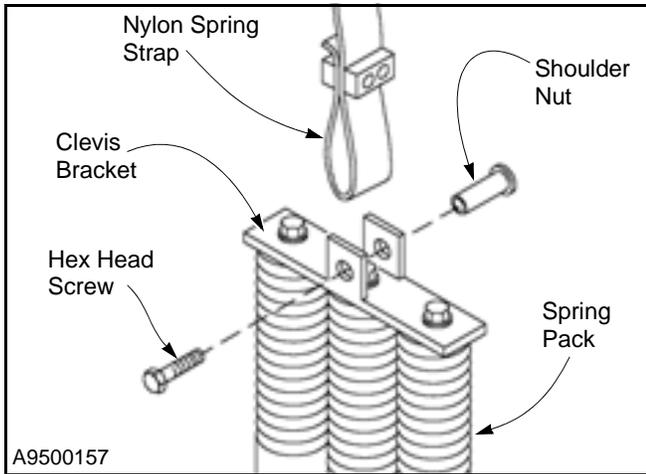


Figure 67

12. Attach the spring pack to the mounting posts on the base plate. Tighten the *lower nuts* against the bottom of the mounting plate to retain the preload setting of the spring pack. (See Figure 68.)

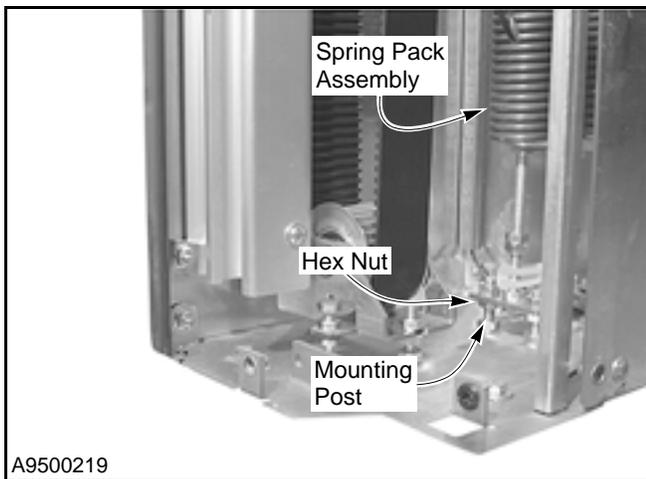


Figure 68

13. Release the electric brake mechanism by pulling the brake release lever. Manually move the door up and down several times to work the new strap.
14. Inspect the spring strap for normal action as the door travels up and down.

WARNING

Take precautions to prevent someone else from operating the door as you perform the following procedure. Also, be cautious around the moving parts exposed in the head assembly.

15. Restore power to the control panel.

16. Cycle the door several times. Verify that the new spring strap is working correctly.
17. Remove power to the control panel by placing the fused disconnect in the OFF position.

WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

18. After all adjustments are complete, attach the end cap and the side column cover.
19. Restore power to the control panel.

SPRING PACK REPLACEMENT

1. Move the door to the fully open position by pressing the door open (▲) button located on the control panel.
2. Remove power to the control panel by placing the fused disconnect in the OFF position.

WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

3. Remove the side cover from the side column.
4. Disconnect the old spring pack assembly from the base plate. The spring pack is held in place by two hex nuts threaded onto a pair of mounting posts. (See Figure 69.)

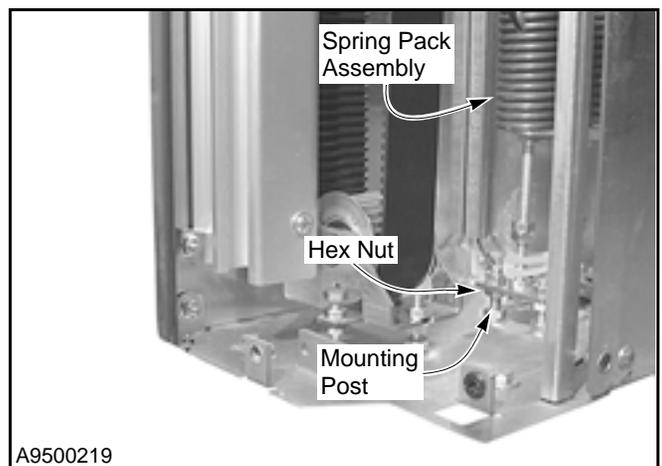


Figure 69

REPLACEMENT PROCEDURES—SPRING PACK REPLACEMENT

- To release the spring pack from the strap, remove the hex screw and the shoulder nut passing through the clevis bracket located at the top of the spring pack. (See Figure 70.)

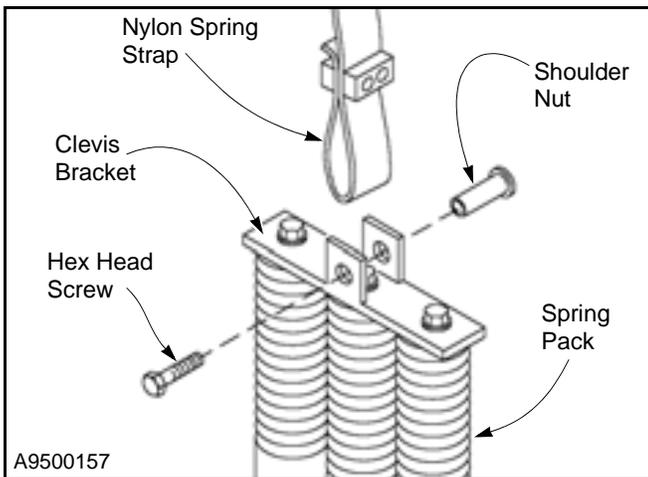


Figure 70

- To install a new spring pack, first attach it to the loop end of the spring strap using the existing hardware. Make sure the strap is not twisted.
- Before a spring pack can be attached to the base plate, it must first be preloaded (sized) for your particular door. The information you will need for this procedure is provided on the Preload Information Sheet that was shipped with the new spring pack.

Preload is the measured distance between the bottom plate and the forked mounting plate. To preload a spring pack, rotate the adjustment rod until the rod assembly is the correct length. Then tighten the jam nut to lock in the adjustment. (See Figure 71.)

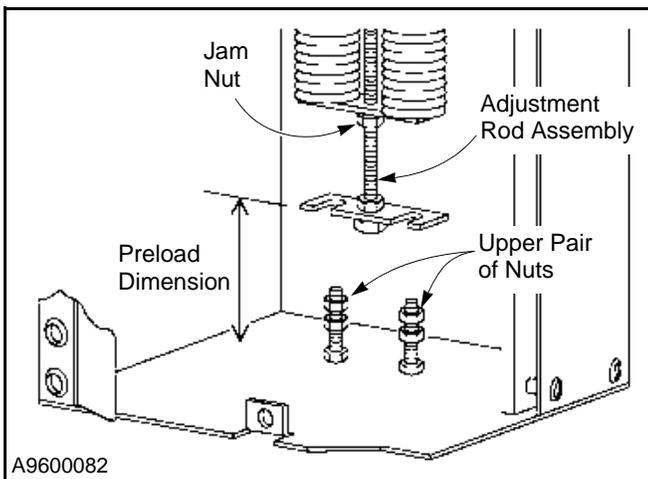


Figure 71

- Attach the spring pack to the mounting posts on the base plate. To retain the preload setting, tighten only the lower nuts against the bottom of the mounting plate — do not adjust the upper pair of nuts. (See Figure 72.)

NOTE: Make sure the spring strap is not twisted. Also, if more than one spring pack is used in the side column, face the forked mounting plates toward each other and use plastic cable ties to hold the mounting plates tight against the posts.

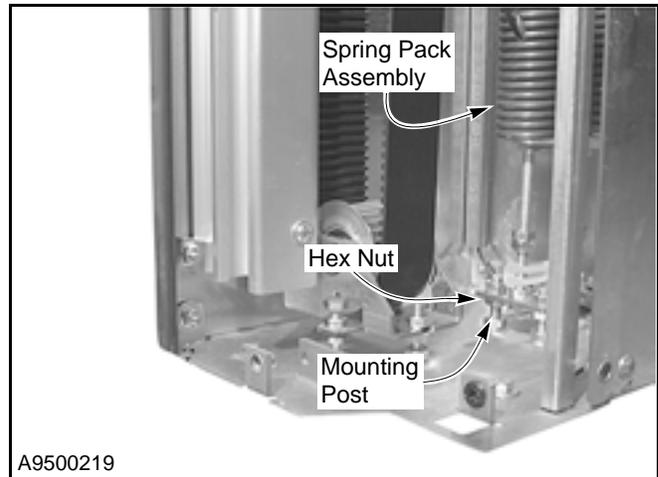


Figure 72

- Release the electric brake mechanism by pulling the brake release lever. Manually move the door up and down several times to stretch and work the new spring pack.
- Inspect the spring pack for normal action as the door travels up and down. Make any necessary adjustments.

⚠ WARNING

Take precautions to prevent someone else from operating the door as you perform the following procedure. Also, be cautious around the moving parts exposed in the side columns.

- Restore power to the control panel.
- Cycle the door several times. Verify that the new spring pack is working correctly.
- Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

14. After all adjustments are complete, attach the cover to the side column.
15. Restore power to the control panel.

DOOR ROLLER REPLACEMENT

1. Move the door to a comfortable working position by pressing the door open (▲) button on the control panel.
2. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

3. Remove the cover from each side column.
4. Once the door is positioned, clamp both sides of the door to the vertical track. Position clamps along both edges of the door. (See Figure 73.)

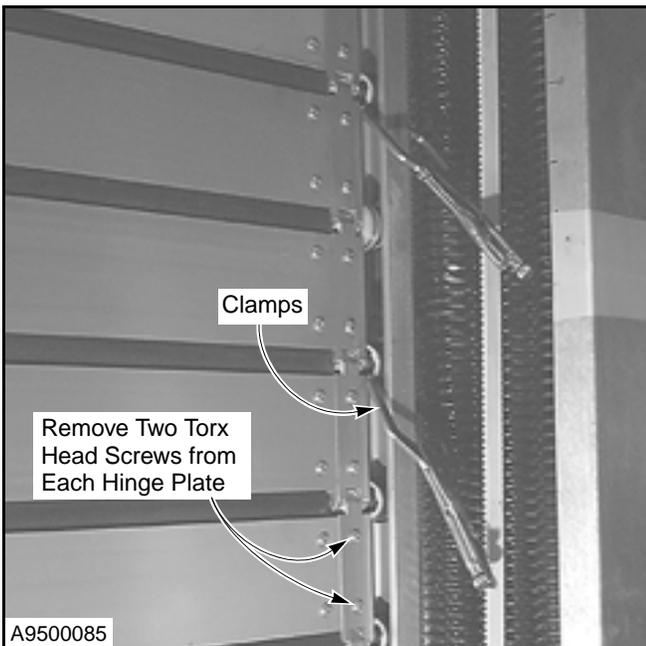


Figure 73

5. Remove the vertical door track cap that is covering the roller to be removed. The cap is held in place with TORX® head screws. (See Figure 74.)

NOTE: Depending on the height of the door, the track cover may be a one- or two-piece unit. If it is a two-piece unit, remove the corresponding cover to service the equipment.

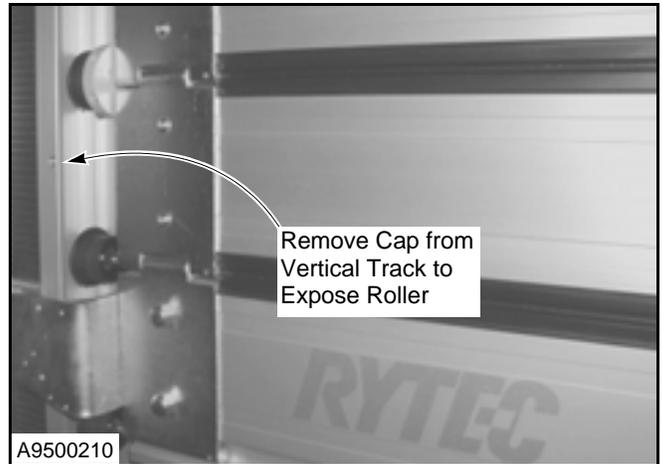


Figure 74

6. Remove the TORX® head screws from the hinge plates along both sides of the roller to be removed. (See Figure 73.)
7. To remove the roller, loosen and remove the nut on the end of the roller. Then slide the roller off the end of the axle. (See Figure 75.)

NOTE: To remove a bent or damaged axle, punch out the small spring pin that locks the axle in the hinge.

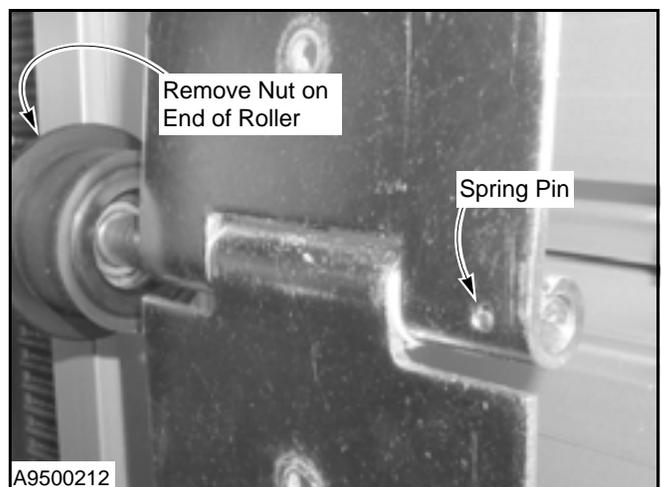


Figure 75

8. Install the new roller, and reassemble the door and the track in the reverse order of disassembly.

CAUTION

Use two clamps on each end to prevent upward or downward movement. Serious injury may result from improper procedure.

9. Release the electric brake mechanism by pulling the brake release lever. Manually move the door up and down several times to work the new roller.

WARNING

Take precautions to prevent someone else from operating the door as you perform the following procedure. Also, be cautious around the moving parts exposed in the head assembly.

10. Restore power to the control panel.
11. Cycle the door several times. Verify that the new roller is working correctly.
12. Remove power to the control panel by placing the fused disconnect in the OFF position.

WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

13. After all adjustments are complete, attach both side column covers.
14. Restore power to the control panel.

PHOTO EYE REPLACEMENT

When replacing the photo eyes, note that the emitter modules are located in the right-front and left-rear corners of the door, and the receiver modules are located in the left-front and right-rear corners of the door.

The eyes must be installed with the emitter modules and receiver modules mounted diagonally across from each other to avoid one set of eyes from interfering with the other set of eyes.

Also, the front and rear sets of photo eyes and their associated wire cables are not interchangeable — each set of eyes is of a different style and manufacturer.

WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

Cleaning Photo Eyes

A dirty photo eye lens can cause a photo eye module to fail or operate intermittently. After any work is performed on either set of photo eyes, it is recommended that the lens on each photo eye be cleaned using a clean, soft cloth and household window cleaner.

REVERSING EDGE REPLACEMENT

1. Move the door to a comfortable working position by pressing the door open (▲) button on the control panel.
2. Remove power to the control panel by placing the fused disconnect in the OFF position.

WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

3. Remove the cover from each side column.

CAUTION

An appropriate number of clamps must be placed across both door tracks to prevent the door panel from moving while performing the following procedure.

4. Clamp both sides of the door to the upper-most sections of track. (See Figure 76.)

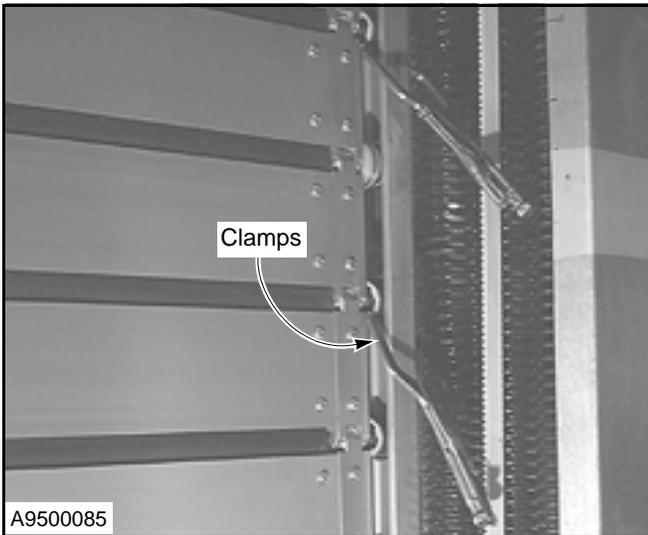


Figure 76

5. Disconnect the reversing edge control wires from the terminal block. (See Figure 77.)
6. Disconnect the reversing edge cable from the end bracket and the bottom door panel by removing the wire clips screwed to the bracket and panel. Save all hardware. (See Figure 77.)

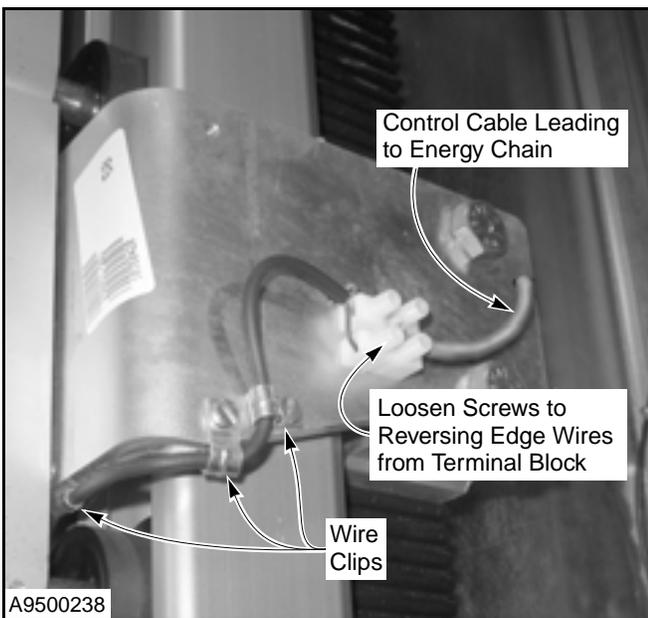


Figure 77

7. Remove and save the two small Phillips head screws used to secure the rubber reversing edge to the bottom door panel. Each screw is located about 4 in. from the ends of the panel, just above the rubber reversing edge. (See Figure 78.)

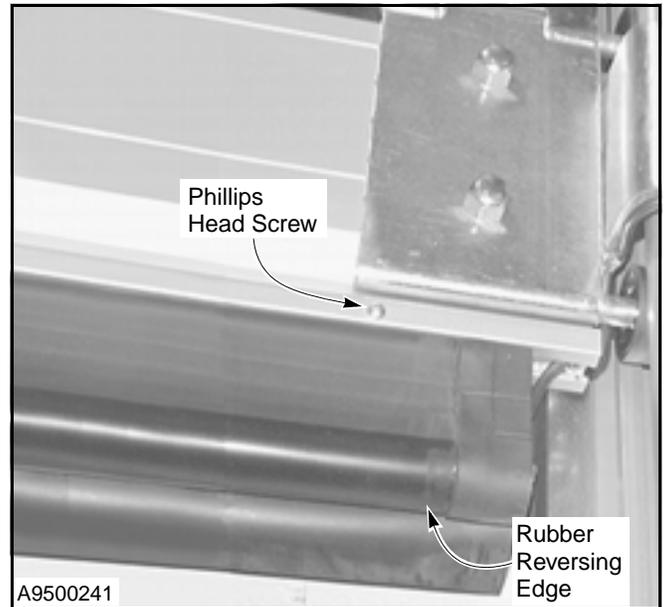


Figure 78

8. Release the tension from each secondary drive belt by removing the guide pulley bracket from its front and rear mounting posts. The pulley bracket is held in place by a nut threaded onto each post. (See Figure 79.)

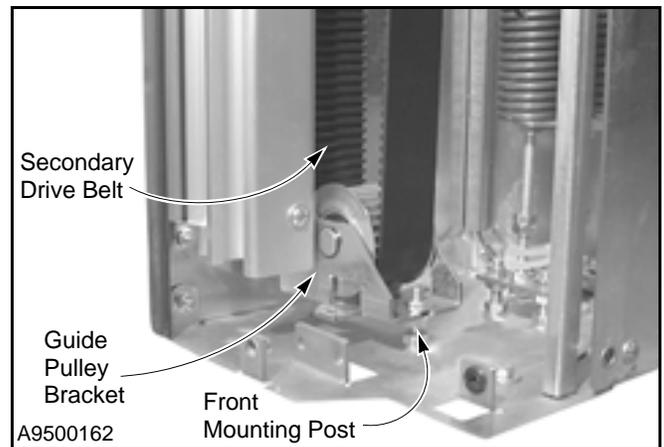


Figure 79

9. Remove the track cap from the lower section of door track along both sides of the door panel. Save all hardware. (See Figure 80.)

NOTE: Depending on the height of the door, the track cover may be a one- or two-piece unit. If it is a two-piece unit, the lower half track cover should be removed.

REPLACEMENT PROCEDURES—REVERSING EDGE REPLACEMENT



Figure 80

10. Lift the lower door panel away from the door opening until the reversing edge just clears the front of each side column.
11. Slide the reversing edge out of the T-channel it hangs from along the bottom edge of the door.
12. Install the new reversing edge in the reverse order the old edge was removed using all saved hardware. Make sure to center the reversing edge between the door panels before reinstalling the small Phillips head screws.
13. Connect both drive belt pulley brackets to the mounting posts in the bottom of the side columns.
14. Inspect the tension on each secondary drive belt. If adjustment is necessary, see “SECONDARY DRIVE BELT ADJUSTMENT” on page 16.
15. Reattach the spring packs to the mounting posts. Make sure the straps from which the spring packs are not twisted.
16. Release the electric brake mechanism by pulling the brake release lever. Manually move the door up and down several times to ensure the panel rolls smoothly.

⚠ WARNING

Take precautions to prevent someone else from operating the door as you perform the following procedure. Also, be cautious around the moving parts exposed in the head assembly.

17. Restore power to the control panel.
18. Cycle the door several times. Verify that the door panel rolls smoothly and is working correctly.

19. Test the new reversing edge to make sure that it is operating properly. (See “Reversing Edge Inspection” on page 7.)
20. Remove power to the control panel by placing the fused disconnect in the OFF position.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

21. After all adjustments are complete, attach the side column covers.
22. Restore power to the control panel.

PARTS LIST

PARTS ORDERING INFORMATION

IMPORTANT: To ensure you order and receive the right parts for your door, determine the model (series) designation of your door by measuring the width of either side column. A spiral L-series side column is 9½ in. (240 mm) wide; a spiral S-series side column is 14 in. (350 mm) wide.

How to Order Parts

1. Identify the parts required by referring to the following pages for part numbers and part descriptions.
2. To place an order, contact your local Rytec representative or the Rytec Customer Support Department at 800-628-1909 or 262-677-2058 (fax).
3. To ensure the correct parts are shipped, please include the serial number of your door with the order. The serial number can be found inside either side column (approximately eye level), on the drive motor, and on the inside door of the System 3 control panel.

Substitute Parts

Due to special engineering and product enhancement, the actual parts used on your door may be different from those shown in this manual.

Also, if a part has been improved in design and bears a revised part number, the improved part will be substituted for the part ordered.

Return of Parts

Rytec will not accept the return of any parts unless they are accompanied by a Return Merchandise Authorization (RMA) form.

Before returning any parts, you must first contact the Rytec Customer Support Department to obtain authorization and an RMA form.

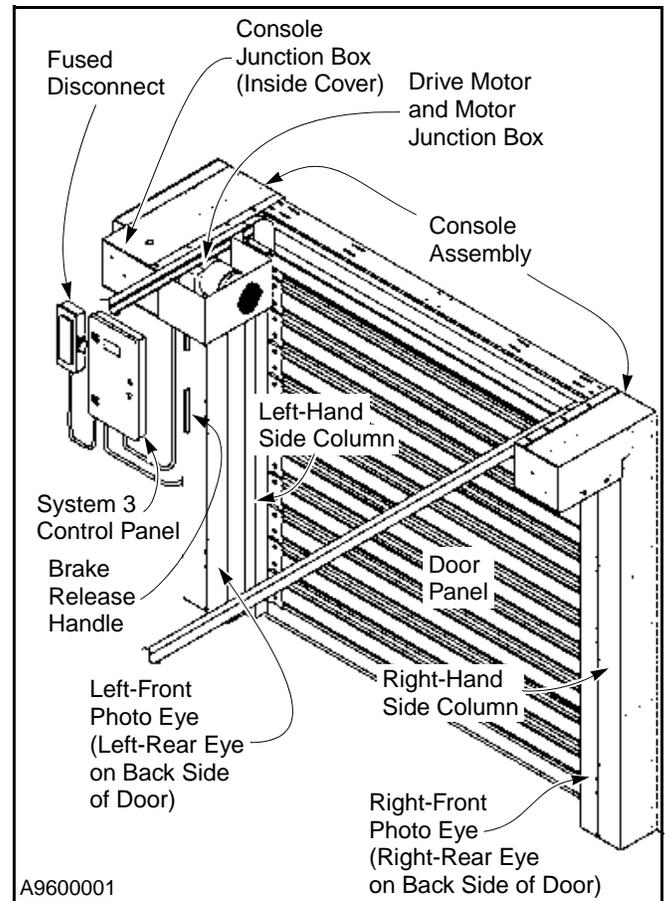
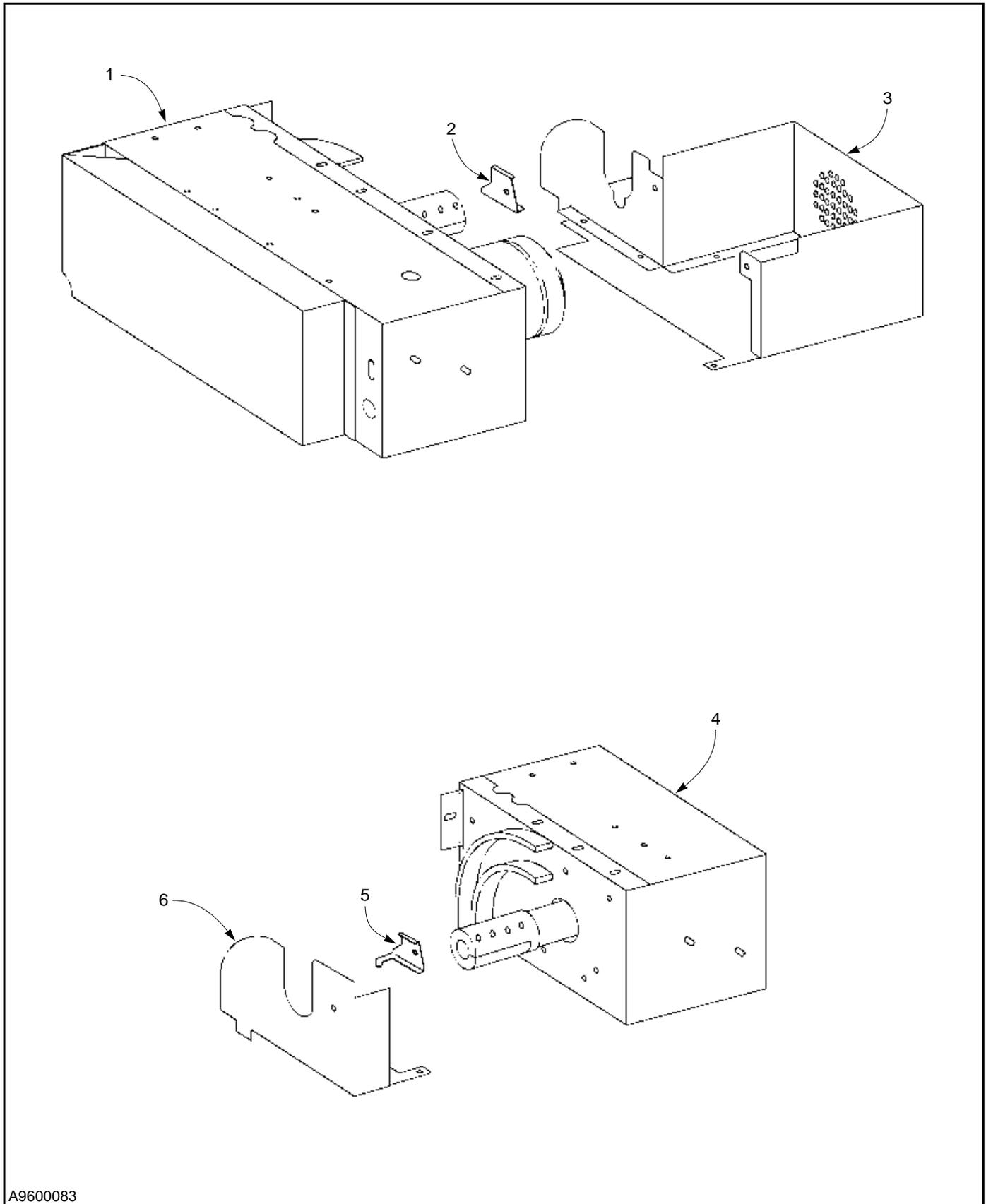


Figure 81

PARTS LIST—LEFT AND RIGHT CONSOLES

LEFT AND RIGHT CONSOLES



A9600083

Figure 82

PARTS LIST—LEFT AND RIGHT CONSOLES

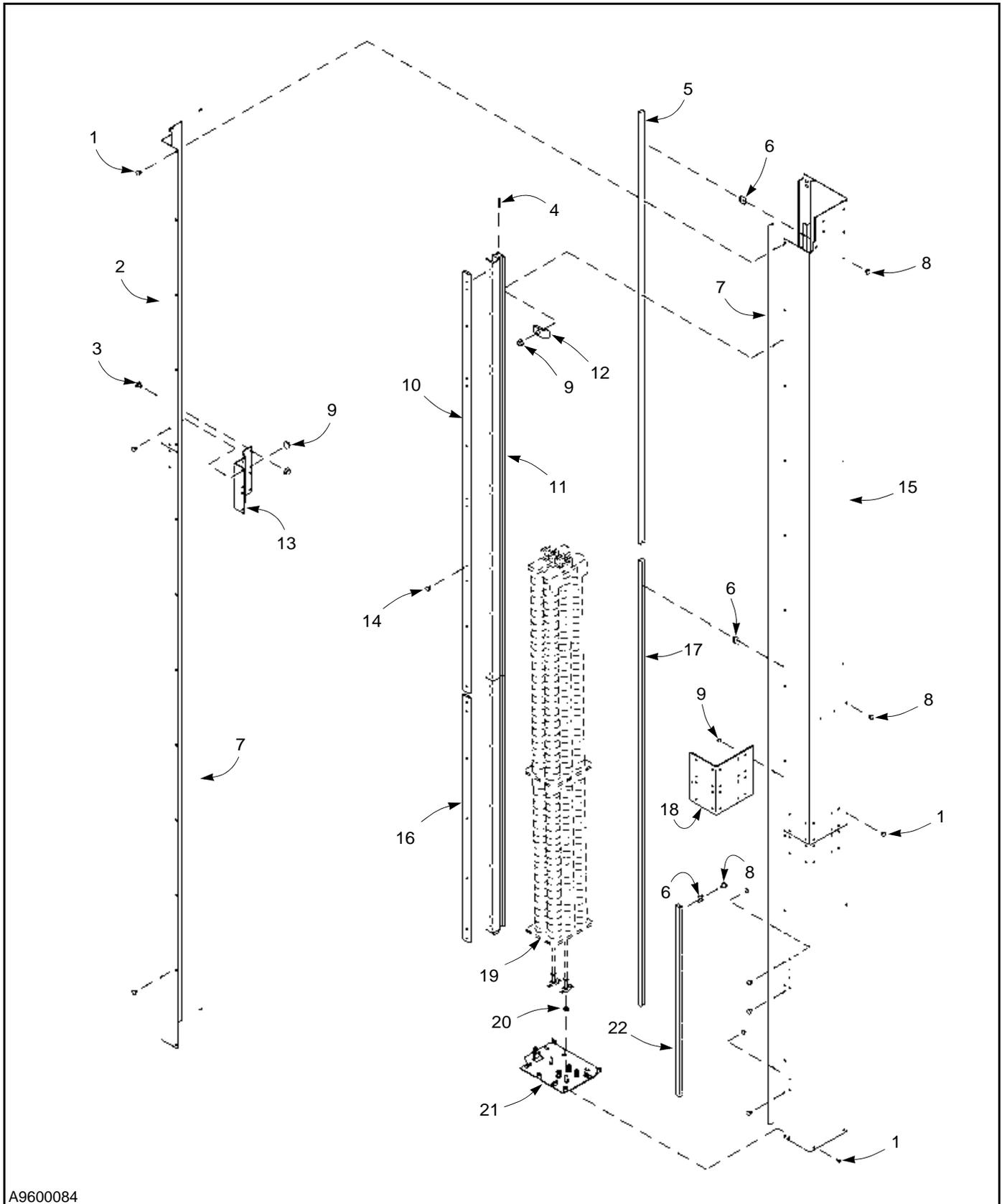
ITEM	QTY.	PART #	DESCRIPTION	ITEM	QTY.	PART #	DESCRIPTION
1	1	243853/1Z1	Console Assembly Drive Side, Consisting of Items 7 thru 43 (Not Shown)	28	1	236866AZ1	Drive, Complete (0.75 kW, 275 U/min.)
						243866BZ1	Drive, Reinforcement (0.75 kW, 430 U/min.)
2	1	243815/1Z1	Bracket, Side Column Cover, LH			243866CZ1	Drive, Reinforcement (1.50 kW, 410 U/min.)
3	1	236819/1Z1	Cover, Console Assembly	29	1	02241783	Drive, LL (0.75 kW 1/Min=275)
4	1	243853/2Z1	Console Assembly Non-Drive Side, Consisting of Items 44 thru 48 (Not Shown)			02441793	Drive, SL (0.75 kW 1/Min=430)
						02441744	Drive, SL (1.50 kW 1/Min=410)
5	1	243815/2Z1	Bracket, Side Column Cover, RH	30	1	243810Z1	Plate, Motor
6	1	236328/2Z1	Cover, Console Assembly	31	1	205534	Cog, Drive (D=66)
7	1	205532	Cog, Drive	32	1	WN250/A	Ring, Distributor (D=35/21 x 5)
8	1	236318Z1	Cover, Drive			WN250/C	Ring, Distributor (D=40/26 x 7)
9	2	243804Z1	Holder, Cog				
10	2	243805Z1	Holder, Rubber Stop	33	1	WN018/B	Piece, Pressure
11	2	243806Z1	Cover, Console			WN018/A	Piece, Pressure (50 lg=5 mm)
12	2	243809/1Z1	Angle, Belt Reel	34	1	217361Z1	Halter, for Bowden
13	2	243811-01Z1	Reel, Belt	35	1	08092673	Bandage, Wire
14	1	217872	Belt, Spring	36	1	08092676	Tube, Pom
15	1	236850/1Z1	Spiral, LH	37	1	08210610	Wire, Steel
16	1	243852/1Z1	Console, LH	38	1	080701071	Spring
17	1	243855/1-01Z1	Plate, Bearing, LH	39	1	08151080	Screw, Wire Fixing
18	1	243854/1-01Z1	Plate w/nuts, Bearing, LH	40	1	01900050	Washer
19	1	237503/1-01Z1	Drive Shaft (Motor Side)	41	1	02001280	End Piece, Wire
20	2	205533	Cog, Drive	42	1	08310426	V-Belt (HDT Typ 960-8M-30)
21	2	237859Z1	Case, Bearing	43	2	08310450	V-Belt (LL-8M-30)
22	2	243813-01Z1	Reel, Belt	44	1	243852/2Z1	Console, RH
23	2	01340150	Bushing, Fixing (35 x 45 x 2.0)	45	1	243855/2-01Z1	Plate, Bearing, RH
24	3	01531036	Treenail (10 x 8 x 36)	46	1	243854/2-01Z1	Plate w/nuts, Bearing, RH
25	2	04100145	Stop, Rubber	47	1	237503/2-01Z1	Drive Shaft (Bearing Side)
26	1	WN018/B	Pressure Piece	48	1	236850/2Z1	Spiral, RH
27	2	243803Z1	Sheet, Reinforcement				

ALWAYS INCLUDE SERIAL NUMBER OF DOOR WHEN PLACING ORDER

To ensure you receive the correct parts when placing an order, always include the serial number of your door. Also, due to product enhancement, the actual parts on your door may be different from those shown in this manual.

PARTS LIST—SIDE COLUMNS

SIDE COLUMNS



A9600084

Figure 83

PARTS LIST—SIDE COLUMNS

ITEM	QTY.	PART #	DESCRIPTION	ITEM	QTY.	PART #	DESCRIPTION
-	1	Consult Factory	Assembly, Right Side Column, L/R	14	A/R	01900820	Screw, M8 x 20 T40 TORX, Dome Washer Head
-	1	Consult Factory	Assembly, Left Side Column, L/R (Not Shown)	15	1	Consult Factory	Sub-Assembly, Side Column, Right, L/R
1	A/R	01900812	Screw, M8 x 12 T30 TORX Drive Dome Washer Head	1	Consult Factory	Sub-Assembly, Side Column, Left, L/R (Not Shown)	
2	1	237331/2Z1*	Front Cover, Side Column, RH L/R	16	1	Consult Factory	Vertical Track Cap, Lower x 1680 Long
	1	237331/1Z1*	Front Cover, Side Column, LH, L/R (Not Shown)	17	1	08041001B*	Wire Raceway, Lower Rear Right Side Column Bracket, Splice
3	A/R	01900816	Screw, M8 x 16 T40 TORX Drive Dome Washer Head	18	N/A		
4	4	217507	Track Pins	19	A/R	*	Spring Pack (Refer to Figure 88 thru Figure 90)
5	1	08041001C*	Wire Raceway, Reversing Edge Cable	20	12	01270060	Nut, DIN 934-8 M10 Hex
6	5	01901010	Nut, Lock, M6 Hex	21	1	Consult Factory	Base Plate Assembly, RH, L/R
7	2	04010337*	Weather Seal, Side Column		1	Consult Factory	Base Plate Assembly, LH, L/R (Not Shown)
8	5	01900708	Screw, M6 x 8 T30 TORX Drive Dome Washer Head	22	1	08041001D	Wire Raceway, Left Side Column, Photo Eye Bracket x 43 cm Long (Not Shown)
9	A/R	01901508	Nut, M8 Flange Hex	23	1	WN524/C01	Handle, Brake Release (Left Side Column Only, Not Shown)
-	1	Consult Factory	Vertical Track Assembly, RH, L/R	24	1	08120607	Energy Chain (Right Side Column Only, Not Shown – Refer to Figure 87)
-	1	Consult Factory	Vertical Track Assembly, LH, L/R				
10	1	Consult Factory	Vertical Track Cap, Upper, Right				
	1	Consult Factory	Vertical Track Cap, Upper, Left (Not Shown)				
11	1	237803/2Z1*	Vertical Track, Upper Right				
	1	237803/1Z1*	Vertical Track, Upper Left (Not Shown)				
12	A/R	217102Z1	Rail Clip				
13	N/A		Bracket, Splice				

ALWAYS INCLUDE SERIAL NUMBER OF DOOR WHEN PLACING ORDER

To ensure you receive the correct parts when placing an order, always include the serial number of your door. Also, due to product enhancement, the actual parts on your door may be different from those shown in this manual.

PARTS LIST—SPREADER AND DOOR PANEL

SPREADER AND DOOR PANEL

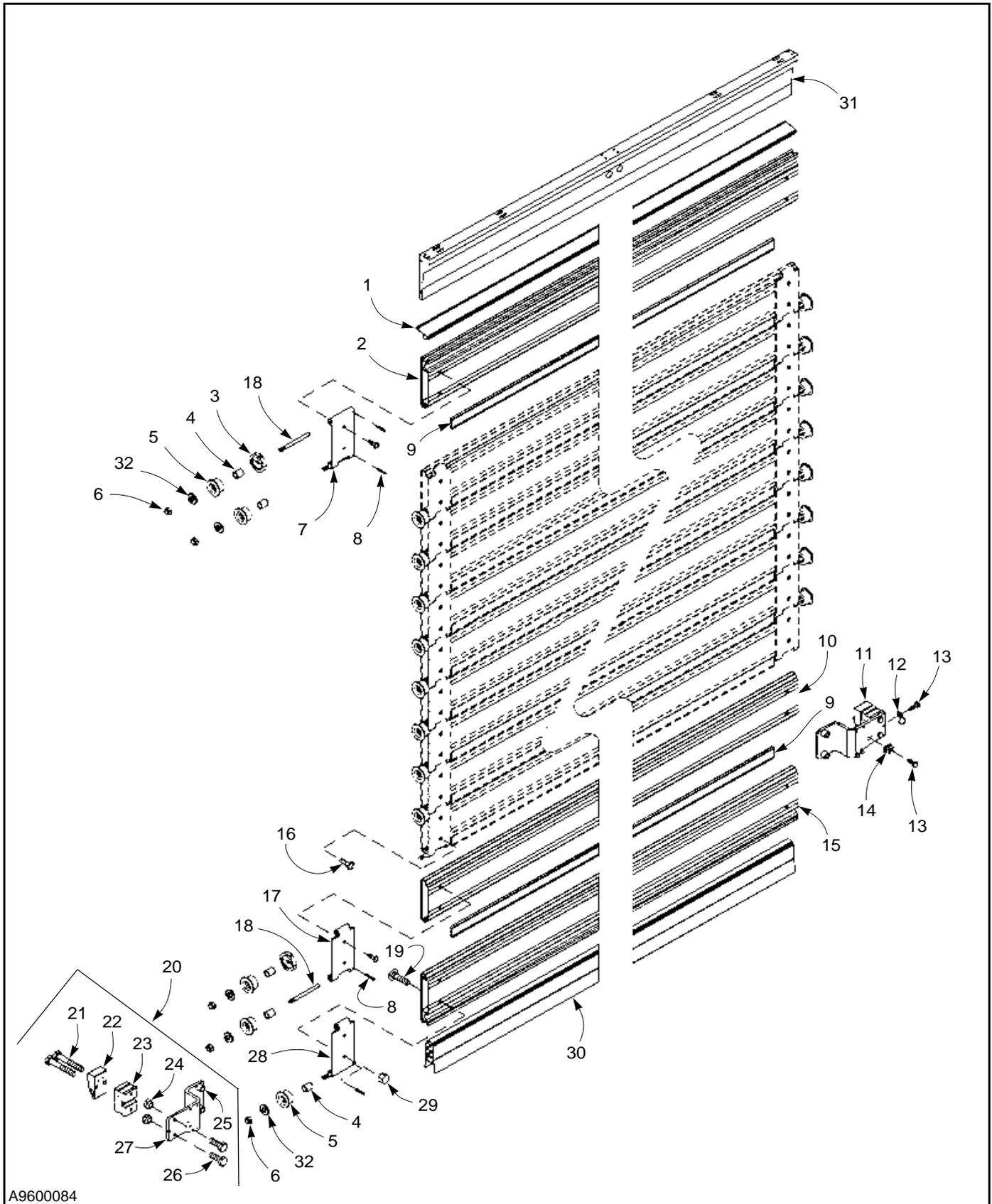


Figure 84

PARTS LIST—SPREADER AND DOOR PANEL

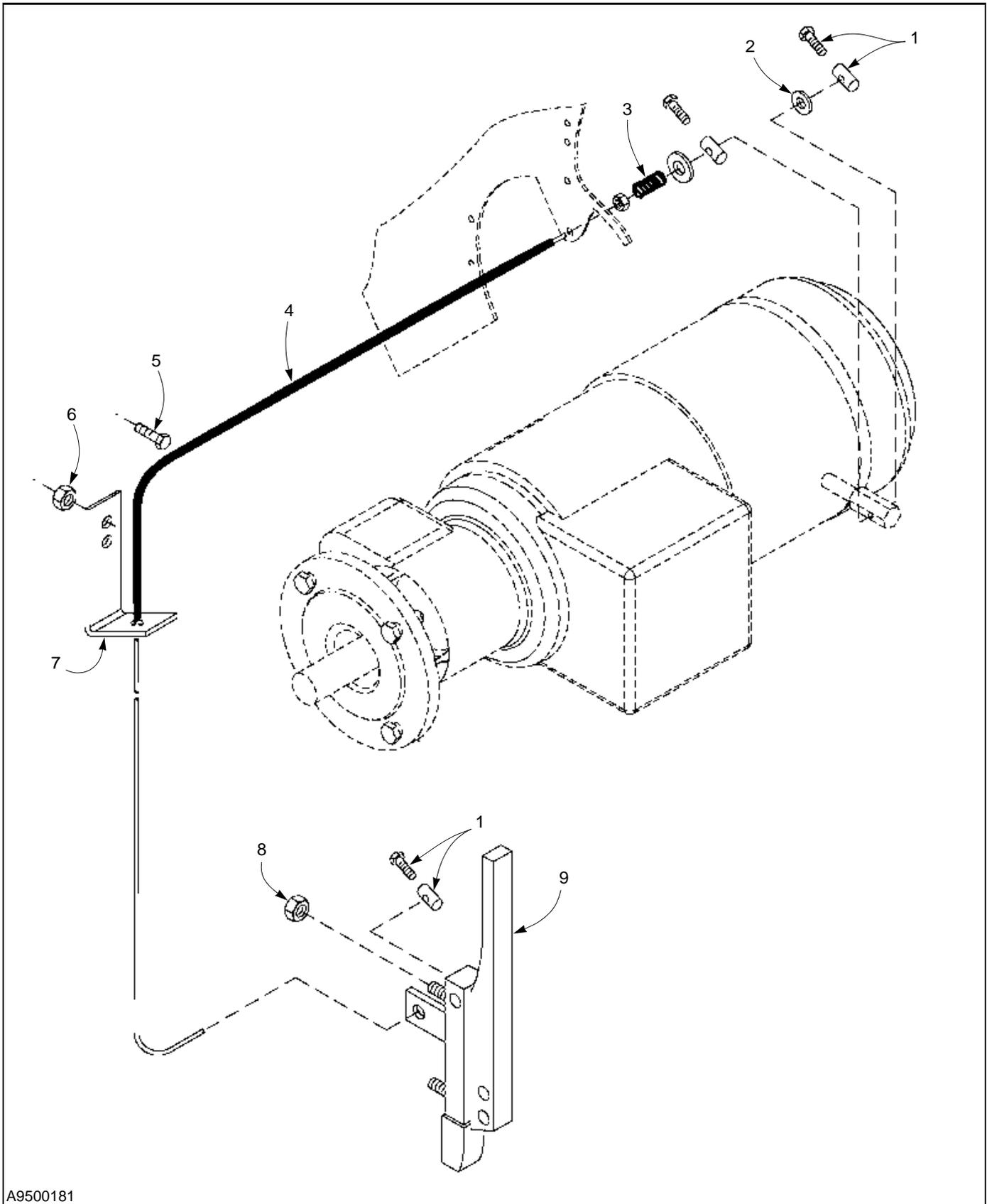
ITEM	QTY.	PART #	DESCRIPTION	ITEM	QTY.	PART #	DESCRIPTION
1	1	04010170*	Top Seal	16	A/R	01900720	Screw, M6 x 20 T30
2	1	237835*	Top Panel Assembly, 30 mm, L/R				TORX® Drive, Dome Washer Head
	1	237834*	Top Panel Assembly, 20 mm, L/R	17	A/R	217853/1Z1	Hinge Assembly, LH, Middle, Metal, L/R
3	4	237602	Guide, Side Door Panel		A/R	231859/1Z1	Hinge Assembly, LH Middle, Alum., L/R
4	A/R	217505Z1	Spacer, Axle		A/R	217853/2Z1	Hinge Assembly, RH Middle, Metal, L/R (Not Shown)
5	A/R	205625	Roller, Hinge		A/R	231859/2Z1	Hinge Assembly, RH Middle, Alum., L/R (Not Shown)
6	A/R	01335008	Nut, Lock, DIN 985-8 M8 Nylon Insert Hex	18	A/R	21750202Z1	Axle, Hinge 98 mm Lg., L/R
7	1	217852/1Z1	Hinge Assembly, LH Top, Metal, L/R	19	4	01160505	Screw, Mushroom Head Square Neck DIN 603 M8 x 35
	1	231828/1	Hinge Assembly, LH Top, Alum., L/R (Not Shown)	20	1	237831/1Z1	End Bracket Assembly, LH, L/R (Consisting of Items 21 thru 27)
	1	217852/2Z1	Hinge Assembly, RH Top, Metal, L/R (Not Shown)	21	4	01260363	Screw, DIN 933-8.8 M10 x 65 Hex Head
	1	231828/2	Hinge Assembly, RH Top, Alum., L/R (Not Shown)	22	2	237102	Splice Clamp, End Bracket, L/R
8	A/R	0021750	Pin, Spring 3 mm Dia. x 18 mm	23	2	237101	Splice Block, End Bracket, L/R
9	A/R	0401008503*	Seal, Panel Hinge	24	4	01335010	Nut, Lock, DIN 985-8 M10 Nylon Insert Hex
10	A/R	237836*	Panel Assembly, 30 mm, L/R	25	4	237501AZ1	Spacer, End Bracket, L/R
	A/R	237833	Panel Assembly, 20 mm, L/R	26	4	01260330	Screw, DIN 933-8.8 M10 x 30 Hex Head
	A/R	231843	Window Assembly, w/ Spacers, 30 mm, L/R	27	1	237318/1Z1	End Plate, End Bracket, LH, L/R
	A/R	231858	Window Assembly, w/ Spacers, 20 mm, L/R	28	1	231827/1	Hinge Assembly, LH Bottom, Alum., L/R (Not Shown)
11	1	237831/2Z1	End Bracket Assembly, RH L/R (Consisting of Items 21 thru 27)		1	231827/2	Hinge Assembly, RH Bottom, Alum., L/R (Not Shown)
12	3	02382756	Wire Clip	29	N/A		
13	7	01010152	Screw, SCMS M4 x 16	30	1	237401*	Reversing Edge Assembly, L/R
14	1	00111174	Block, Terminal	31	1	236807Z1	Rear Spreader
15	1	237328*	Bottom Panel, Cut/Drill, 30 mm	32	A/R	0021815	Washer, M8 x 14mm x 1mm
	A/R	237310*	Bottom Panel, Cut/Drill, 20 mm				

ALWAYS INCLUDE SERIAL NUMBER OF DOOR WHEN PLACING ORDER

To ensure you receive the correct parts when placing an order, always include the serial number of your door. Also, due to product enhancement, the actual parts on your door may be different from those shown in this manual.

PARTS LIST—BRAKE RELEASE ASSEMBLY

BRAKE RELEASE ASSEMBLY



A9500181

Figure 85

PARTS LIST—BRAKE RELEASE ASSEMBLY

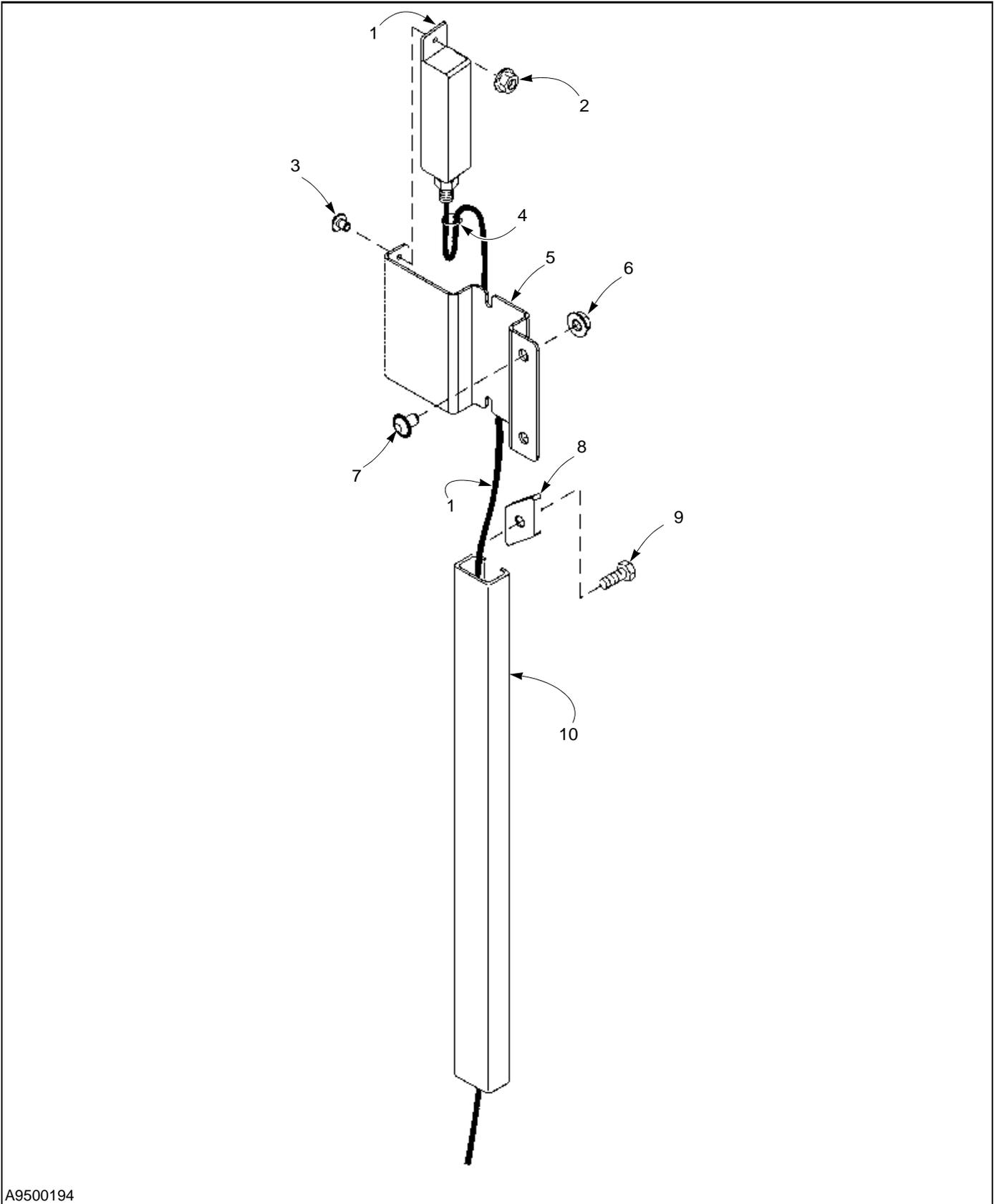
ITEM	QTY.	PART #	DESCRIPTION
1	2	08151080	Clamp, Cable Stop
2	2	01900050	Washer, Flat, H1231 6.4 x 25 x 1.25 Thick
3	1	080701071	Spring
4	1	08210610	2 mm Steel Cable 6 x 7
5	2	01900712	Screw, M6 x 20 T30, Dome Washer Head
6	2	01901506	Nut, M6, Flange Hex, Zinc
7	1	217361Z1	Bracket, Motor Brake Cable
8	1	01335005	Nut, Lock, DIN 985-8 M5 Nylon Insert
9	1	WN524/C01	Handle, Brake Release

ALWAYS INCLUDE SERIAL NUMBER OF DOOR WHEN PLACING ORDER

To ensure you receive the correct parts when placing an order, always include the serial number of your door. Also, due to product enhancement, the actual parts on your door may be different from those shown in this manual.

PARTS LIST—FACTORY-INSTALLED PHOTO EYES

FACTORY-INSTALLED PHOTO EYES



A9500194

Figure 86

PARTS LIST—FACTORY-INSTALLED PHOTO EYES

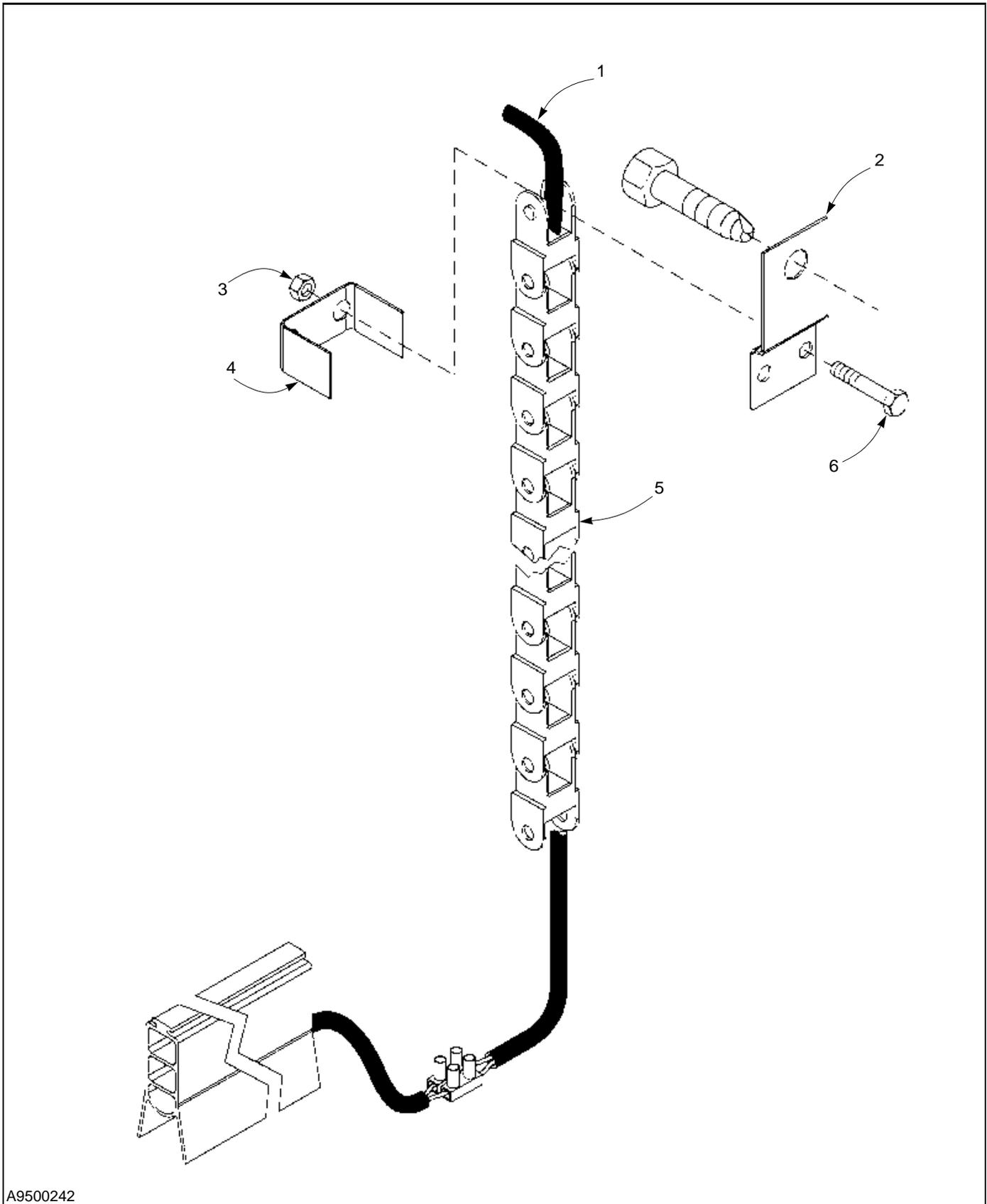
ITEM	QTY.	PART #	DESCRIPTION
1	1	0222320851	Photo Eye, Transmitter (Factory-Installed)
	1	0222320852	Photo Eye, Receiver (Factory-Installed)
	1	02222784	Cable, Photo Eye, 4-Pole, L=8 m
	1	02222786	Cable, Photo Eye, 4-Pole, L=15 m
2	2	01335004	Nut, Lock, DIN 985-8 M4
3	2	01010156	Screw, DIN 84-4.8, M4 x 20
4	A/R	N000084	Tie, Cable 15" Black 3M 06277
5	2	23733401Z1	Bracket, Photo Eye
6	8	01901508	Nut, M8 Flange Hex, Zinc
7	8	01900812	Screw, M8 x 12 T30 TORX Drive Dome Washer Head
8	A/R	0191010	Nut, M6 Flanged Hex, Zinc
9	A/R	0190708	Screw, M6 x 8 T30, Dome Washer Head
10	2	08041001D	Wire Raceway, 43 cm Long

ALWAYS INCLUDE SERIAL NUMBER OF DOOR WHEN PLACING ORDER

To ensure you receive the correct parts when placing an order, always include the serial number of your door. Also, due to product enhancement, the actual parts on your door may be different from those shown in this manual.

PARTS LIST—ENERGY CHAIN

ENERGY CHAIN



A9500242

Figure 87

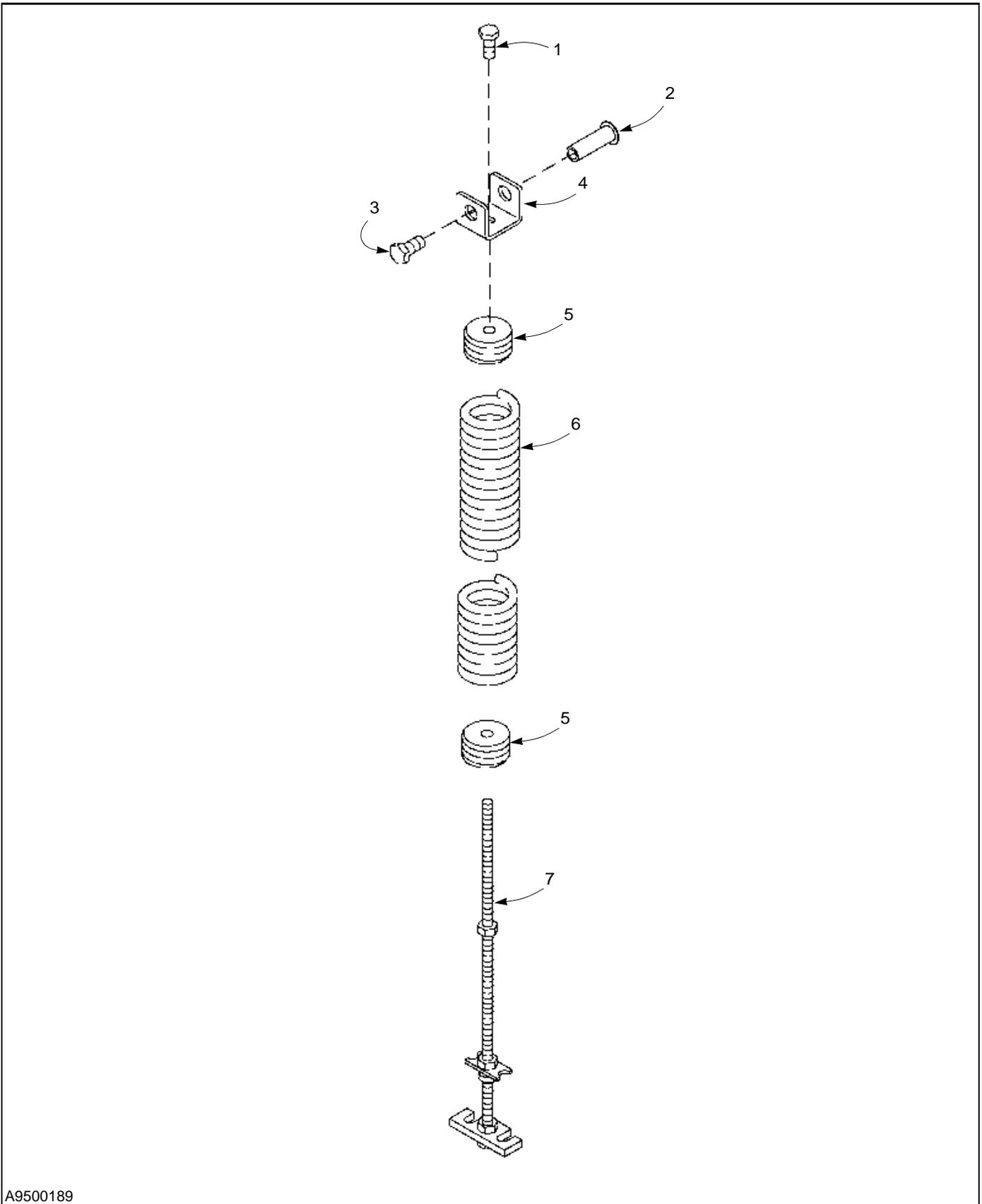
ITEM	QTY.	PART #	DESCRIPTION
1	1	WN817/BL	Lead, Energy Cable
2	1	08120609	Anchor Clip, Energy Chain
3	2	01335004	Nut, Lock, DIN 985-8 M4 Nylon Insert
4	1	237322Z1	Bracket, Energy Chain Clamp
5	1	08120607	Energy Chain
6	2	01010156	Screw, DIN 84-4.8 M4 x 20 Slotted Cheese Head

ALWAYS INCLUDE SERIAL NUMBER OF DOOR WHEN PLACING ORDER

To ensure you receive the correct parts when placing an order, always include the serial number of your door. Also, due to product enhancement, the actual parts on your door may be different from those shown in this manual.

PARTS LIST—SINGLE SPRING PACK

SINGLE SPRING PACK



A9500189

Figure 88

PARTS LIST—SINGLE SPRING PACK

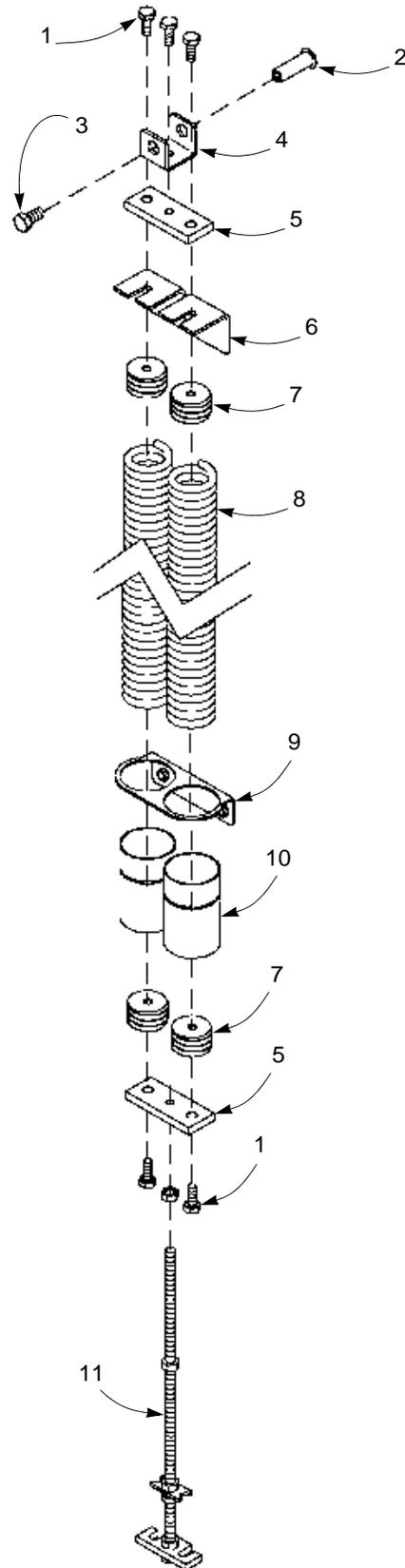
ITEM	QTY.	PART #	DESCRIPTION
-	A/R	217871B02Z1	Spring Pack Assembly, 1 Outside
1	1	01260320	Screw, DIN 933 8.8 M10 x 25, Hex Head
2	1	609270A	Shoulder Nut, Spring Clevis
3	1	01260400	Screw, DIN 933 M12 x 25, Hex Head
4	1	207070	Clevis, Spring Pack
5	2	205512	Spring Plug
6	1	WN350/AA	Spring, Tension
7	1	217891BZ1	Adjustment Rod Assembly, Spring Pack

ALWAYS INCLUDE SERIAL NUMBER OF DOOR WHEN PLACING ORDER

To ensure you receive the correct parts when placing an order, always include the serial number of your door. Also, due to product enhancement, the actual parts on your door may be different from those shown in this manual.

PARTS LIST—DOUBLE SPRING PACK

DOUBLE SPRING PACK



A9500187

Figure 89

PARTS LIST—DOUBLE SPRING PACK

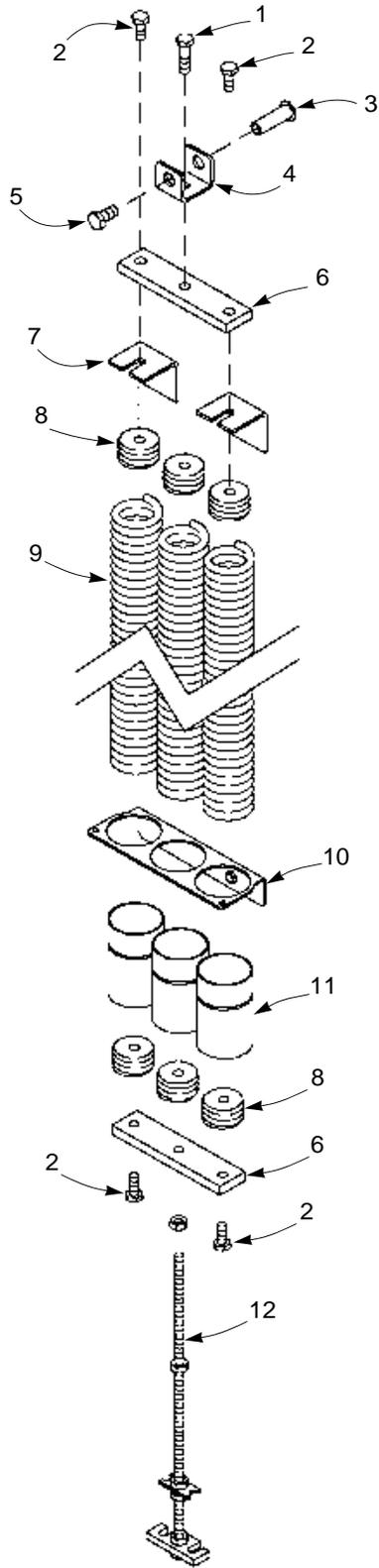
ITEM	QTY.	PART #	DESCRIPTION
-	1	217871A03Z1	Spring Pack Assembly, 2 Outside
-	1	217871DZ1	Spring Pack Assembly, 2 Inside
1	5	01260320	Screw, DIN 933 8.8 M10 x 25, Hex Head
2	1	609270A	Shoulder Nut, Spring Clevis
3	1	01260400	Screw, DIN 933 M12 x 25, Hex Head
4	1	207070	Clevis, Spring Pack
5	1	205084	Bar, Dual Spring Pack
6	2	217604	Guide, Spring Pack, Hard PVC (Outside Spring Pack Assembly Only)
7	4	205512	Spring Plug
8	2	WN350/AA	Spring, Tension
9	1	217902Z1	Outside Guide Bracket, Dual Springs
	1	218104Z1	Inside Guide Bracket, Dual Springs
10	2	217605	Guide Tube, PVC Spring Pack
11	1	217891BZ1	Adjustment Rod Assembly, Spring Pack

ALWAYS INCLUDE SERIAL NUMBER OF DOOR WHEN PLACING ORDER

To ensure you receive the correct parts when placing an order, always include the serial number of your door. Also, due to product enhancement, the actual parts on your door may be different from those shown in this manual.

PARTS LIST—TRIPLE SPRING PACK

TRIPLE SPRING PACK



A9500188

Figure 90

PARTS LIST—TRIPLE SPRING PACK

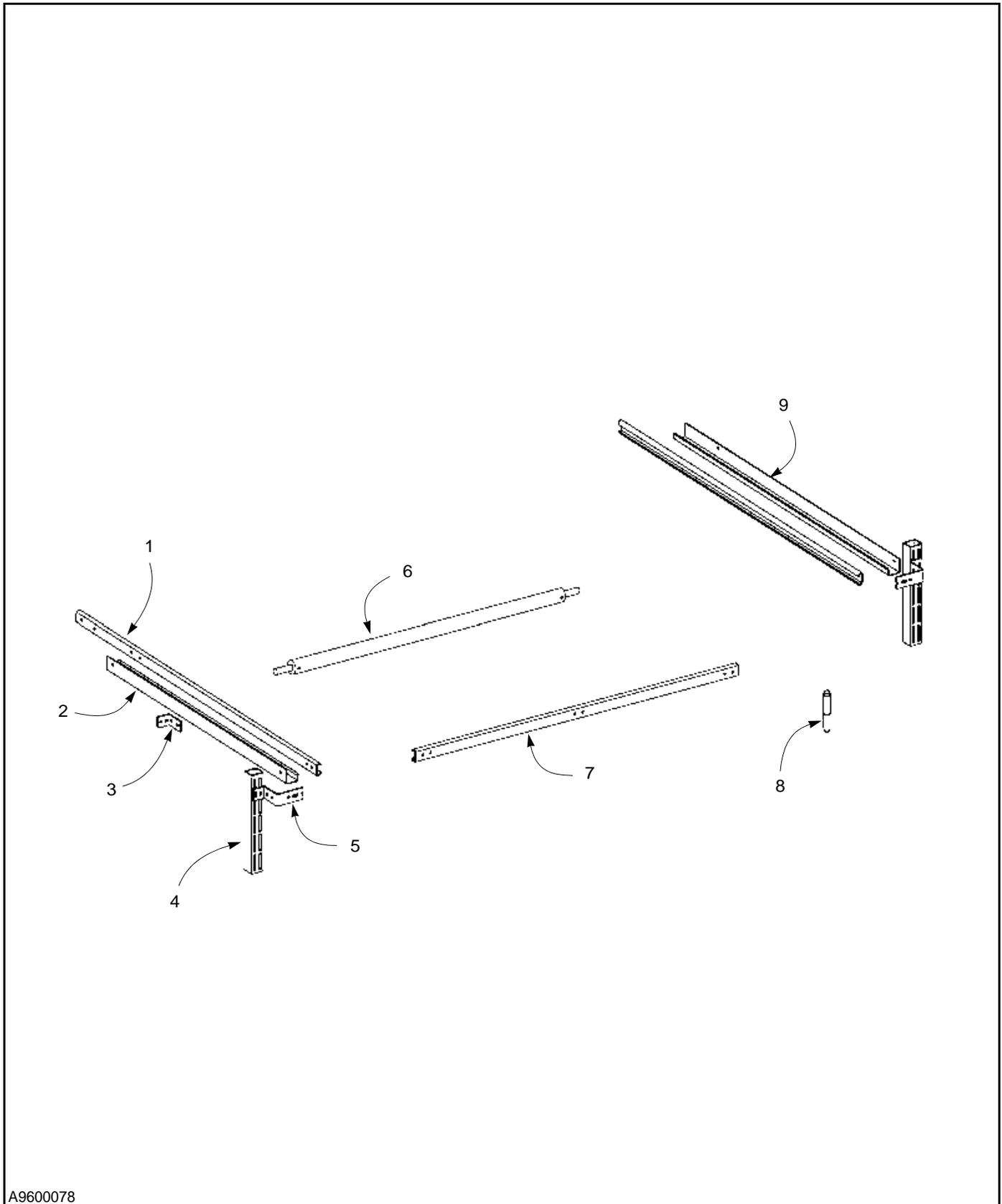
ITEM	QTY.	PART #	DESCRIPTION
-	1	217891C03Z1	Spring Pack Assembly, 2 Outside
-	1	217891EZ1	Spring Pack Assembly, 2 Inside
1	1	01260340	Screw, DIN 933 8.8 M10 x 40, Hex Head
2	4	01260320	Screw, DIN 933 8.8 M10 x 25, Hex Head
3	1	609270A	Shoulder Nut, Spring Clevis
4	1	207070	Clevis, Spring Pack
5	1	01260410	Screw, DIN 933 M12 x 25, Hex Head
6	1	206070Z1	Bar, 3 Spring Pack
7	2	217604	Guide, Spring Pack, Hard PVC (Outside Spring Pack Assembly Only)
8	6	205512	Spring Plug
9	3	WN350/AA	Spring, Tension
10	1	217902Z1	Outside Guide Bracket, Dual Springs
	1	218104Z1	Inside Guide Bracket, Dual Springs
11	3	217605	Guide Tube, PVC Spring Pack
12	1	217891BZ1	Adjustment Rod Assembly, Spring Pack

ALWAYS INCLUDE SERIAL NUMBER OF DOOR WHEN PLACING ORDER

To ensure you receive the correct parts when placing an order, always include the serial number of your door. Also, due to product enhancement, the actual parts on your door may be different from those shown in this manual.

PARTS LIST—HORIZONTAL PROFILE SYSTEM

HORIZONTAL PROFILE SYSTEM



A9600078

Figure 91

PARTS LIST—HORIZONTAL PROFILE SYSTEM

ITEM	QTY.	PART #	DESCRIPTION
1	2	236856	Guide, Horizontal
2	1	236821/1Z1	Cover, Profile, LH
3	A/R	236621Z1	Holder, Console
4	A/R	236322Z1	Holder, Console
5	A/R	236319Z1	Angle, Reinforcement Profile
6	1	217706Z1	Connection Shaft Welded
7	1	236325	Profile, Horizontal
8	8	217507	Pin 5.2 x 30
9	1	236821/2Z1	Cover, Profile, RH

ALWAYS INCLUDE SERIAL NUMBER OF DOOR WHEN PLACING ORDER

To ensure you receive the correct parts when placing an order, always include the serial number of your door. Also, due to product enhancement, the actual parts on your door may be different from those shown in this manual.

R Y T E C

Spiral LH[®]

Installation Manual



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[Revision: September 19, 2008, 0915013, ©Rytec Corporation 2006]

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INTRODUCTION

The information contained in this manual will allow you to install your Rytec® Spiral LH Door in a manner which will ensure maximum life and trouble-free operation.

Any unauthorized changes in procedure, or failure to follow the steps as outlined in this manual, will automatically void the warranty. Any changes in the working parts, assemblies, or specifications as written that are not authorized by Rytec Corporation will also cancel the warranty. The responsibility for the successful operation and performance of this door lies with the owner of the door.

DO NOT OPERATE OR PERFORM MAINTENANCE ON THIS DOOR UNTIL YOU READ AND UNDERSTAND THE INSTRUCTIONS CONTAINED IN THIS MANUAL.

If you have any questions, contact your Rytec representative or call the Rytec Customer Support Department at 800-628-1909. Always refer to the serial number of the door when calling the representative or Customer Support. The serial number plate is located on the left side column, at approximately eye level.

The wiring connections and schematics in this manual are for general information purposes only. A wiring schematic is provided with each individual door specifically covering the control panel and electrical components of that door. That schematic was shipped inside the control panel.

DOOR SERIAL NUMBER(S)

To obtain your **DOOR SERIAL NUMBER**, there are three universal locations where this information can be found. These are at the inside of either side column (approximately eye level), on the drive motor, and on the inside door of the System 3 control panel. (See Figure 1.)

IMPORTANT: *When installing multiple doors of the same model but in different size, verify the serial number in the control panel with the one in the side column.*

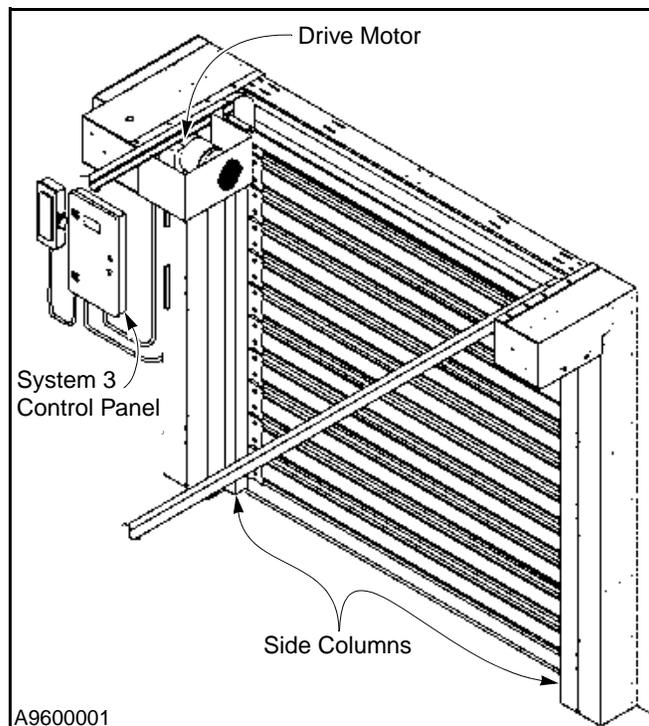


Figure 1

HOW TO USE MANUAL

Throughout this manual, the following key words are used to alert the reader of potentially hazardous situations, or situations where additional information to successfully perform the procedure is presented:



WARNING is used to indicate the potential for personal injury, if the procedure is not performed as described.



CAUTION is used to indicate the potential for damage to the product or property damage, if the procedure is not followed as described.

IMPORTANT: **IMPORTANT** is used to relay information **CRITICAL** to the successful completion of the procedure.

NOTE: **NOTE** is used to provide additional information to aid in the performance of the procedure or operation of the door, but not necessarily safety related.

INSTALLATION—ADDITIONAL REQUIREMENTS

INSTALLATION

MATERIAL, TOOLS, AND EQUIPMENT

1. Threaded rod (½-in. diameter) and other various wall anchor hardware and material. Concrete anchor bolts (½-in. diameter). (See “ANCHORING METHODS” on page 3.)
2. Assorted shim stock.
3. Double-sided tape.
4. Package of oversize plastic cable ties.
5. Mounting hardware for field-installed photo eye brackets.
6. Carpenter’s or spirit level (4-ft. minimum length).
7. Carpenter’s square.
8. Hammer drill.
9. Masonry drill bit (for ½-in. diameter anchors).
10. Three or four bar clamps (18 in. long).
11. Hammer or mallet, and block of wood.
12. Crowbar or pry bar.
13. Assorted hand tools (pliers, tape measure, etc.).
14. Plumb bob with line.
15. Metric and U.S. socket and wrench sets.
16. T-30, T-40, and T-50 TORX® drivers.
17. Water level, line level, or transit.
18. Two ladders (taller than height of door opening).
19. Forklift. (See “Forklift Requirements” on page 2.)

ADDITIONAL REQUIREMENTS

Labor and Site Requirements

1. Two installers.
2. A licensed electrician is required for making all electrical connections.

NOTE: All electrical work must be performed in accordance with local and state building codes.

3. 100% accessibility to the door opening during the entire installation process. No traffic should be allowed to pass through the opening while the door is being installed.

Electrician’s Responsibilities

NOTE: See “CONTROL SYSTEM” on page 26 for complete details on the electrical work to be performed.

1. Install fused disconnect and Rytec control panel. (See Figure 2 for typical installation.)

2. Install all necessary conduit tubing.
3. Run electrical power lines to disconnect.
4. Run power lines from disconnect to control panel.
5. Run power lines from control panel to upper junction box.
6. Run power lines from control panel to door motor.
7. Run low-voltage cables from door to control panel.
8. Mount rear photo eyes.
9. Wire low-voltage safety devices and activators (if used).

Forklift Requirements

A forklift supplied by the customer, dealer, or installer is mandatory for the safe and proper installation of this door. The forklift should have the following:

- 4000-pound lift capacity.
- Minimum height ability — door height plus 12 in.
- 48-in. wide fork.
- Side-shift capability (desired).

NOTE: The height of the fork carriage may be an issue if the ceiling height is not sufficient when installing the console assembly.

Floor-Loop Activator Requirements (If Used)

If a floor-loop activator was ordered and shipped with your Rytec door, the following additional items will be required to install the activator:

NOTE: For complete floor-loop installation instructions, refer to the manual shipped with the activator.

1. Concrete saw (with water-cooling attachment).
2. Water supply and garden hose.
3. Wet/dry shop vacuum.
4. 200–500 ft. of 16-gauge, 19-strand, type XLPE, copper, crosslink polyethylene jacket wire (or equivalent). The size of the floor loop will determine the length of wire required.
5. Bondo® P606 Flexible Embedding Sealer (or equivalent) — required to fill saw cuts in floor after the activator is installed. For cold temperature applications, Bondo P610 Speed Set must be added to the P606 to ensure the sealer cures properly.

TYPICAL INSTALLATION

Figure 2 shows the location of the major components of your Spiral LH door. This illustration should be used as reference only and should not be used as part of the installation instructions.

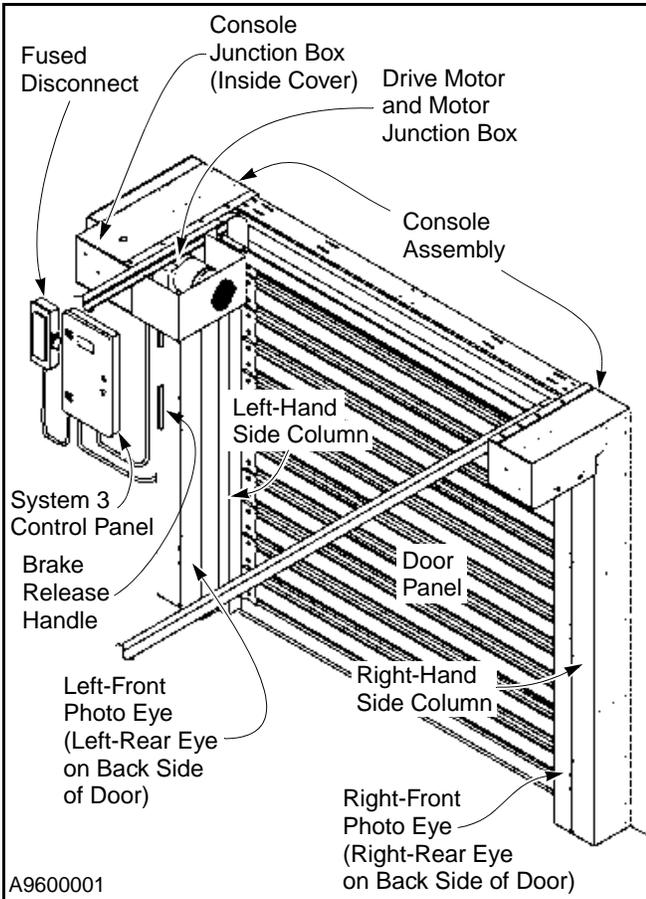


Figure 2

NOTE: Figure 1 shows the front side of the door. Left and right are determined when viewing the front side of the door.

ANCHORING METHODS

Correct anchoring of the side columns to the wall and the floor is important for the smooth and safe operation of the door. The wall material should be strong enough to support the weight of the door and all wall anchors.

Figure 3 details the wall load requirement for supporting the Rytec Spiral LH Door. Figure 3 through Figure 6 show anchoring methods for various types of walls. Use the method best suited for your particular installation site.

All necessary anchoring hardware and material required for the installation of this door is the responsibility of the door owner. If you have any questions, call your Rytec representative or the Rytec Customer Support Department at 800-628-1909.

NOTE: Use 1/2-in. diameter threaded through bolts or 1/2-in. diameter threaded rods to anchor the door to all wall applications. Use 1/2-in. diameter concrete anchor bolts to anchor the door to a concrete floor.

Concrete, Block, or Brick Wall

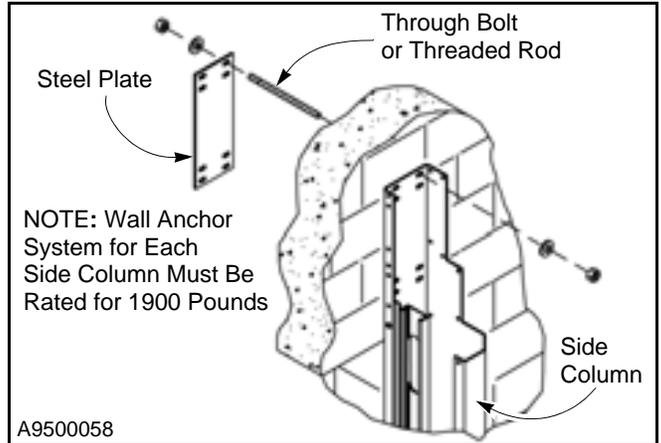


Figure 3

Concrete, Block, Brick, or Wood Wall

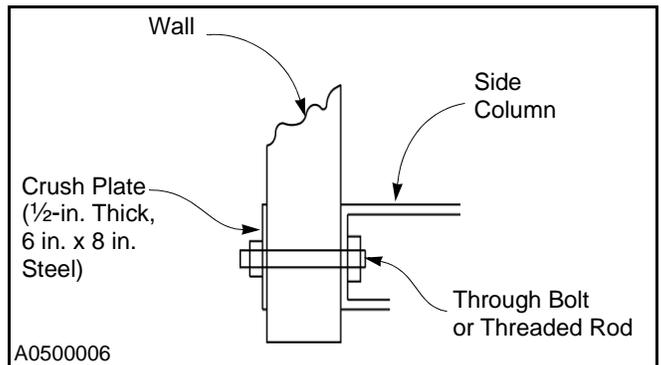


Figure 4

Insulated Wall (Option 1)

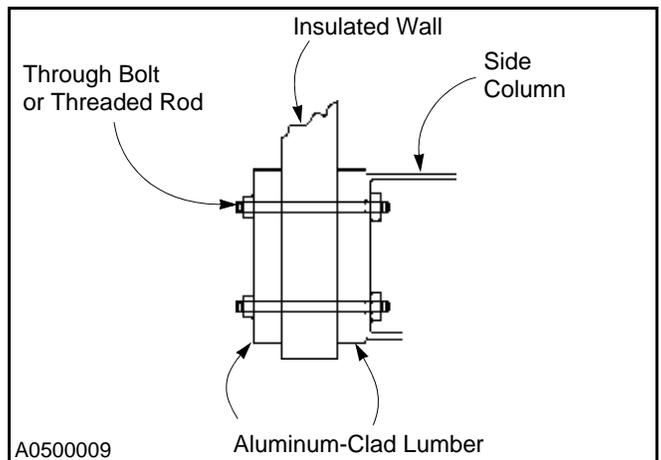


Figure 5

INSTALLATION—LOCATING SIDE COLUMNS

Insulated Wall (Option 2)

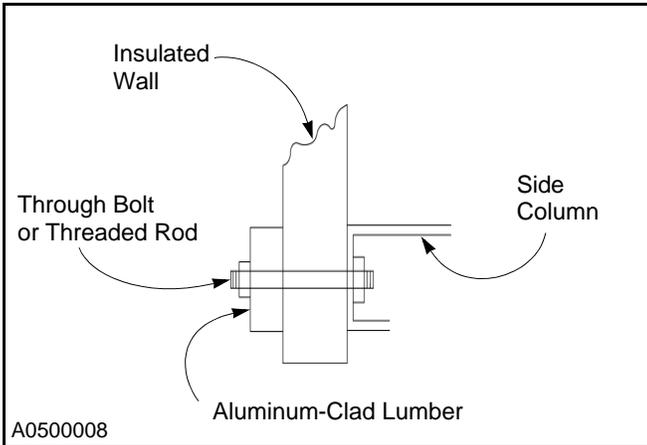


Figure 6

UNCRATING

NOTE: Remove parts and sub-assemblies from the shipping crate in the order directed throughout this installation manual.

1. Remove the two side columns, spring pack assemblies, and the small parts carton from the shipping crate. (See Figure 7.)



Figure 7

LOCATE CENTERLINE OF DOOR OPENING

NOTE: Accurate measurements are critical for the proper installation and operation of your Rytec door. Verify all measurements.

1. Measure the width of the door opening. Then divide the measurement in half to locate the centerline. Mark the centerline along the floor. (See Figure 8.)

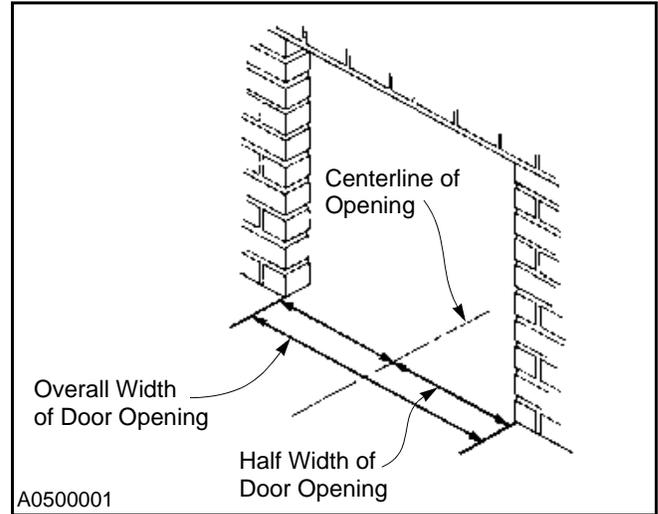


Figure 8

LOCATING SIDE COLUMNS

1. Locate the layout drawing of the door. It should be attached to the small parts carton. This drawing identifies the production width of your door.
2. Using the centerline as a reference point, lay out and mark half of the door's production width along the floor. (See Figure 9.)

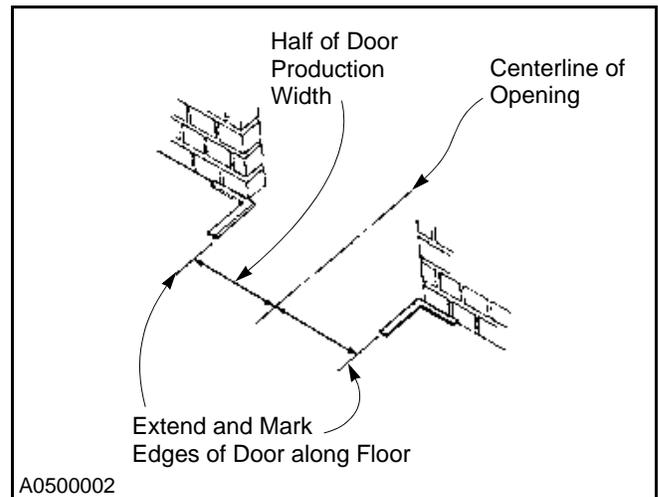


Figure 9

3. With a carpenter's square placed against the wall, mark both sides of the door along the floor. Extend the line along each edge.

- 4. Check that the floor is level across the door opening. The floor must be level within 0.12 in. from side to side. If one side of the opening is higher than the other, a shim under the side column will be required.

Figure 10 and Figure 11 show two recommended methods that can be used to ensure a level side column installation.

NOTE: Contact the Rytec Customer Support Department if the floor is more than 1 in. out of level.

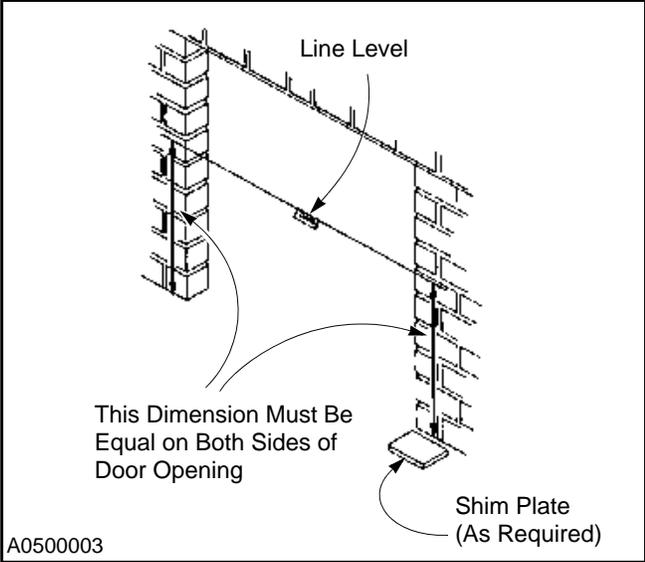


Figure 10

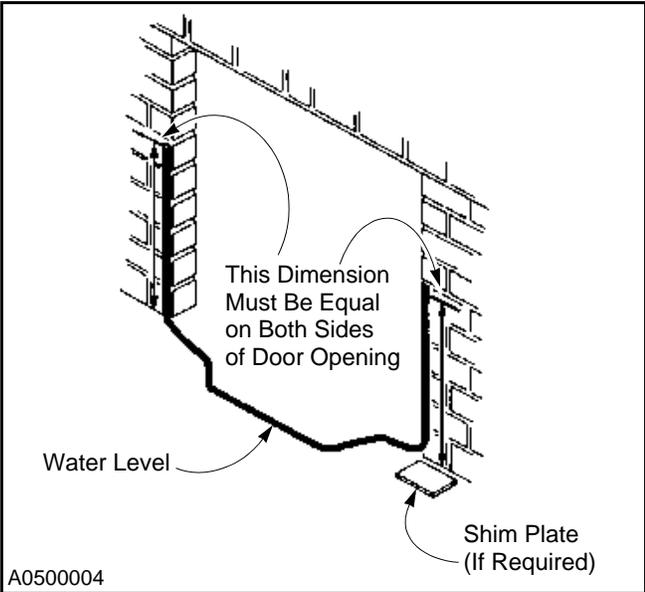


Figure 11

- 5. Use a plumb bob or carpenter's level to check the wall for plumb in the areas where the side columns are to be mounted. Also, inspect the wall for any obstructions.

If the wall is not plumb, use shims. If you find an obstruction, remove it or shim the column to avoid the obstruction. (See Figure 12.)

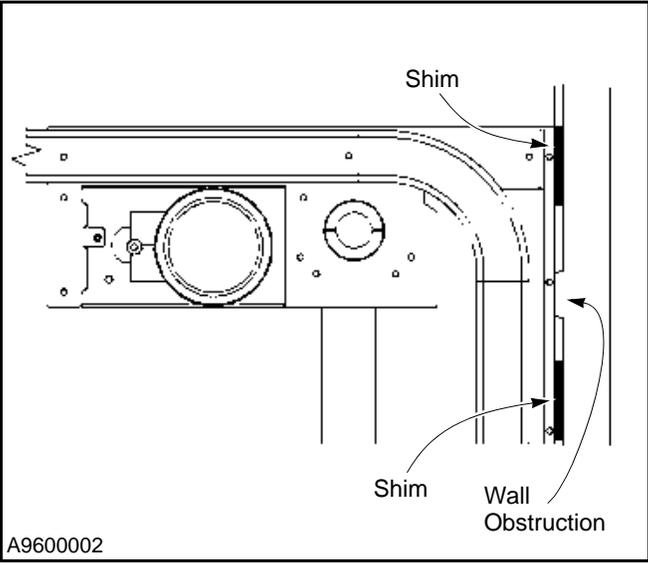


Figure 12

SIDE COLUMNS

- 1. To install the first side column, first remove and retain the screws used to secure the column cover to the side column assembly. Lift away the cover.
- 2. Stand the side column assembly on the floor, with the back of the column firmly against the wall. (See Figure 13.)

NOTE: Set the inside edge of the column flush with the door layout line.

INSTALLATION—SIDE COLUMNS

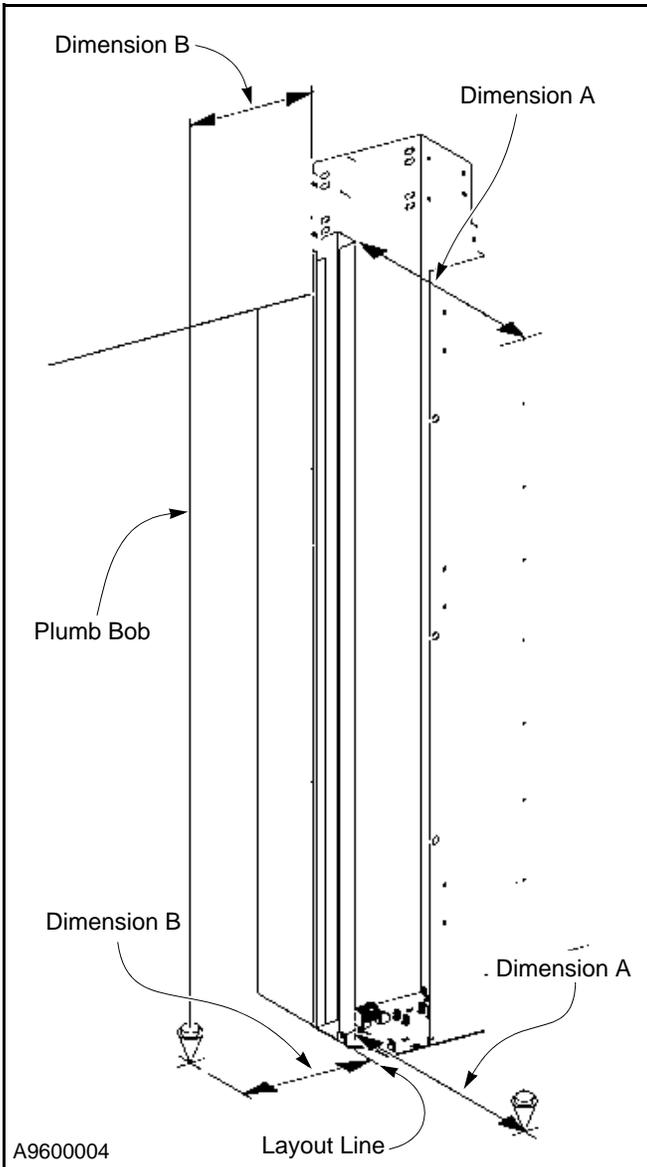


Figure 13

3. Position the column so that it is plumb to the wall and square with the floor.

A plumb bob or carpenter's level is recommended for setting the column plumb and square. The use of bar clamps to temporarily secure the column to the wall during installation is also recommended. When required, shim behind the side column if the wall is out of plumb. To hold the shims in place until the column is secured, attach them to the wall or column with double-sided tape. (See Figure 14.)

USING A PLUMB BOB:

To check for plumb, measure a few inches away from the face of the side column, near the top (Dimension A), and drop the plumb bob. (See Figure 13.)

Mark the floor where the plumb bob touches. Compare the upper measurement to the lower measurement. Shim the column toward or away from the wall, as required, until the two measurements are equal and the column is plumb to the wall.

Also, measure a few inches away from the side of the column, near the top (Dimension B), and drop the plumb bob. (See Figure 13.) Mark the floor where the plumb bob touches. Compare the upper measurement to the lower measurement. Lean the column to the left or the right until the two measurements are equal and the column is plumb with the floor (or shim plate).

USING A CARPENTER'S LEVEL:

Hold the level firmly against the face and side of the column. Make the necessary adjustments to set the side column level.

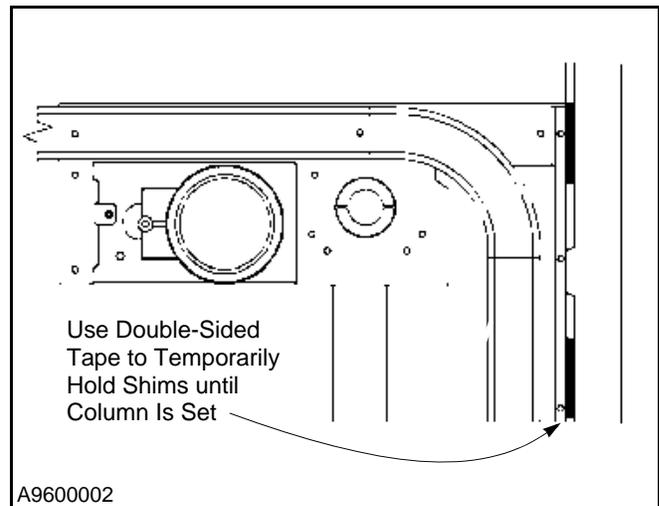


Figure 14

4. Temporarily clamp the side column to the wall once the column is properly positioned.
5. Using the predrilled anchor points in the back of the column as a reference, mark their location on the wall. (See Figure 15.)

NOTE: If threaded rod is used at these inside anchor points, there must be no exposed threaded rod when the nut is installed and tightened. Interference could result from hardware used to install the rear spreader.

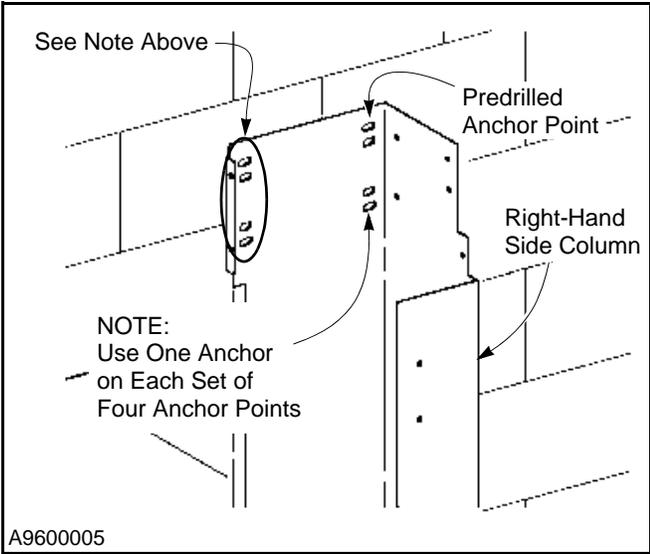


Figure 15

- Using the predrilled anchor points in the base plate as a reference, mark their location on the floor. (See Figure 16.)

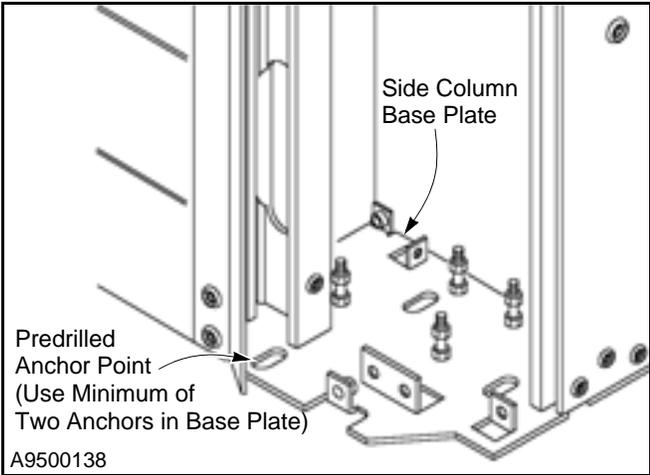


Figure 16

- Unclamp and set the column aside. Drill holes into the floor and through the wall for all anchors.

⚠ WARNING

Before drilling any holes, be sure there are no electrical wires, water pipes, gas lines, etc., buried in the floor or hidden in the wall.

- Reposition and reclamp the side column to the wall. Secure the base plate to the floor with the appropriate anchors. Do not over-tighten the anchors at this time.
- Anchor the side column to the wall using the appropriate anchoring method (see “ANCHORING METHODS” on page 3) and all drilled anchor points. Do not tighten the anchors at this time. They should just be snug.
- Mount the remaining side column to the floor and wall in the same manner as outlined for the previous side column.

NOTE: To ensure the side columns are positioned identically, take measurements for each column from similar points of reference.

- With both columns set and snugly bolted in place, check the overall squareness of each column.

Compare the diagonal measurements and the upper and lower horizontal measurements across the columns. The columns are square and parallel when the diagonal measurements are equal and the horizontal measurements are equal. (See Figure 17.)

If either column requires a slight repositioning (when the difference of either comparison is greater than 1/4 in.), loosen the hardware and move the column within the slotted anchor holes. The use of a block of wood or mallet may be required to move the column into position.

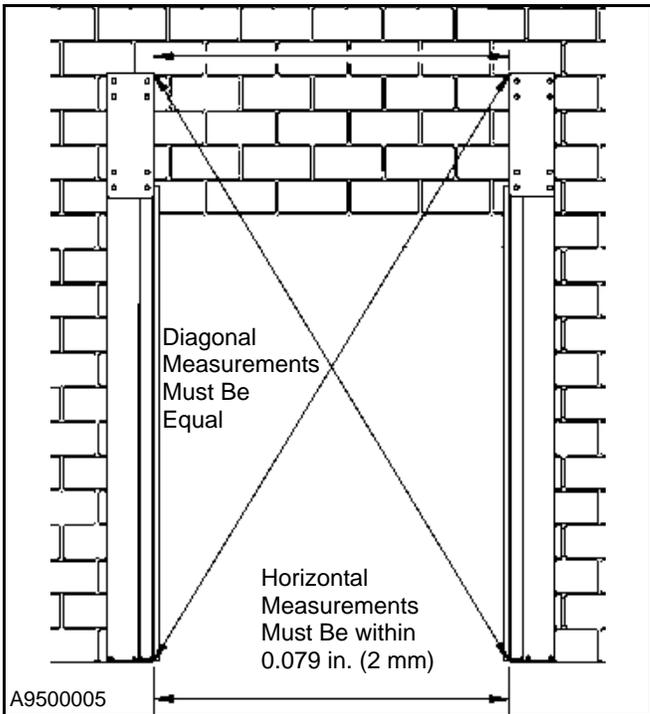


Figure 17

INSTALLATION—CONSOLE ASSEMBLY

NOTE: Before the side columns are secured, the rear spreader must be installed prior to tightening hardware at the anchor points.

REAR SPREADER

To make it possible to install the rear spreader and the console assembly later on, the guide rails running along the inside edge of each side column must first be released and slid out of the way.

1. Each section of guide rail is attached to the side column by a series of clips that are bolted to the back of the column. Loosen the hex nut that locks each clip in place.
2. Once each clip is loose, slide the guide rails to the bottom of the side column.

NOTE: Spacers are used to ensure a gap between the back of the column and the guide rail (track). Be sure that the spacers have not fallen to the bottom of the side column. Should they fall out of position, make sure they are spaced between mounting clips (bolts).

3. With the flat side of the rear spreader facing the wall and the wide end toward the top, attach the ends of the spreader to the side columns.

Use two M6 x 20 T-30 TORX® socket button head screws at each end. The screws are located in the small parts carton. (See Figure 18.)

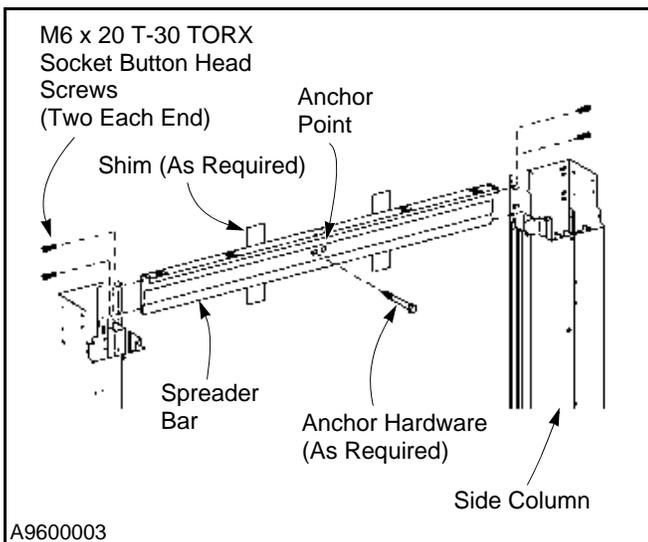


Figure 18

4. Using the appropriate hardware, secure the rear spreader to the wall at the two anchor points in the center of the spreader. The rear spreader must be secured to the wall at both anchor points.

NOTE: When securing the rear spreader to the wall, it will be necessary to mark the location of the wall anchors using the holes in the rear spreader as a reference. After drilling the required holes and installing the anchors, permanently secure the rear spreader to the wall.

Also, if shims or spacers were installed behind the side columns, it will be necessary to shim behind the rear spreader as well.

5. Tighten all hardware in the side columns and rear spreader. Check the alignment of the side columns and rear spreader with a level. Adjust as necessary.

CONSOLE ASSEMBLY



DO NOT lift the console assembly without clamping or securing it to the forklift. Failure to securely fasten the console assembly to the forklift can result in property damage and/or personal injury.

NOTE: The console assembly is extremely heavy. The use of a mechanical lift is required if the ceiling height is too low to allow the use of a forklift for installing the console assembly.

The drive side of the console assembly can be optionally mounted on either the left or right side column.

1. Carefully lift and remove the console assembly from the shipping crate. (See Figure 19.)

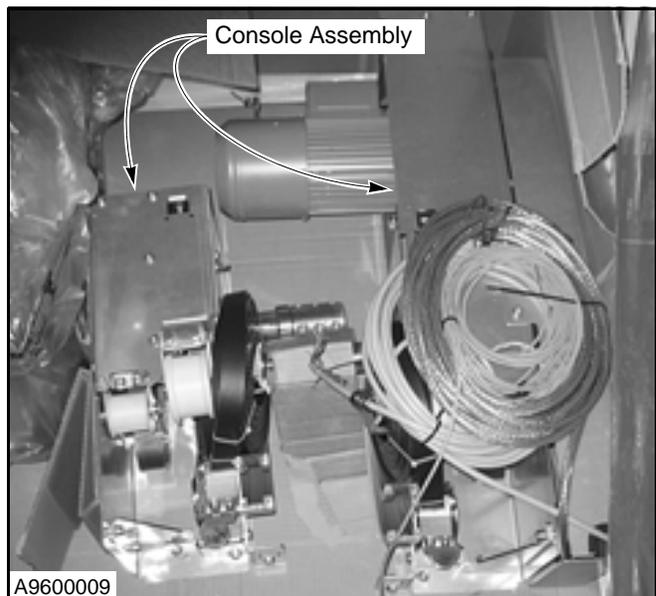


Figure 19

- Before lifting the console assembly into position, remove the drive cover. Retain all fasteners. (See Figure 20.)

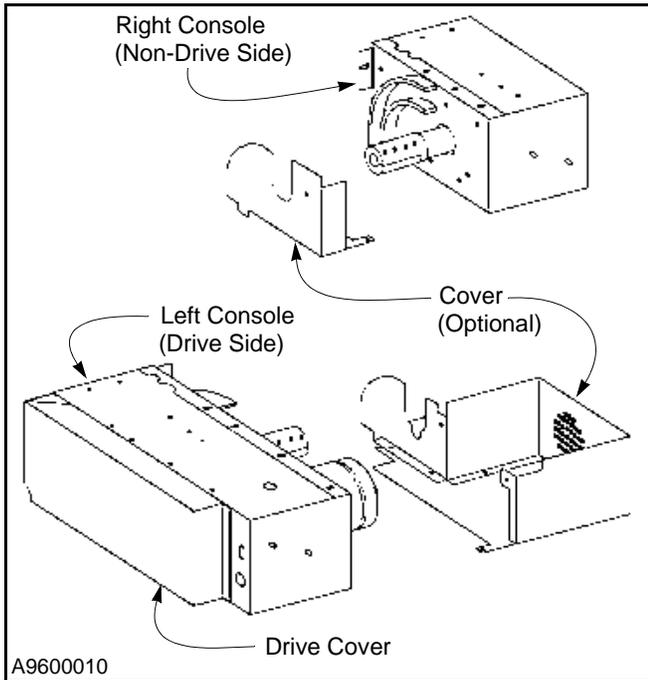


Figure 20

- Remove cap screws on both consoles. Retain the fasteners to use for the installation of the console to the side columns. (See Figure 21 and Figure 22.)

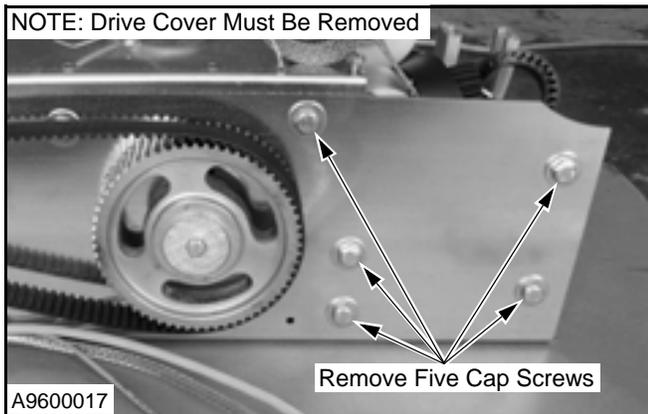


Figure 21

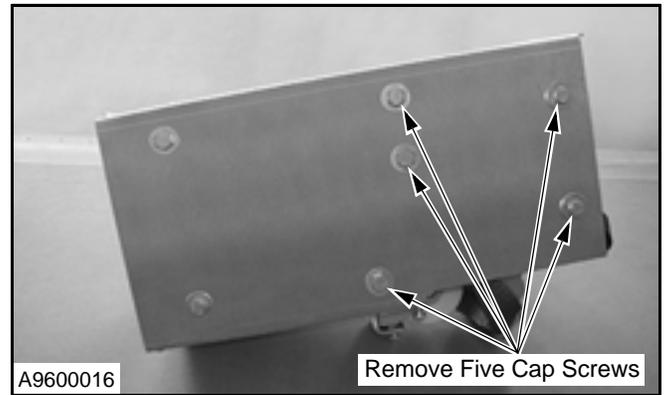


Figure 22

- Raise and position the console assembly above each side column so that it is parallel to the wall and level with each side column. Align the console assembly with the side column and install the five cap screws that were removed in step 3. (See Figure 23 and Figure 24.)

NOTE: Use extreme care when lowering the console assembly into position.

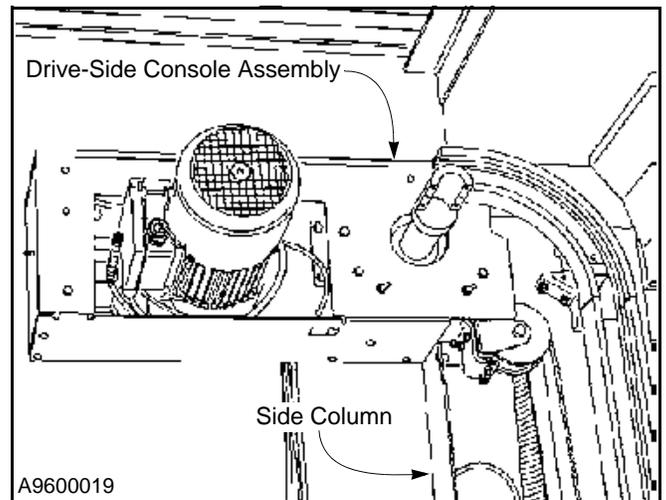


Figure 23

INSTALLATION—CONSOLE ASSEMBLY

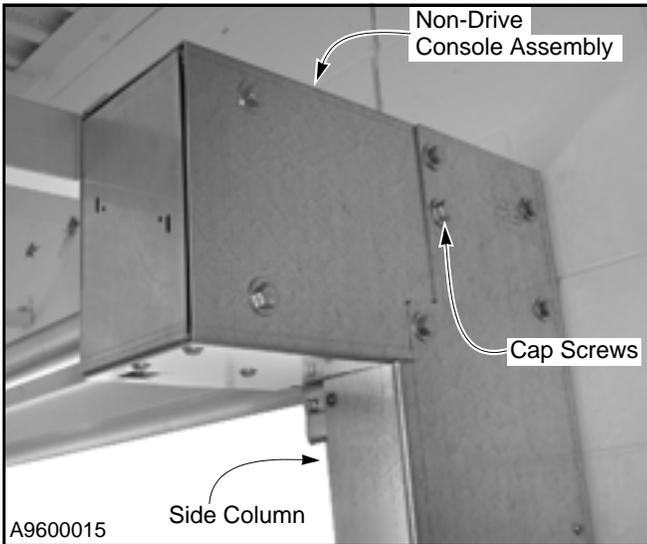


Figure 24

- Secure the console assemblies to the wall with the appropriate anchor. (See Figure 25.)

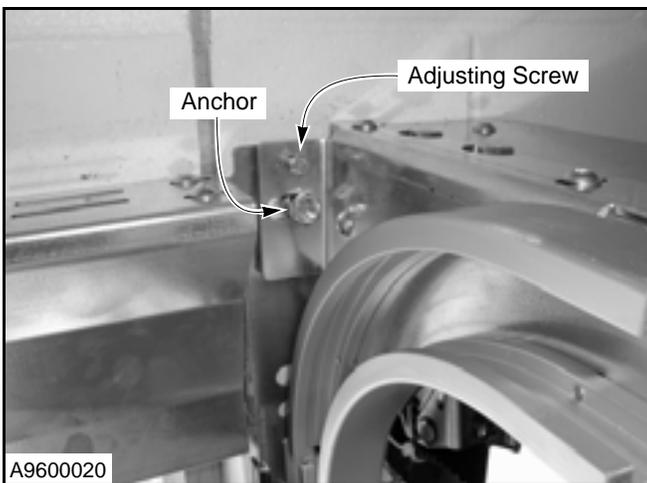


Figure 25

- Remove the track cover. Loosen the hardware to the retaining clips and lower the track assembly. (See Figure 26.)

NOTE: Depending on the height of the door, the track cover may be a one- or two-piece unit. If it is a two-piece unit, the top half of the track cover should be removed as shown in Figure 26.

Spacers are used to ensure a gap between the back of the column and the guide rail (track). Be sure that the spacers have not fallen to the bottom of the side column. Should they fall out of position, make sure they are spaced between mounting bolts.

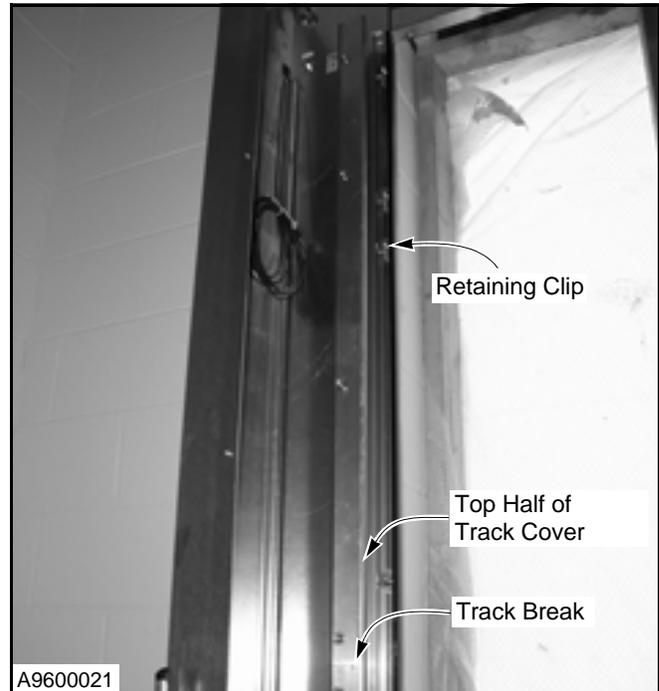


Figure 26

- Insert the two guide pins into both rear holes in the console assembly guide rails. (See Figure 27.)

NOTE: Lubricate the pins to ease installation.

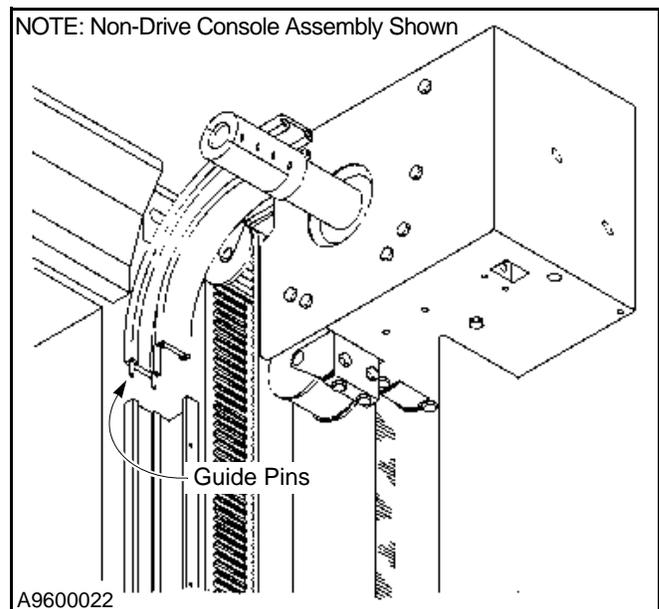


Figure 27

- Insert the two guide pins into the top half of the front track cover.

- Slide each length of straight track up tight against the spiral track. To secure the track to the side column, lock the retaining clips to the track by threading the hex nut tight against the clip. (See Figure 28.)

NOTE: Spacers are used to ensure a gap between the back of the column and the guide rail (track). Be sure that the spacers have not fallen to the bottom of the side column. Should they fall out of position, make sure they are spaced between mounting bolts.

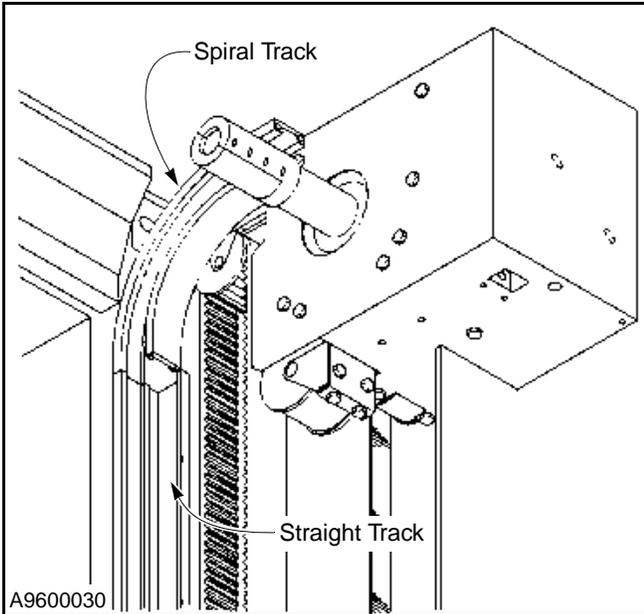


Figure 28

CONNECTION SHAFT

NOTE: Check that all side columns, rear spreader, and console assemblies are properly anchored and that hardware is tightened prior to installation.

The following procedure may be used with either console assembly as a starting point.

- Turn the drive shafts of both consoles until the jaw clamps of the serrated belts arrive at the upper rubber buffer. The position of the clamping jaw must be identical and the blue nylon strap must be wound onto the drive shafts as specified in this manual. (See Figure 37. The sample packing sheet shows that three spring wraps are required for that size of door.)
- Remove the hardware and the clamping jaw half from the drive shaft. (See Figure 29.)

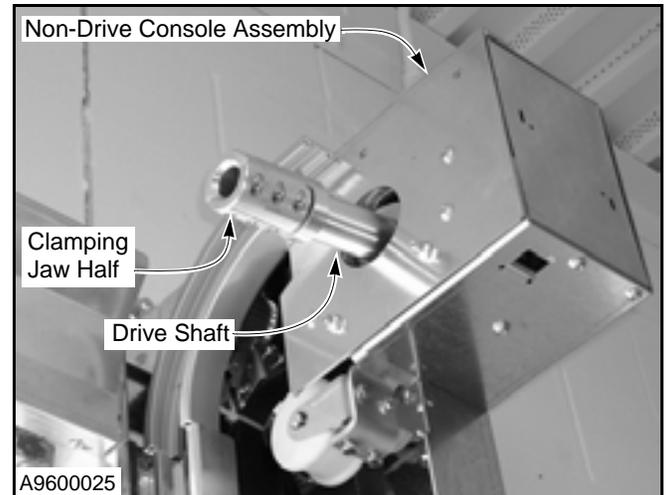


Figure 29

- Loosen the hardware on the opposite end of the drive shaft but do not remove the clamping jaw half, and insert the end of the connection shaft. (See Figure 30.)

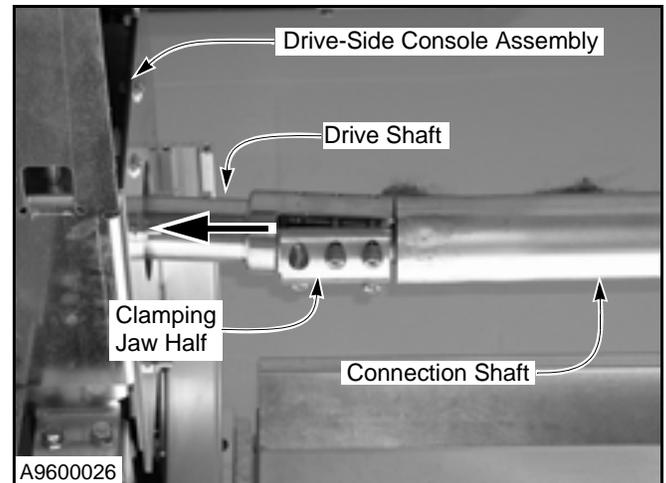


Figure 30

- Insert the opposite end of the connection shaft into the drive shaft and install the clamping jaw half. Provide an equal gap on both ends between the drive shaft and connection shaft. (See Figure 31.)

NOTE: For proper belt alignment, the drive shafts should be pushed out as far as possible away from the connecting shaft.

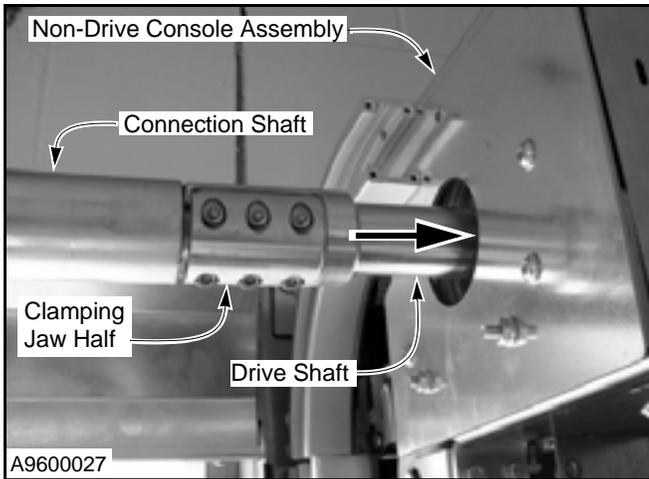


Figure 31

5. On the opposite end, verify the gap between the drive shaft and connection shaft. Tighten the clamping jaw halves.
6. Insert the serrated belt and blue nylon strap into their respective pulleys.

MOTOR DRIVE BELT

The motor drive belt must be tensioned. Final tensioning must be carried out with the door closed. To do this, measure the low tension side. With a testing force of 22.5 lbf, the deflection of the belt should be 0.393 in.

NOTE: If the drive belt still jumps despite being tightened as above, the depth of deflection can be reduced by 0.078 in.

If the belt is tensioned too much, the bearing of the connecting shaft or the connecting shaft itself can be affected.

SPRING PACK AND DRIVE BELT

The spring pack mechanism consists of spring assemblies and belts. It balances out the weight of the door panel assembly. This mechanism also assists the drive motor to open the door.

Spring System

Depending on the size of the door, up to six springs are used. Springs are arranged in spring pack assemblies consisting of one, two, or three springs. A nylon strap attached to the upper end of each spring pack connects the pack to the drive shaft located in the console assembly. (See Figure 32.)

NOTE: The larger S-size doors may have two straps containing up to a maximum of two spring packs with three springs each.

Two spring packs of three in each side column is the maximum.

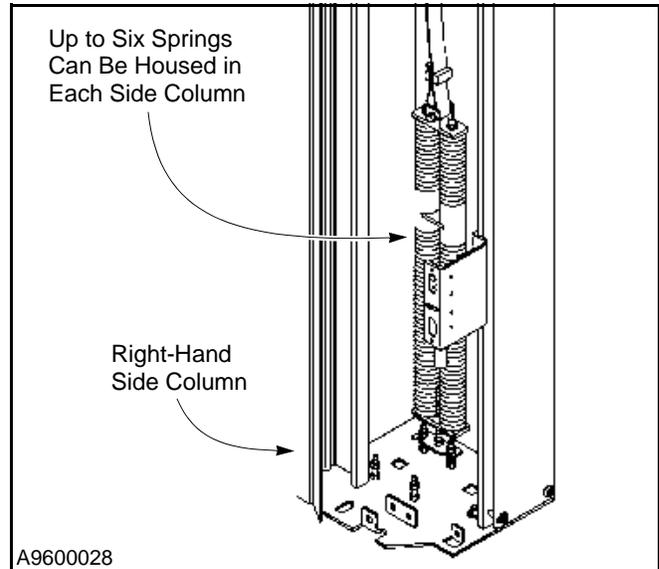


Figure 32

1. Locate the blue nylon spring strap on the end of the drive shaft. To lower the strap through the side column, first carefully cut the plastic cable tie securing the strap to the drive assembly. (See Figure 33.)

NOTE: Each spring pack has its own dedicated nylon spring strap. The number of prewraps are predetermined at the factory for the proper door timing. DO NOT unwind any of the strap from around the drive shaft. Verify the number of wraps using the packing sheet provided with the door. (See Figure 37.)

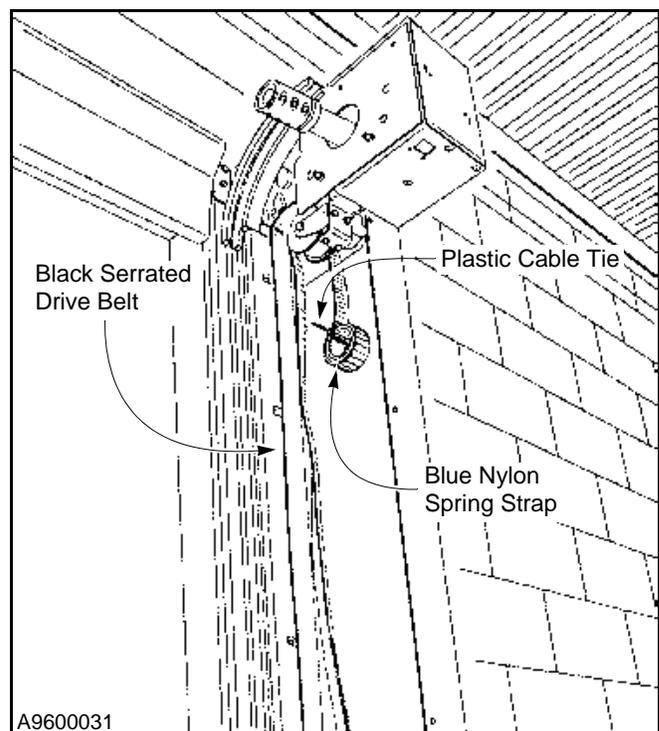


Figure 33

- Hang each spring pack assembly from its associated spring strap. Make sure the nylon straps are not twisted. Use the hardware provided with the spring pack to attach the strap to the pack. (See Figure 34.)

NOTE: Spring packs have a special guide bracket for mounting the spring pack to the side column.

- With the spring packs attached to the straps, mount the spring packs (with the guide bracket) to the side column. Two TORX® socket button head screws, located in the small parts carton, are used to attach the spring pack to the side column. (See Figure 34.)

NOTE: Screw into guide from outside the side column.

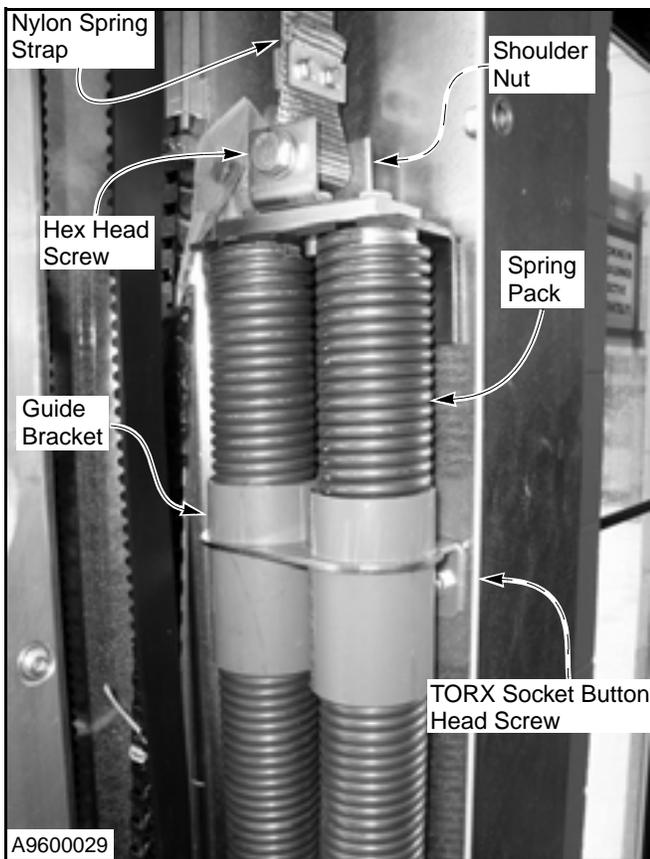


Figure 34

- Locate the two threaded weld studs with nuts mounted to the base plate. Check the bottom set of nuts to be sure they are tight and loosen the top set of nuts. (See Figure 35.)

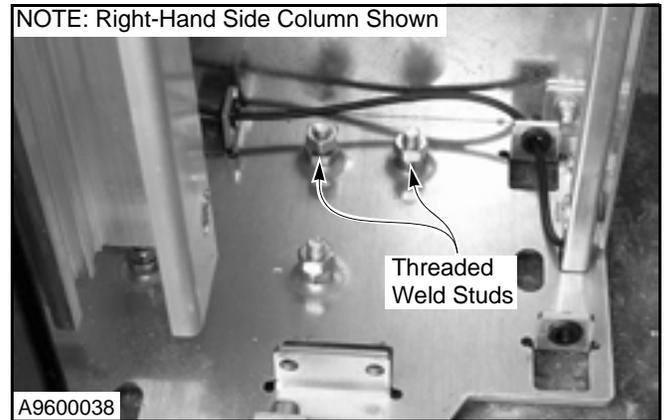


Figure 35

- Preload dimension will adjust the spring to a preset tension before securing the spring packs to the base plate. That measurement is from the base plate to the forked plate on the spring pack. (See Figure 36.)

NOTE: On the end of the adjustment rod is a forked mounting plate. It is used to attach the spring pack to a pair of mounting posts on the base plate. A pair of nuts on each post locks the spring pack to the plate.

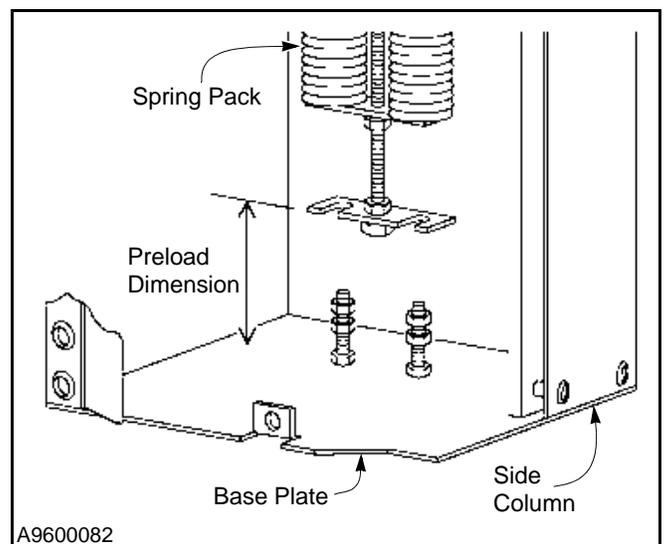


Figure 36

INSTALLATION—SPRING PACK AND DRIVE BELT

RYTEC CORPORATION

SAMPLE PACKING SHEET

ORDER # * W015 * WAREHOUSE 05

TOP LVL 94476.001

SHIP TO CUST

SHIP TO PO

BILL TO CUST

SOLD TO PO

PRODUCT# SD.SMALL.PARTS REV DRAWING SCHD-DUE 07-07-06
 DESCRIPTN SPIRAL SMALL PARTS BOX SCHD-STR 07-07-06
 QTY-ORDR 1 EA PRNT-DTE 07-17-06
 COMMENTS PLAC-DTE 07-13-06
 TAKEN BY

OPER#	PRODUCT#	DESCRIPTION	WORK CENTER	AMT-REQD	AMT-ISSUED
		OPTIONS BEGIN.....			
		80723	DOOR SERIAL NUMBER		
			CUSTOMER NAME		
		MECH	SPECIAL ORDER DOOR		
		DAYLIGHT WIDTH	144		
		DAYLIGHT HEIGHT	144		
		ADJUSTED HEIGHT	144		
		SSN	LOW LENTIL HEAD PROJECTION		
		LOW LENTIL	SPIRAL DOOR		
		480	VOLTAGE		
		3	THREE PHASE		
		LEFT	MOTOR MOUNT		
		DOM	DOMESTIC CRATE		
		WINDOW PANEL(S)	04		
		51	WINDOW LOCATION FROM FLOOR		
		SD SPRING QTY	04		
		SD SPRING LGTH	0000001781.00000		
		SD SPRING BELT	0000002338.00000		
		SD SPRING TENSN	147		
		SD SPRING WRAPS	03		
		PUSH BUTTON BLK	02		
		ONECHAN	ONE CHANNEL LOOP MODULE		
		T4	NEMA TYPE 4 ENCLOSURE (STANDARD)		
		ND	NO DISCONNECT REQUIRED		
		OPTIONS END.....			

L2 = Spring Length

Spring Wrap Requirement

Spring Pre-load Dimension is in Millimeters

A9600073

Figure 37

Drive Belt and Guide Pulley System

The drive belt used to raise and lower the door can now be installed in each side column.

1. Each drive belt has been factory mounted to a drive pulley and a guide pulley. Also, each belt has been packed for shipping inside its respective drive assembly. Carefully cut the plastic cable tie that is temporarily securing the belt to the drive assembly.

NOTE: Leave both drive belts on the drive shaft pulley in the position found. Do not reindex either drive belt on the drive shaft. Otherwise, the “timing” of the door travel will be affected, which could result in damage to the door.

2. Pass the belt, along with the guide pulley, down the side column.
3. The nearest pair of mounting posts on the base plate is used for mounting the guide pulley. Remove the two upper nuts from this set of posts to make it possible to place the pulley. (See Figure 38.)

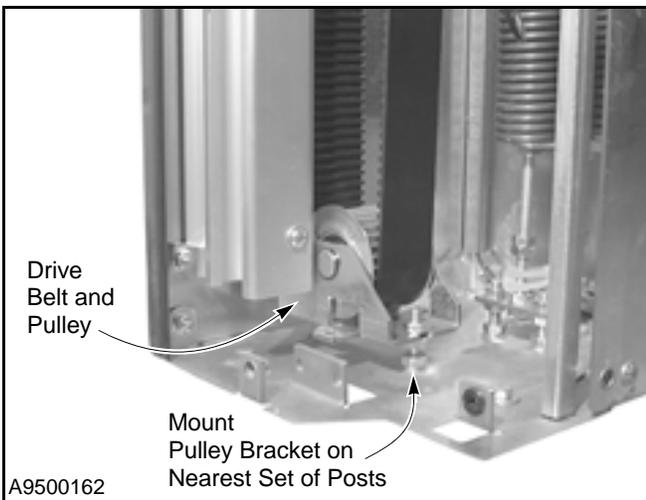


Figure 38

4. Secure the pulley bracket to the base plate using only the back post. Position that end of the pulley as close to the base plate as possible.

Depending on the length of the drive belt, the position of the lower nut along the back post can vary. Tighten the upper nut against the pulley bracket to lock the back of the pulley to the base plate.

5. The front post is used to set the tension on the drive belt. Thread the upper nut down against the pulley bracket until the belt is properly tensioned. Tighten the lower nut against the bottom of the pulley to lock in the tension. (See Figure 40.)

NOTE: If you find it difficult to reach the front post with the pulley, give the belt some slack by repositioning the pulley bracket on the back post. Also, it is important that the pulley bracket be level (side to side).

If the pulley bracket is too short to reach the baseplate mounting post in the side column, the guide pulley trolley in the console will have to be adjusted. See “Console Guide Pulley Trolley Adjustment” on page 16. After the installation of the baseplate pulley bracket, the tension on the guide pulley in the console should be reapplied.

6. To make the belt run true, level the pulley assembly by installing one bolt and two nuts, which can be found in the small parts carton, on each tab of the guide pulley bracket. (See Figure 39.)

NOTE: The factory will determine if the door being installed is oversize and then will designate the proper pulley assembly. Step 6 and following will be required only if your pulley assembly has tabs and hardware included.

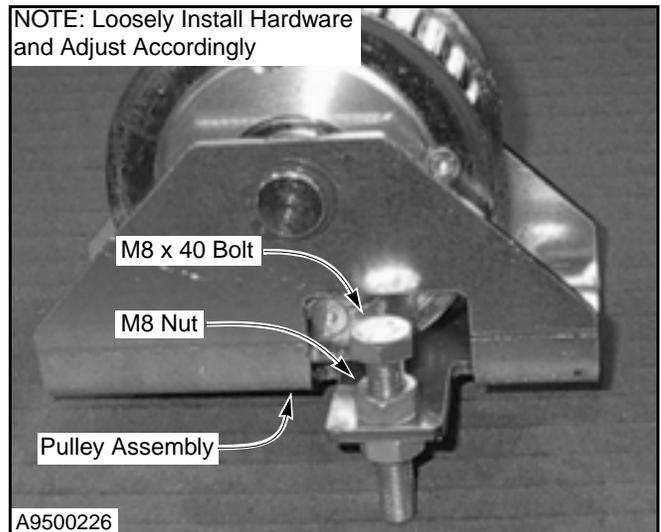


Figure 39

7. Level pulley assembly, as required, and tighten hardware. (See Figure 40.)



Be sure that the guide pulley bracket is level when the door is in operating mode. Damage to the belt or pulley components may occur if the guide pulley bracket is not level.

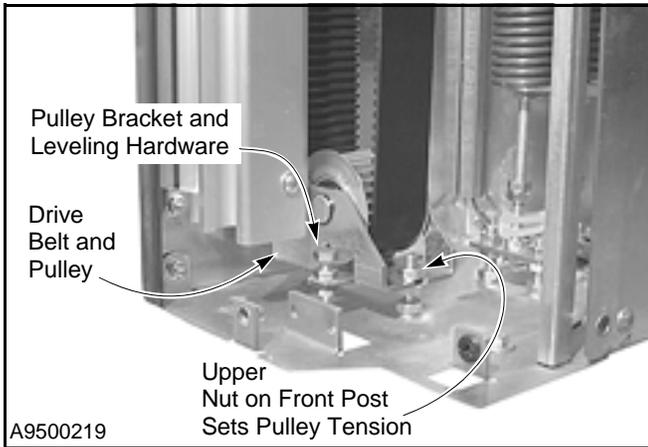


Figure 40

Console Guide Pulley Trolley Adjustment

The drive belt guide pulley trolley within a drive or non-drive console can be adjusted fore and aft. This allows extra slack in the drive belt system if the guide belt pulley in the bottom of a side column cannot be installed. This should not be construed as the proper procedure in adjusting the drive belt.

NOTE: Doors that are 13 ft. x 13 ft. and smaller have only one adjusting screw for the trolley. Doors larger than 13 ft. x 13 ft. will have two adjusting screws for the trolley.

For consoles that have two adjusting screws, both screws should be adjusted and, when finished, should have contact with the pads on the trolley.

After installation of the baseplate pulley bracket, the tension on the guide pulley in the console should be reapplied.

CONSOLE — SINGLE ADJUSTING SCREW (L-SERIES)

1. Remove front cover to non-drive console.

NOTE: On the drive console, there is no panel to remove to access the adjusting screw.

2. Loosen the two nuts on the side of the console. (See Figure 41.)

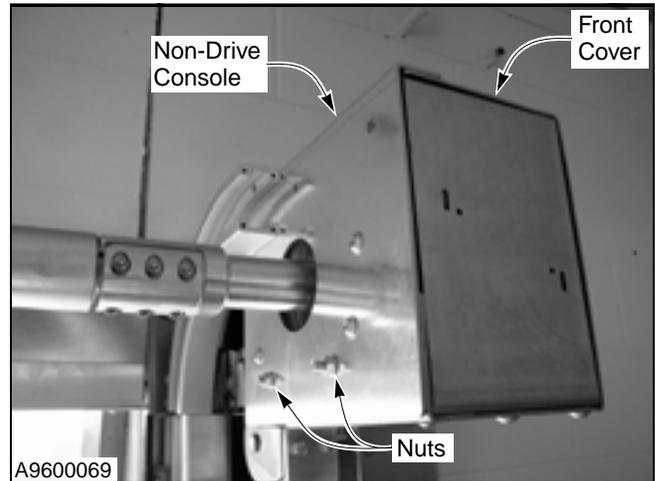


Figure 41

3. Loosen the two TORX® socket button head screws on the bottom of the console. (See Figure 42.)

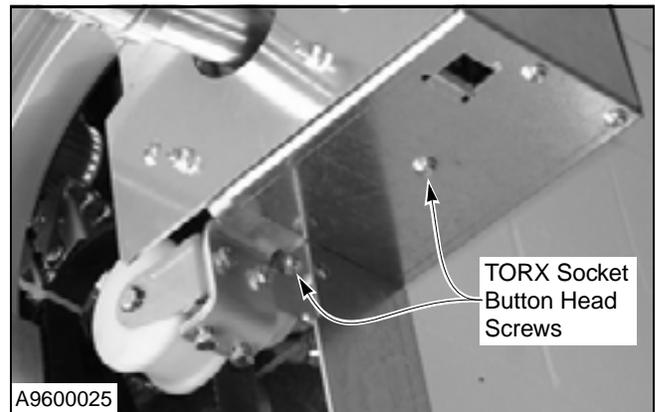


Figure 42

4. Turn cap screw to adjust guide pulley trolley. (See Figure 43.)

NOTE: Turn cap screw clockwise to move the trolley toward the wall. Turn cap screw counterclockwise to move the trolley away from the wall or toward the front of the console.

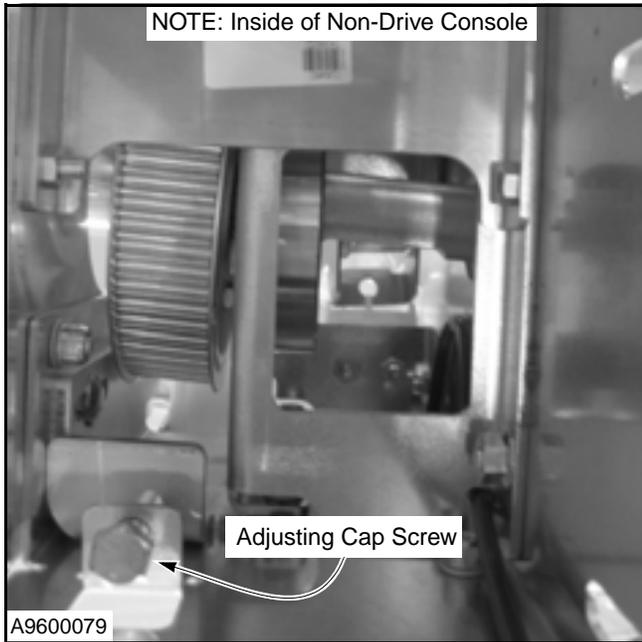


Figure 43

- When the desired position of the trolley has been achieved, tighten the hardware and reinstall the front cover.

CONSOLE — DUAL ADJUSTING SCREW (S-SERIES)

- Remove front cover to non-drive console.

NOTE: On the drive console, there is no panel to remove to access the adjusting screw. The belt cover needs to be removed to access the bolts for the guide pulley trolley.

- Loosen the two nuts on the side of the console. (See Figure 44.)

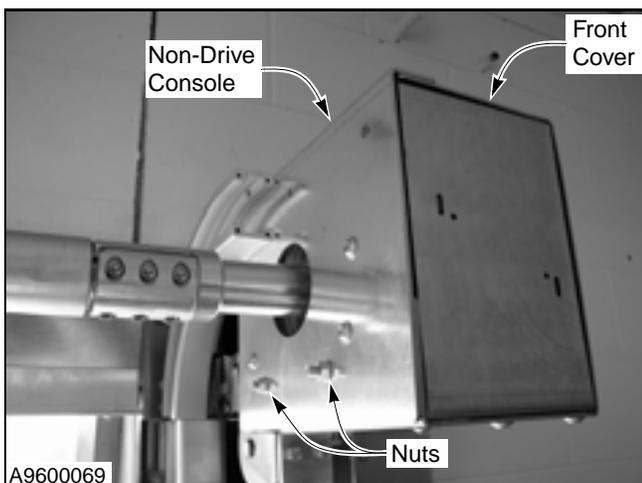


Figure 44

- Locate the two access holes on the opposite side of the console and loosen the bolts to the guide pulley trolley. (See NOTE.)

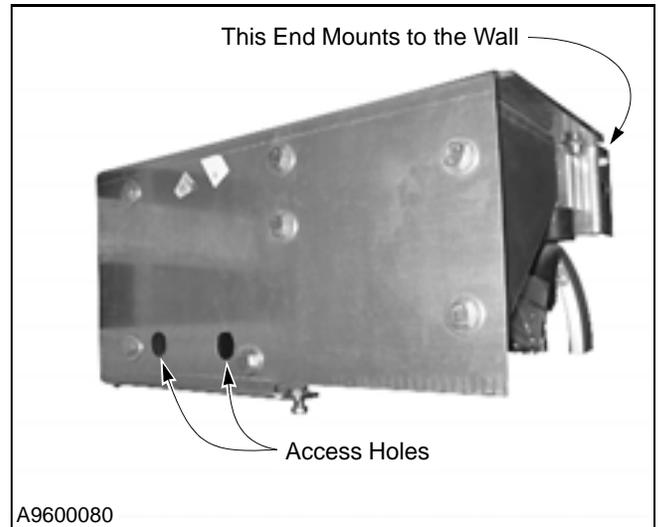


Figure 45

NOTE: On the drive console, remove the belt cover to locate the two access holes and loosen the bolts to the guide pulley trolley. (See Figure 46.)

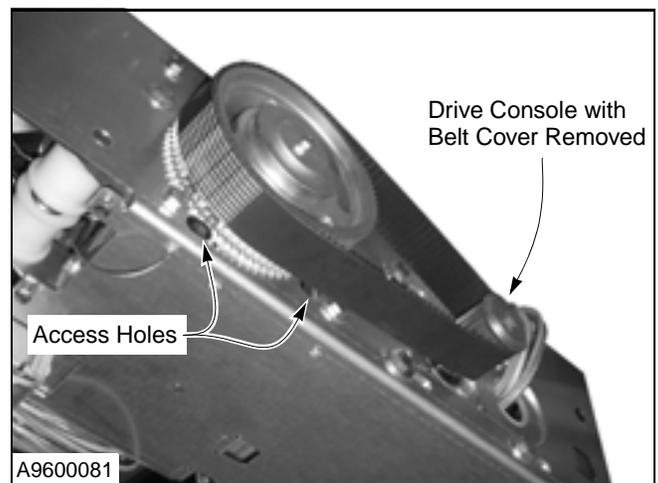


Figure 46

- Turn the two cap screws and adjust the guide pulley trolley.

NOTE: Turn cap screw clockwise to move the trolley toward the wall. Turn cap screw counterclockwise to move the trolley away from the wall or toward the front of the console.

- When the desired position of the trolley has been achieved, tighten the hardware and reinstall the front cover.

INSTALLATION—HORIZONTAL GUIDE RAILS

HORIZONTAL GUIDE RAILS

NOTE: The door comes from the factory with a set of brackets designed for a multi-platform installation. Should the factory brackets be unsuitable for the application, the installer will be responsible for custom fabrication of brackets based on the requirements of the installation.

1. Confirm that guide pins are installed in the horizontal guide rail. (See Figure 47.)

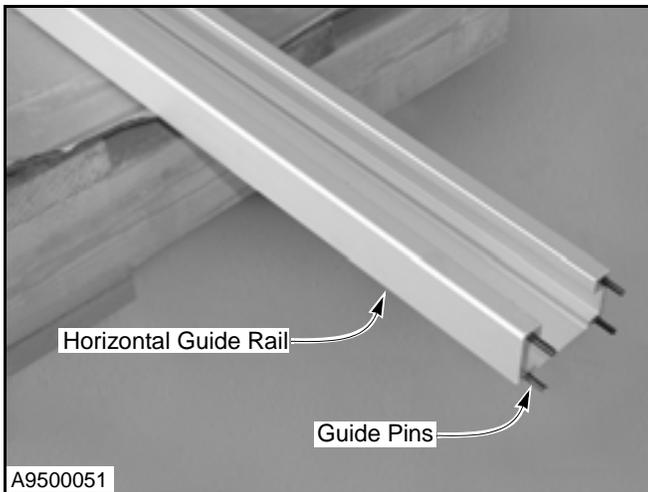


Figure 47

2. Insert the horizontal guide rail into the console. Install the hardware and secure the rail to the console. (See Figure 48.)

IMPORTANT: *When installing hardware, make sure the head of the bolt is inside the guide rail, or interference may cause damage to the rollers when the door operates.*

NOTE: Support the opposite end of the guide rail while performing this installation.

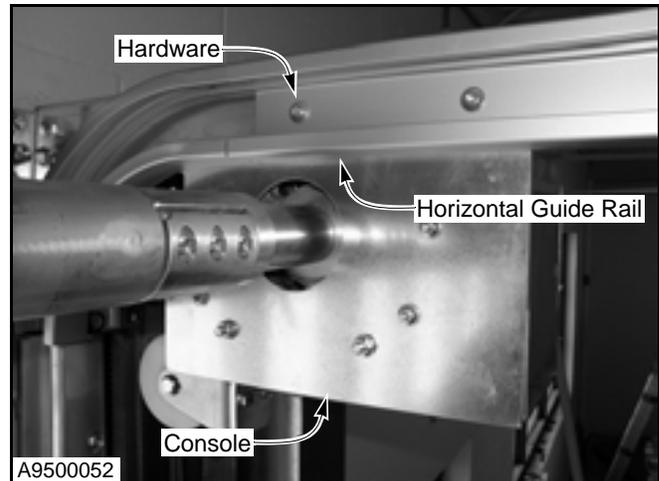


Figure 48

3. Support the end of the guide rail with rope or a mechanical device. Place a carpenter's level on top of the guide rail and secure the guide rail in a level position. (See Figure 49.)

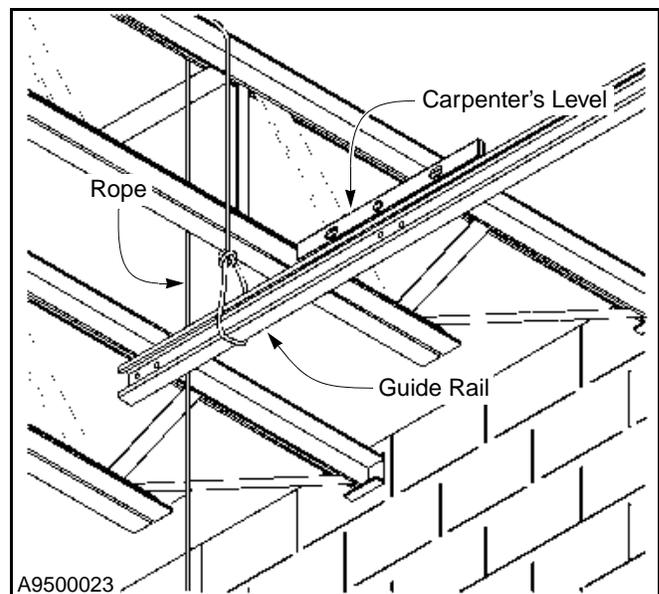


Figure 49

4. Install the ceiling mounting brackets. (See Figure 50.)

NOTE: The horizontal guide rail has factory pre-drilled holes for mounting the ceiling brackets, two for each side. Custom fabrication of the brackets and drilling of extra mounting holes may be required to facilitate installation.

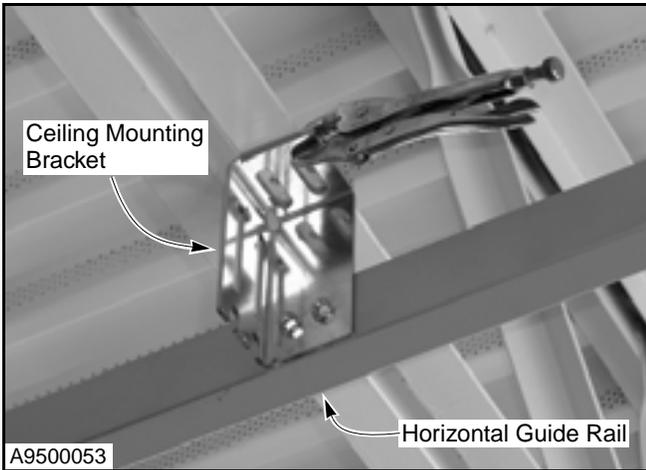


Figure 50

5. Install the connecting end bracket to both horizontal guide rails. (See Figure 51.)

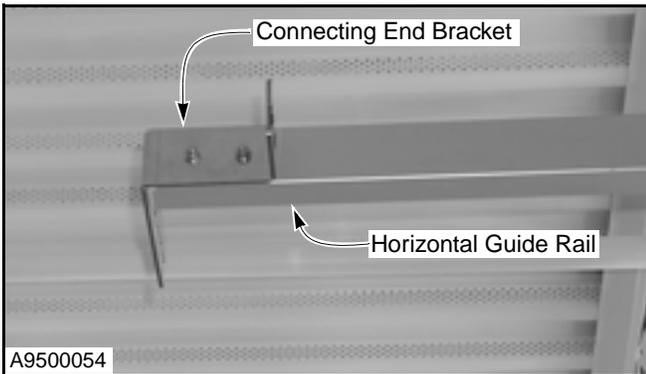


Figure 51

6. Install the rear mounting rail and ceiling mounting bracket. (See Figure 52.)

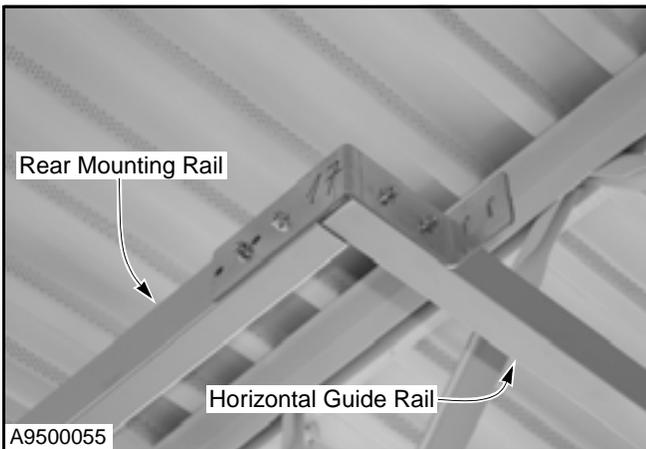


Figure 52

7. Confirm that the horizontal guide rails are still level and all hardware is tight and secure.
8. Check that the overhead rail assembly is square and in proper alignment. (See "FINAL ADJUSTMENTS" on page 30.)

DOOR PANEL



CAUTION: The door panel assembly is extremely heavy. To prevent personal injury or damage to the door panel, the use of a mechanical lifting device or forklift is required for installation.

1. Prior to installation, confirm that the side columns, rear spreader, consoles, connection shaft, and horizontal guide rails are secure and hardware is tightened.
2. Remove the track cover. (See Figure 53.)

NOTE: Depending on the height of the door, the track cover may be a one- or two-piece unit. If it is a two-piece unit, the top half track cover should be removed as shown in Figure 53.

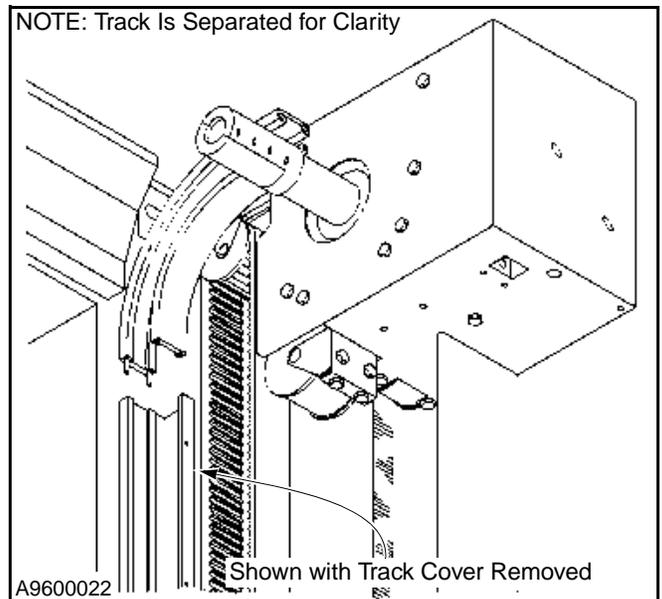


Figure 53

3. Remove door panel assembly from the crate using the shipping pallet that the panel is strapped to and make a general inspection of the door panel. (See Figure 54.)

INSTALLATION—BRAKE RELEASE

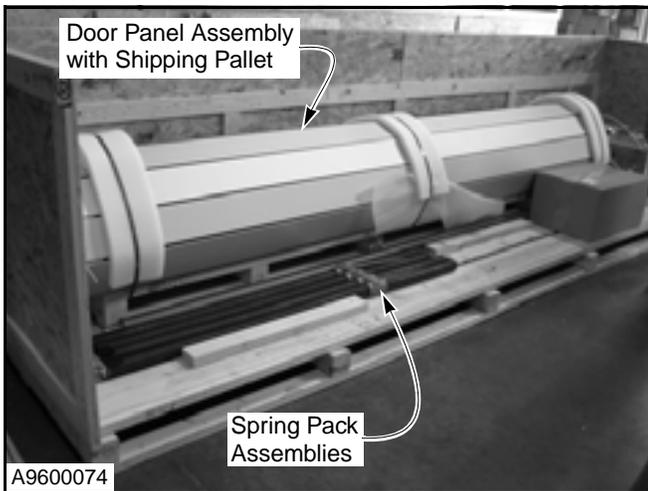


Figure 54

4. Center the door panel assembly on the forks and align the panel in the center of the opening.
5. Position the pallet and panel on the forks so that the door lip is facing the side column guide rails. (See Figure 55.)

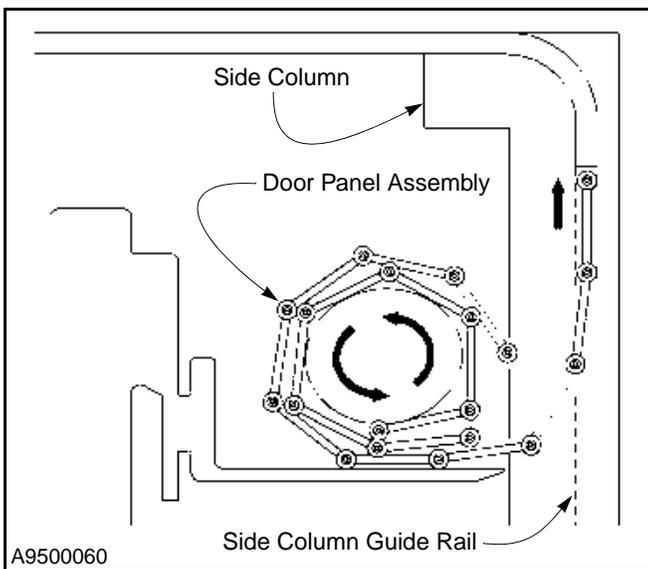


Figure 55

6. Guide the rollers of the door into the guide rail system. (See Figure 56.)

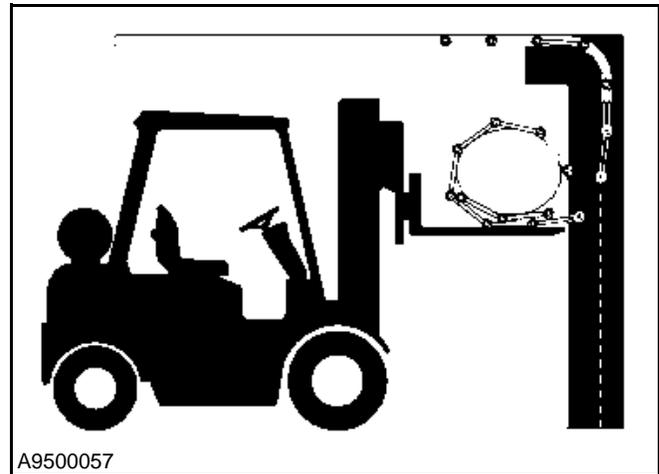


Figure 56

NOTE: The use of a rope might be required to secure the door while trying to insert rollers into the rail system. The rope must be tied to both ends of the door panel. Run the ropes over the connecting shaft and pull the door panel into the guide rails. (See Figure 57.)

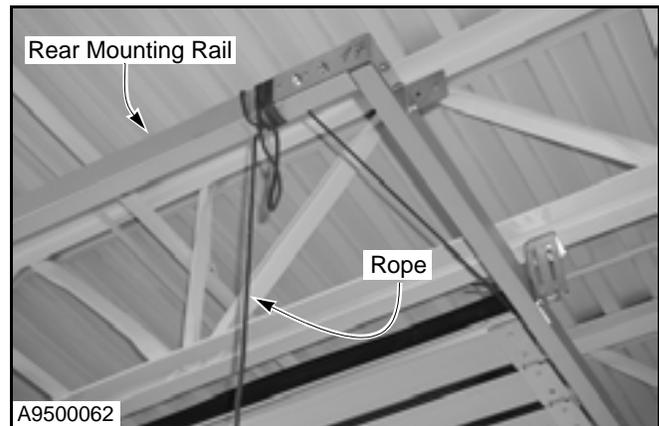


Figure 57

7. Secure the door panel to the rear mounting rail and install the upper half of the track cover.

BRAKE RELEASE

This Rytec door is equipped with a brake override system that allows the door to be manually opened or closed in the event of an emergency or power outage. A steel cable links the electric brake mechanism, located just above the drive motor, to a brake release handle mounted on the left-hand side column.

When the brake release has been engaged, the door should automatically lift to about half or two-thirds of the way open.

1. One end of the steel cable was connected to the brake mechanism at the factory. For shipping, the other end has been routed out through the side of the drive console. Pull the cable back through the console assembly and route it down through the side column to the brake release handle. (See Figure 58 and Figure 59.)

NOTE: Tug on the free end of the cable to check that it is not caught or hung up.

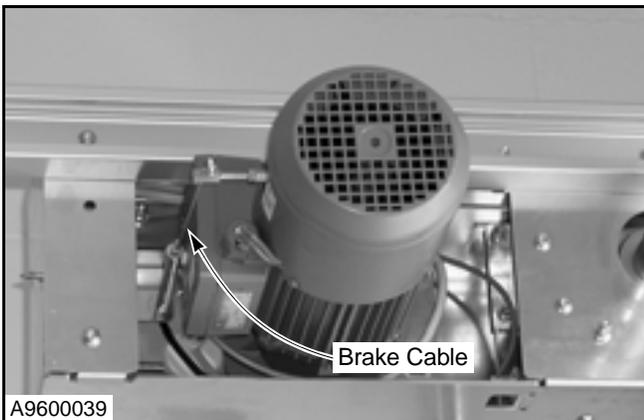


Figure 58

2. With the brake release handle fully extended out or at 90 degrees, feed the cable through the eyelet in the bottom of the handle. Slide a crimp nut over the end of the cable with the nut tight against the eyelet. Then tighten down the set screw — with most of the slack removed from the cable. The crimp nut is located in the small parts carton. (See Figure 59.)

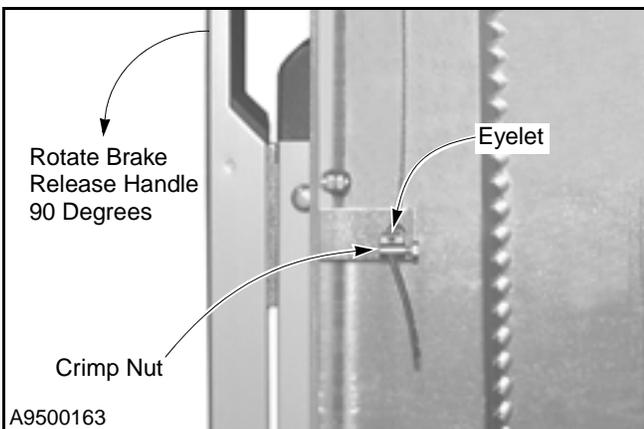


Figure 59

3. Pull the handle several times to stretch the cable and remove any slack. Check the action of the lever on the brake mechanism for proper travel. If necessary, reposition the crimp nut.

NOTE: Be sure that the cable isn't so tight that the brake mechanism cannot re-engage once the lever is released and put back in place.

4. Cut the cable to length, 2 in. after the crimp nut.
5. Disengage the electric brake by pulling the brake release handle. Then manually lower the door a few inches to verify that the door is not bound or caught up in the head assembly.
6. To re-engage the electric brake to lock the door in place, place the brake release handle back against the side column.

DOOR PANEL TO DRIVE BELT

The following procedure can be performed without either the power or the control panel connected as explained below. Should the panel be fully operational, set the System 3 in jog mode (Refer to System 3 Drive & Control Installation & Owner's Manual, page 10) and lower the belt accordingly.

1. Release the brake to the drive motor assembly.
2. Pull on the drive belt and align the splice block with the door bracket.
3. Install hardware, connecting the door bracket to the splice block in each side column. (See Figure 60.)

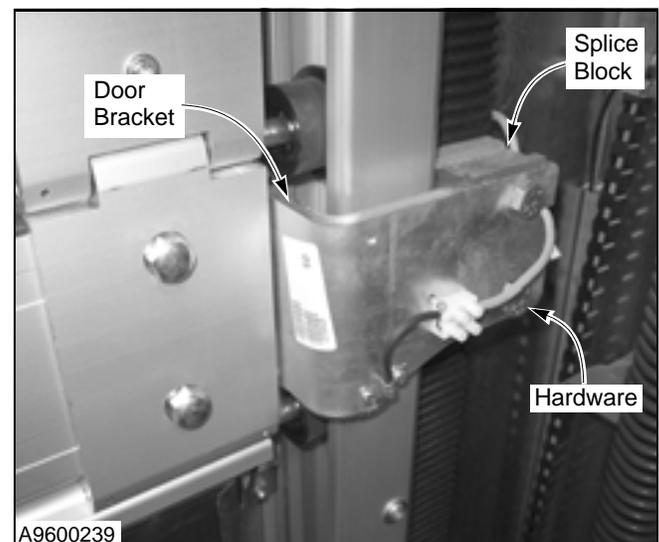


Figure 60

NOTE: The door bracket and splice block will have a similar configuration.

4. Remove the ropes holding the panel and engage the brake.

PHOTO EYES

This door uses two sets of photo eyes to monitor the front and back sides of the door. Each set consists of two photo eye modules. The factory-installed eyes are located in the left-front and right-front corners of the door. The customer-installed eyes are to be located in the left-rear and right-rear corners of the door. (See Figure 61.)

INSTALLATION—PHOTO EYES

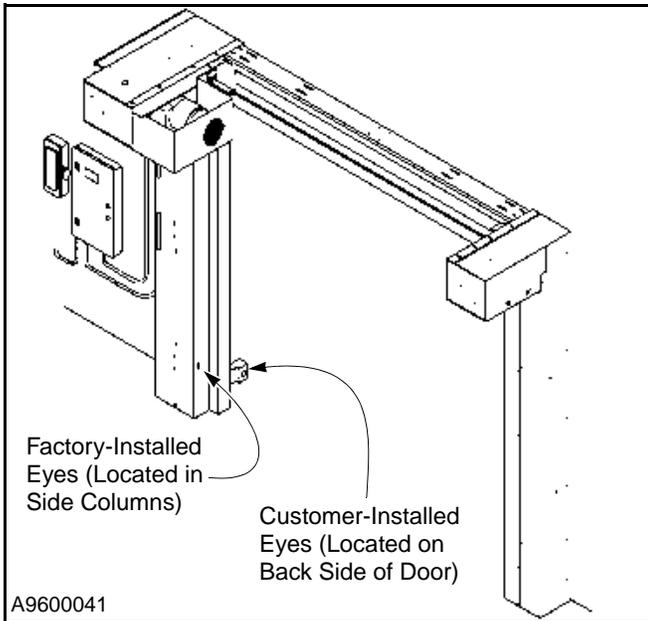


Figure 61

Factory-Installed Eyes

1. Locate each factory-installed photo eye module and its required wire cable. (See Figure 62.)

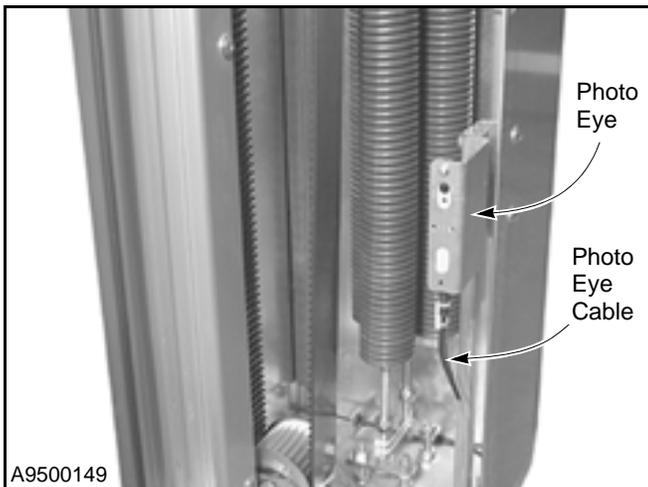


Figure 62

2. Each cable has been routed up through a vertical raceway located in the corner of the side column. Locate the free end of each photo eye cable. (See Figure 63.)

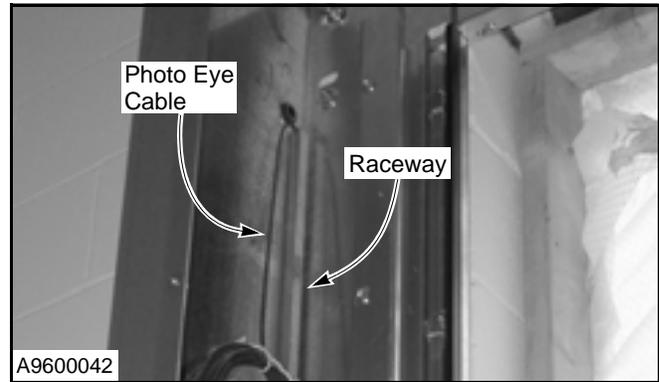


Figure 63

3. Route the right-front photo eye cable straight up into the right console assembly, then across the rear spreader. This rear spreader runs between the side columns along the top. (See Figure 64.)

Check to make sure the cable is lying on top of the rear spreader. Later, once all wiring is complete, plastic cable ties will be used to keep the cables on the rear spreader.

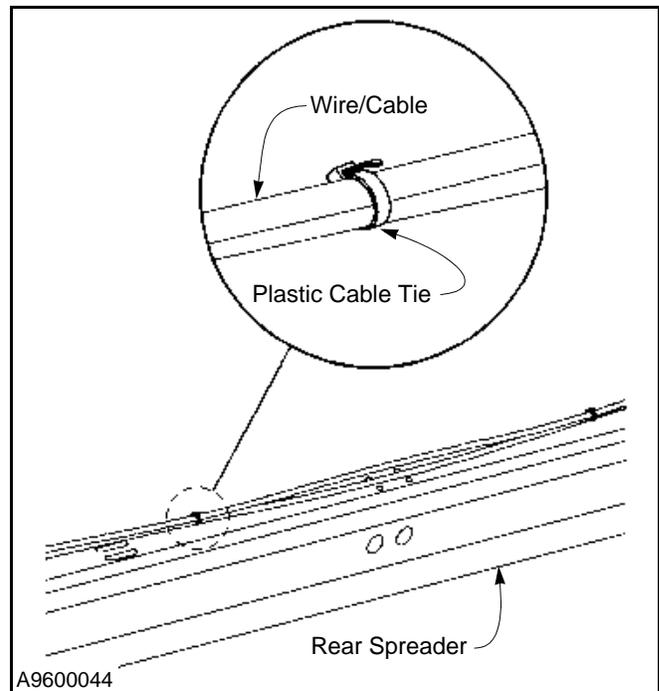


Figure 64

4. Continue routing this cable through to the left console assembly and over to the door head junction box, located behind a panel on the drive side console. (See Figure 65.)

NOTE: Route the cable away from all belts and pulleys. Separate high- and low-voltage cables to prevent signal interference.

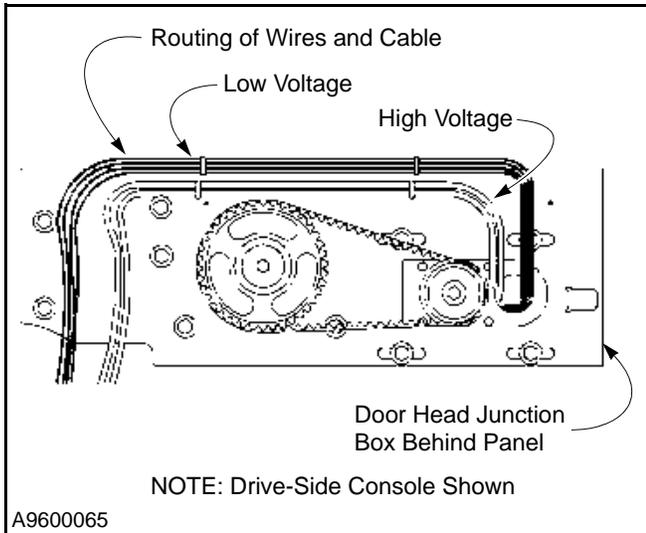


Figure 65

- Remove the junction box cover and save the hardware for later use. Then pass the cable through the double-cable cord grip on the side of the junction box. Do not tighten the cord grip at this time. (See Figure 66.)

NOTE: Take note that the two available cord grips are different — one is a single-cable grip, the other a double-cable grip.

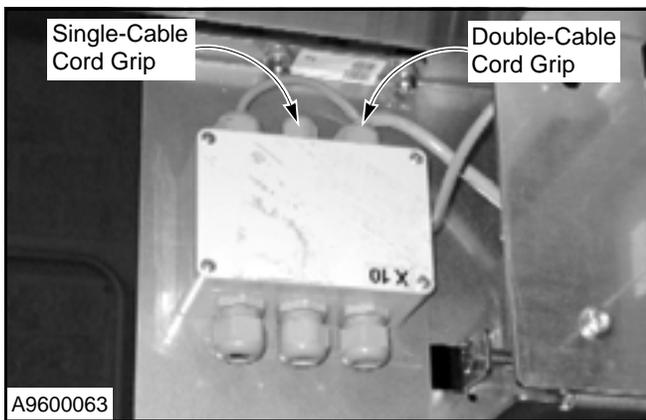


Figure 66

- Route the left-front photo eye cable out the hole that is lined with the rubber grommet. This hole is located just above the raceway. (See Figure 67.)

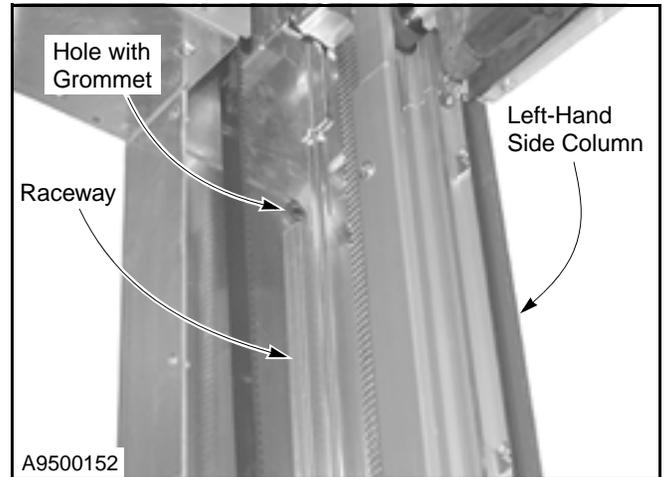


Figure 67

- From the grommet-lined hole, pass the photo eye cable into the drive-side console and over to the door head junction box. (See Figure 68.)

NOTE: Make sure to route the wire cable away from all belts and pulleys. Separate high- and low-voltage cables to prevent signal interference.

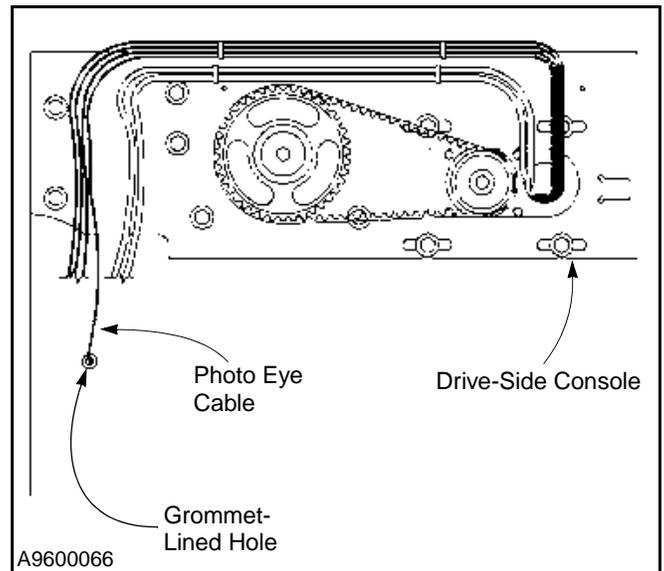


Figure 68

- Pass the second photo eye cable through the double-cable cord grip. Tighten the cord grip to lock both photo eye cables to the junction box. (See Figure 66.)
- Connect the control lines for the factory-installed photo eyes to the door head junction box as indicated below:
 - Photo eye emitter module brown wire to terminal 1.
 - Photo eye emitter module blue wire to terminal 2.

INSTALLATION—DOOR REVERSING EDGE

- Photo eye receiver module brown wire to terminal 1.
- Photo eye receiver module blue wire to terminal 2.
- Photo eye receiver module white wire to terminal 6.

NOTE: Do not install the junction box cover at this time. Cable connections are shown in the wiring diagram.

Customer-Installed Eyes

To monitor the back side of the door, a second set of photo eyes must be installed. These eyes, their required cables, and two mounting brackets are located in the small parts carton. You must provide the necessary hardware to install the brackets on your particular wall.

NOTE: The rear set of eyes is to be located on the back side of the door, approximately 12 in. above the front set of eyes and as close to the door opening as possible. It is also important that the eyes are mounted directly across from each other.

In addition, note that the front and rear sets of eyes and their associated cables are of different styles. The eyes and cables are not interchangeable.

1. After the mounting brackets are in place, mount the emitter module in the left-rear mounting bracket and the receiver module in the right-rear bracket.

The receiver module can be identified by the two small lights, one yellow and one green. The emitter module has two green lights. (See Figure 69.)

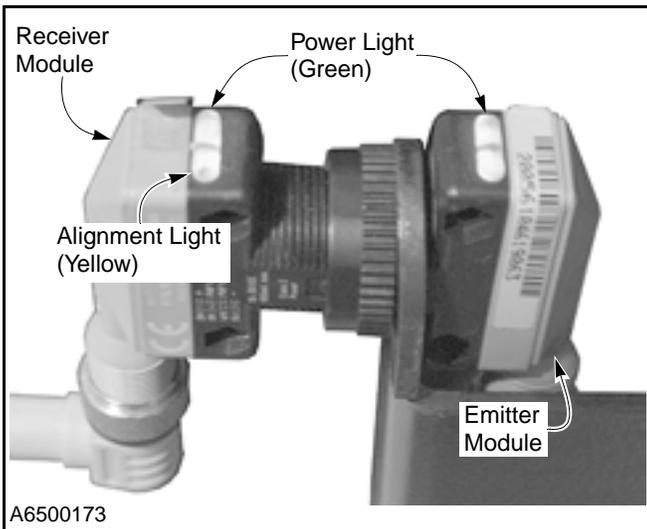


Figure 69

2. Using the two cables provided, route one cable from each photo eye to the control panel. At the factory, a string was routed through each side column to help you pull the cables through the side columns. Remove both strings once the cables are routed.

NOTE: Be sure the path through which the cables are routed hides and protects them from damage. If necessary, run conduit to each mounting bracket to protect the cables. Note the end of the cable intended for the photo eye. DO NOT connect the photo eye cables to the control panel at this time.

DOOR REVERSING EDGE

The door reversing edge was installed at the factory. You are required to complete the installation of the wire cable.

1. Locate the reversing edge cable leading from the bottom, right-hand corner of the door. Install wires into terminal block and tighten screws. (See Figure 70.)

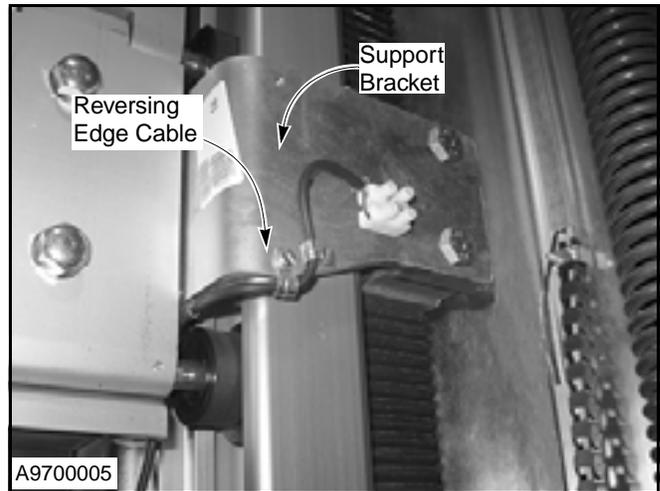


Figure 70

NOTE: The door bracket and splice block will have a similar configuration.

2. On the end block assembly, remove the nylon lock nut from the E-chain mounting bolt. (See Figure 71.)

NOTE: The end block has been removed from the door assembly to give a constructive view of the E-chain, cable, and wires.

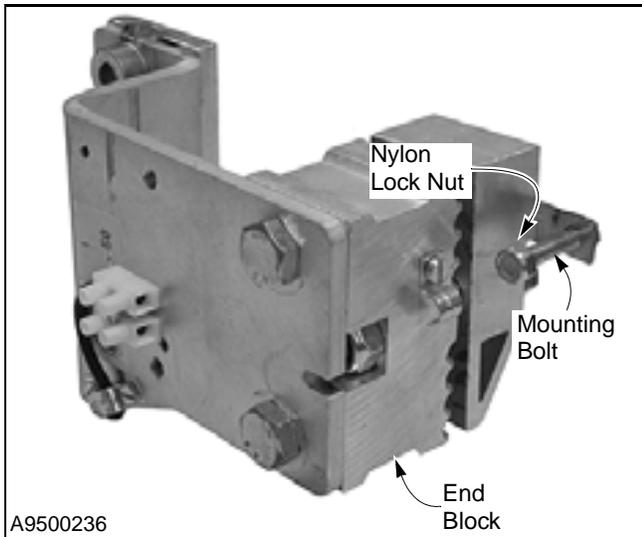


Figure 71

3. Locate E-chain with cable inside the side column.

NOTE: The wire cable that attaches to the terminal block is routed internally through the E-chain.

4. Attach E-chain to mounting bolt. Install nylon lock nut and tighten.

NOTE: Make sure that when the E-chain is installed that the cable is routed between the bolt and end block clamp.

Tightening the lock nut excessively will cause the E-chain to bind.

5. Route cable to the front of the end block. (See Figure 72.)

NOTE: The end block has been removed from the door assembly to give a constructive view of the E-chain, cable, and wires.

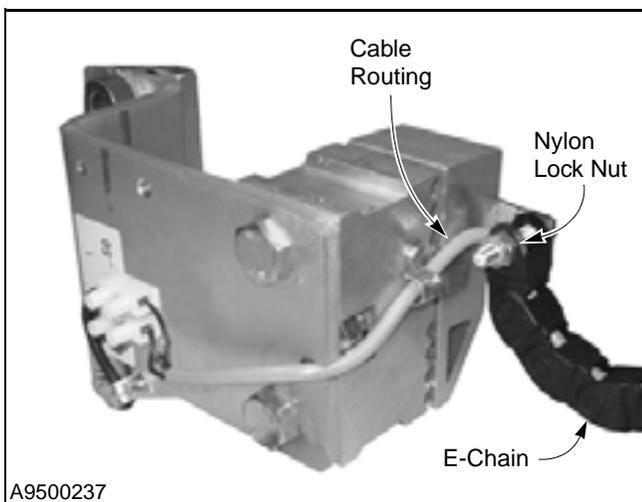


Figure 72

6. On the near end of the cable, run the wires into the terminal block. Then secure them together using the small screws.

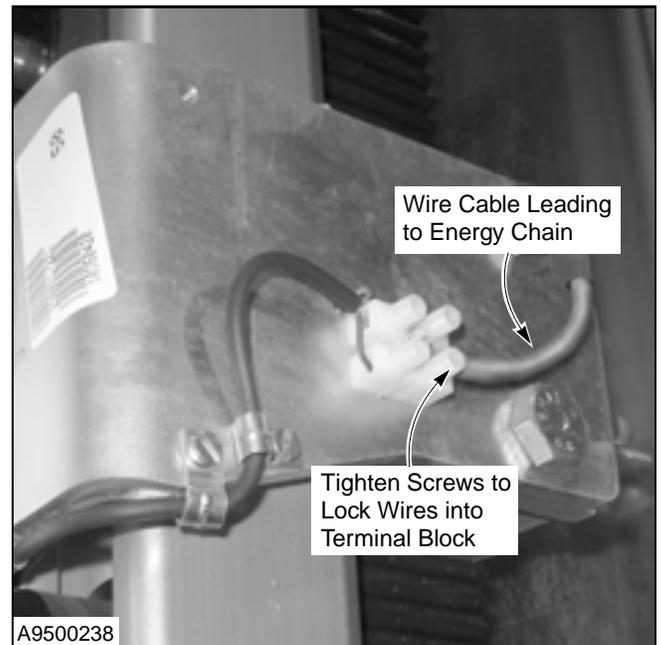


Figure 73

7. Locate the free end of the reversing edge cable. It should be hanging out of the raceway near the top of the right-hand side column. Route this cable over to the door head junction box, taking the same path as the right-front photo eye cable.

8. Secure the reversing edge cable to the junction box using the remaining available, single-cable cord grip. (See Figure 74.)

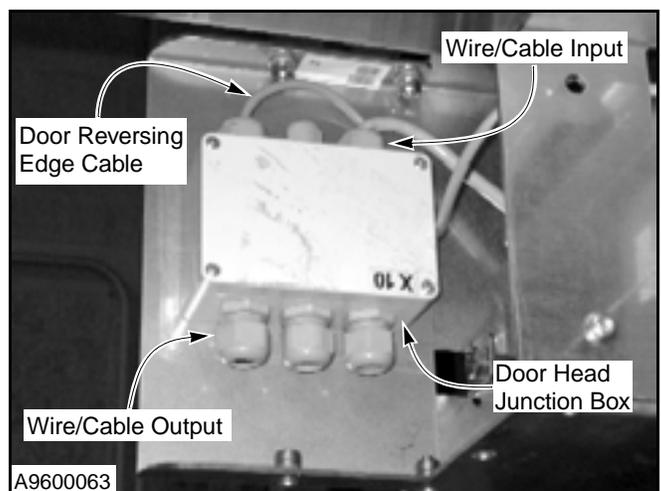


Figure 74

CONTROL SYSTEM—CONTROL PANEL

9. Connect the control lines for the reversing edge to the door head junction box as indicated below:
 - Reversing edge brown wire to terminal 8.
 - Reversing edge white wire to terminal 7.
10. Secure the junction box cover.
11. With all cables routed, secure them with plastic cable ties, as required, on the rear spreader (supplied by door owner or installer). Be sure to check that no wires or cables are pinched or interfering with any moving components of the door. (See Figure 75.)

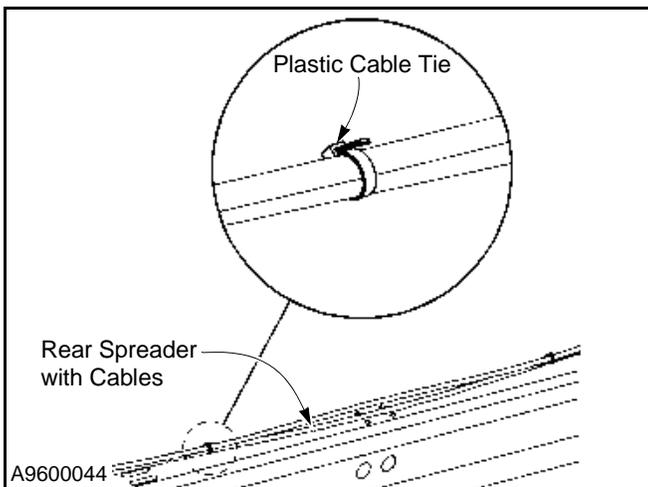


Figure 75

CONTROL SYSTEM

CONTROL PANEL

Once the door has been assembled, see the Rytec System 3 Drive & Control Installation & Owner's Manual for information on control panel installation, electrical connections, and door limit settings. (See Figure 76.)

NOTE: To expedite the installation of this door, it is recommended that the electrical disconnect and control panel be installed prior to installing the door. Review the layout diagram shipped with your door to determine exactly where these major electrical components are to be located. The control panel and disconnect are typically mounted adjacent to the left side column.

If you have any questions regarding this installation, contact your Rytec representative or the Rytec Customer Support Department at 800-628-1909.



Figure 76

⚠ WARNING

All electrical work must be performed by a licensed or certified electrician. All electrical work must be performed in accordance with all local and state building codes and requirements.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

IMPORTANT: High- and low-voltage lines MUST be routed to the control panel in separate conduit.

NOTE: All wiring and required conduit between the electrical disconnect and the control panel, between the control panel and the small junction box near the drive motor, and between the control panel and the floor must be supplied by the owner of the door. All wiring and conduit must meet all local and state building codes and requirements. Wires provided with the door have been identified with terminal or contact numbers.

All conduit entering the control panel **MUST** enter from the bottom through a removable knockout plate. **DO NOT** run any conduit into or through either the top or the side of the control panel.

Protect the components inside the control panel from metal chips when installing the conduit. Seal the conduit where it enters the control panel — particularly if the conduit is routed from one area to another, where the two areas can have different ambient air temperatures. If the conduit is not sealed properly, condensation can form inside the control panel, which can lead to serious electrical problems.

The wiring diagrams and schematics provided in this manual are for informational purposes only. Due to customer requirements for individual installations, a schematic diagram has been prepared for your particular door and installation. That schematic diagram has been shipped with the control panel and must be referred to during this installation.

Drive Motor to Control Panel

1. Route the drive motor/motor brake power cable, leading from the motor junction box, to the control panel. (See Figure 77.)

NOTE: To properly ground the outer shield of this cable, terminate the end of the cable to the control panel using the grounded cable clamp provided.

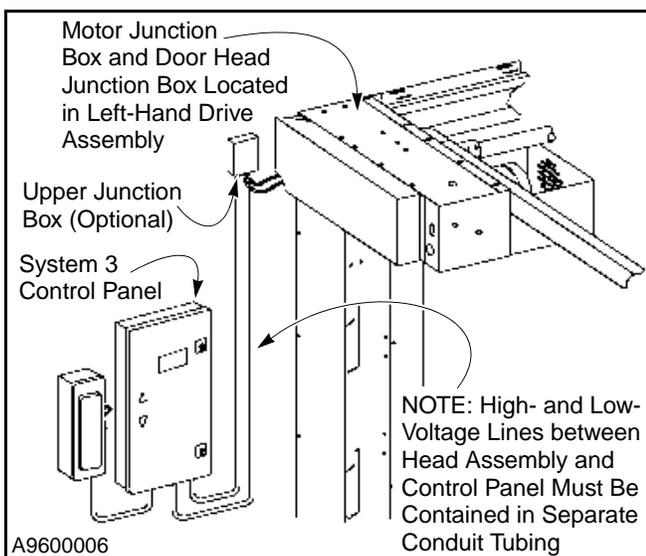


Figure 77

2. Connect the drive motor power supply lines to the control panel as indicated below:
 - MCC-7-1 green/yellow wire to terminal PE.
 - MCC-7-1 #1 wire to terminal T1.
 - MCC-7-1 #2 wire to terminal T2.
 - MCC-7-1 #3 wire to terminal T3.
3. Connect the motor brake power supply lines to the control panel as indicated below:
 - MCC-7-1 #4 wire to terminal B1.
 - MCC-7-1 #5 wire to terminal B2.

Brake Release Sensor to Control Panel

1. Route the brake release sensor cable, leading from the motor junction box, to the control panel. (See Figure 78.)

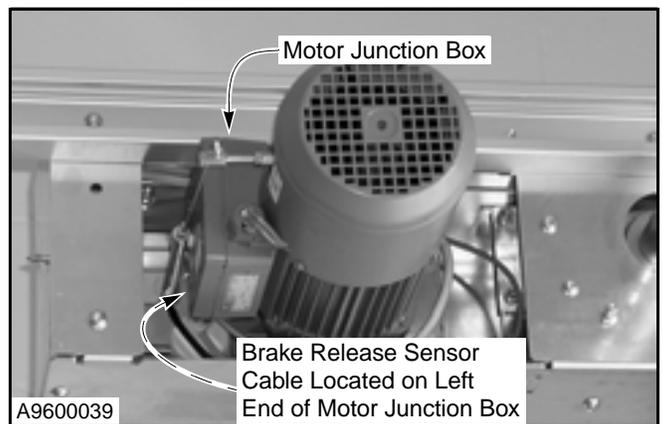


Figure 78

2. Connect the brake release sensor control lines to the control panel as indicated below:
 - MCC-2-1 black wire #1 to upper terminal strip, terminal 1.
 - MCC-2-1 black wire #2 to lower terminal strip, terminal 2.

Reversing Edge and Factory-Installed Photo Eyes to Control Panel

1. Route the reversing edge and photo eye control cable, leading from the door head junction box, to the control panel. (See Figure 79.)

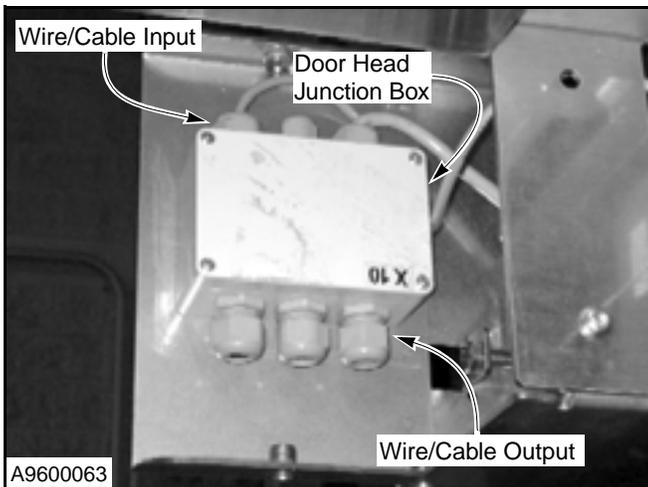


Figure 79

NOTE: To properly ground the outer shield of this cable, terminate the end of the cable to the control panel using the grounded cable clamp provided.

2. Connect the reversing edge control lines to the control panel as indicated below:
 - MCC-14-1 brown wire to upper terminal strip, terminal Si1.
 - MCC-14-1 white wire to lower terminal strip, terminal Si2.
3. Connect the control lines for the factory-installed encoder/photo eyes to the control panel as indicated below:
 - MCC-14-1 pink wire to upper terminal strip, terminal 8.
 - MCC-14-1 green wire to upper terminal strip, terminal 28.
 - MCC-14-1 yellow wire to lower terminal strip, terminal 26.
 - MCC-14-1 red wire to upper terminal strip, terminal 29.
 - MCC-14-1 black wire to lower terminal strip, terminal 30.
 - MCC-14-1 shield line to ground.

Customer-Installed Photo Eyes to Control Panel

1. Earlier, the two control cables for the customer-installed photo eyes were routed from the eyes to the control panel. Now these control lines can be connected to the control panel as indicated below:
 - Photo eye emitter module brown wire to upper terminal strip, terminal 31.
 - Photo eye emitter module blue wire to lower terminal strip, terminal 32.
 - Photo eye receiver module brown wire to upper terminal strip, terminal 31.

- Photo eye receiver module blue wire to lower terminal strip, terminal 32.
- Photo eye receiver module black wire to upper terminal strip, terminal 10.

Activators

Install all activators as shown in the schematic provided with each door in the door's control box.

OPERATING CONTROL SYSTEM

The Spiral LH Door offers high-speed operation with the advantage of providing a secure barrier. All operator inputs and control functions are carried out by the System 3 drive and control system. (See Figure 80.)



Figure 80

Modes of Operation

AUTOMATIC AND NON-AUTOMATIC MODES OF OPERATION

Automatic Mode

If a *momentary* contact activator such as a push button, pull cord, or radio control is used to activate the door:

- The door will open when the device is activated.
- A timer, internal to the control system, will start up once the door reaches the full open position.
- When the internal timer clocks out, the door will automatically begin to close.

If a *maintained* contact activator device such as a floor loop or motion detector is used to activate the door:

- The door will open and remain open for as long as the device is active.
- Once the device becomes inactive, the internal timer will start up.
- When the internal timer clocks out, the door will automatically begin to close.

In the automatic mode, while the timer is running, at any time the activator device or another activator in the system is enabled, the timer will reset and the door will not be allowed to close. It is only when the timer clocks out that the door will begin to close. (To change the timer setting, see the System 3 Drive & Control Installation & Owner's Manual.)

In summary, in the automatic mode, an externally installed activator device is used to open the door and an internal timer is used to close the door.

Non-Automatic Mode

If a *momentary* contact activator such as a push button, pull cord, or radio control is used to operate the door:

- The door will open when the device is activated.
- After passing through the door, a similar type of device must be used to close the door.

In summary, in the non-automatic mode, a manually operated activator is used to open and close the door.

INITIAL START-UP



Initial system start-up should only occur when the door and control panel have been properly installed, wired, and all preliminary door adjustments made. Failure to follow the instructions as outlined in the installation manual that was provided with your door can result in damage to the door upon initial system start-up.

1. Release the brake with the handle located on the side column and manually move the door to the half-open position.
2. Apply power to the control system. During the system initialization, the display will indicate that the door open and close limits must be set by displaying the associated fault codes ("F700" and "F762" will scroll across the display). (See Figure 81.)

Then the message Push ● [press enter (●) key] will appear on the display. (See Figure 82.)

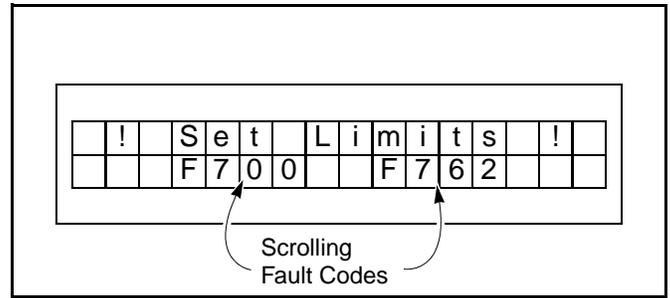


Figure 81

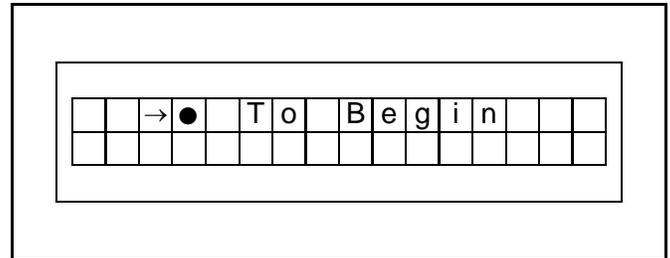


Figure 82



Set the door open and door close limits only after verifying that the motor (door) operates in the proper direction when the up (▲) and down (▼) keys are pressed.

3. After the enter (●) key has been pressed one time (Figure 82), verify the motor rotation by briefly pushing the up (▲) and down (▼) keys on the control panel.

The door should open with the up (▲) key and close with the down (▼) key. If the door does not operate in this manner, reverse two of the motor wires (not the incoming three-phase supply wires).

NOTE: Reversing the incoming supply voltage lines will not solve the problem if the motor is running in the wrong direction.

4. Now set the door close and open limits according to the instructions on the display.

If any error messages are displayed, some of the required input connections may be missing. Once the missing inputs are connected, perform the open and close limit set-up. Otherwise, refer to "FAULT CODES" in the System 3 Drive & Control Installation & Owner's Manual.

NOTE: When establishing the close and open limit positions, refer to the owner's manual that came with your door.

FINAL ADJUSTMENTS—LEVELING DOOR PANEL

5. Set ACL1 and ACL2 timers as required.
(See “SYSTEM PARAMETERS” in the System 3 Drive & Control Installation & Owner’s Manual.)

System Reset — Door Reversing Edge

Anytime the door is closing and the reversing edge along the bottom bar makes contact with an object, the display will read “**F.361 (Edge Trip)**” and the door will immediately move to the fully open position. With “**F.361**” displayed, the door will remain parked and locked in the fully open position until the control system is reset.

1. To reset the control system with “**F.361**” displayed, first make sure the area directly below the path of the door is clear of all objects and personnel.
2. Then press and hold the enter (⏏) button on the control panel to reset the control system.
3. Press the door close (▼) button to move the door to the fully closed position.

System Reset — Photo Eyes

If either set of photo eyes detects that an object has entered the door opening while the door is closing, the door will immediately reverse direction and move to the fully open position. The door will remain parked in this position until the object has been removed from within the opening. If the front set of photo eyes detects the interruption, the display will read “**Photoeye - Fr**”. If the rear set of eyes detects the interruption, the display will read “**Photoeye - Rr**”.

The door will remain parked in the fully open position for as long as the object is in the path of the door opening. If the timer is set, the door will close when the timer clocks out. If the timer is off, the door close (▼) button must be pressed.

After the door is closed, the display will read “**Spiral Door**” and the control system will wait for operator input.

Automatic Door Close Timer

See “Setting Automatic Delay Timers” in the System 3 Drive & Control Installation & Owner’s Manual.

FINAL ADJUSTMENTS

HORIZONTAL GUIDE RAIL

The horizontal guide rail system must be aligned and properly squared in order for the door to operate smoothly and efficiently.

1. Check that horizontal guide rails are level.
2. To get an accurate square reading of the horizontal guide rail assembly, measure diagonally. Use the same reference points on each side when measuring. The measurements must be identical within ± 0.079 in. (See Figure 83.)

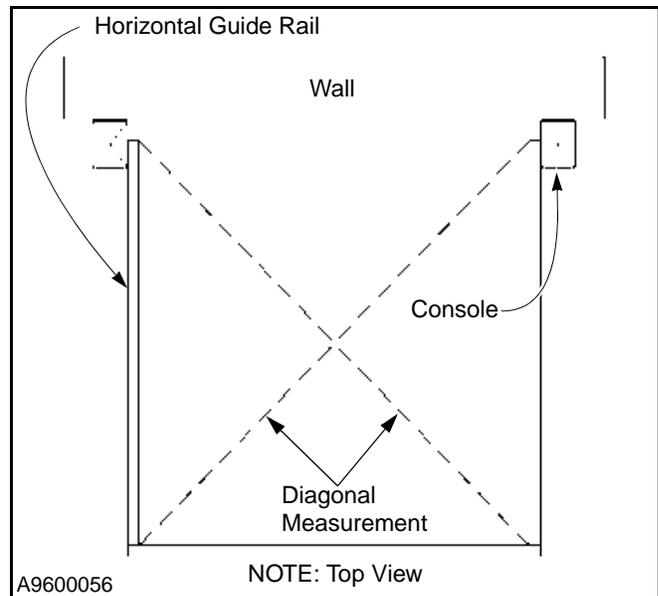


Figure 83

3. To put the horizontal guide rail system into alignment, turn the adjusting screw, as required, to square the rail system. (See Figure 84.)

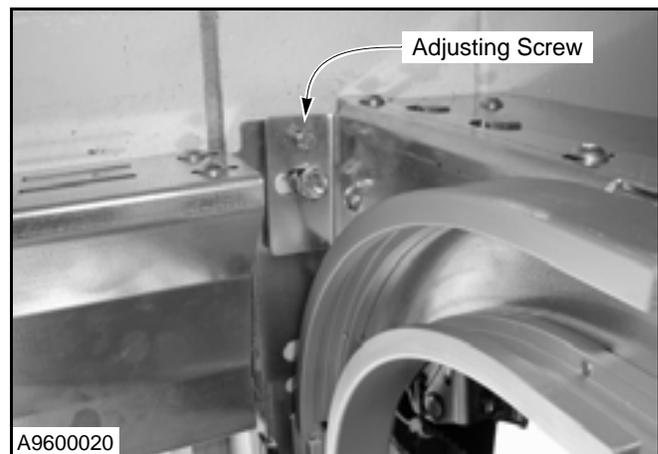


Figure 84

LEVELING DOOR PANEL

1. To check a door panel for level, first position the panel so that it is approximately four or five feet off the floor. Then check the bottom edge of the door panel for level. (The panel is considered level when both sides are within $\frac{1}{4}$ in. of each other.)

NOTE: Do not check the door panel for level by visually observing how it rests on the floor. Level is referred off the two side columns and the head assembly.

2. Before making any adjustment to the door, remove all electrical power to the control panel.

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

- Mounted on the bottom corner of the door is an end bracket (one in each corner). This bracket is clamped around the two ends of the drive belt. With a visible marker, mark the location of the end bracket on the drive belt. (See Figure 85.)

NOTE: If the door requires adjustment, always lower the high side of the door and never lower the door more than one notch at a time. Also, a reference mark on the drive belt will make it easier to return the end bracket to its original location, should that become necessary.

- Release the end bracket from the drive belt by loosening the hex head bolts located on the face of the bracket. (See Figure 85.)
- Drop the bracket a notch or two on the belt to lower the corner of the door. Tighten the bolts to lock the bracket to the belt. (See Figure 85.)

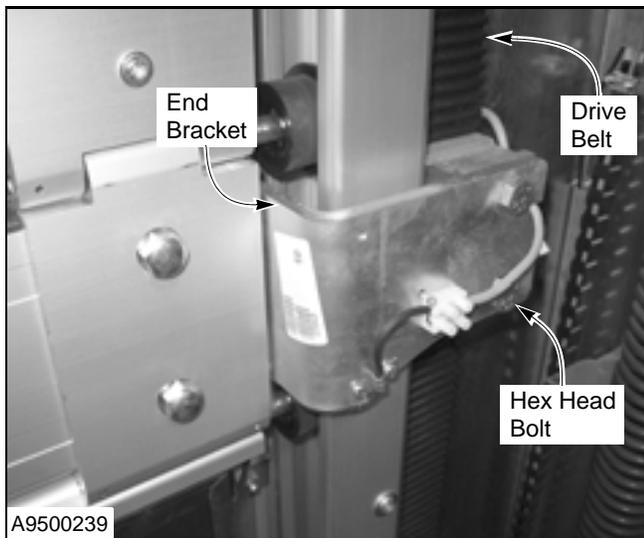


Figure 85

IMPORTANT: The drive belt is not a one-piece unit, but splined together to form a single-length belt. The maximum belt adjustment allowed is one rib in either the up or down direction.

- Restore power to the control panel and cycle the door several times. Recheck the panel for level and repeat the above steps, as necessary, until the panel is level.

TESTING REVERSING EDGE

⚠ WARNING

Take precautions to prevent someone else from operating the door as you perform the following procedure. Also, be cautious around the moving parts that are exposed in the side columns.

- With the door fully open, press the door close (▼) button. As the door begins to come down, test the door reversing edge by hitting the bottom (rubber) edge of the door. (See Figure 86.)

If the reversing edge sensor is working correctly, the door should immediately reverse direction and remain parked in the fully open position.

NOTE: Avoid tripping the photo eye sensors when testing the reversing edge.

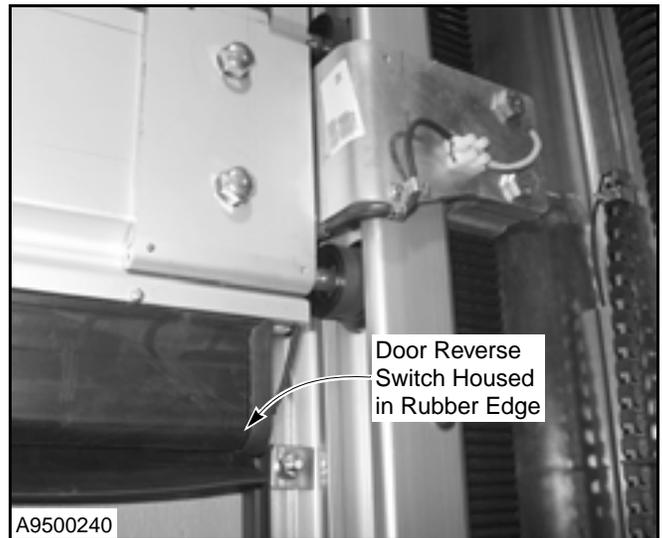


Figure 86

- Verify that the control panel is working properly. The display should read “F.361 (Edge Trip)”.

NOTE: Each time the reversing edge is activated, the door must be reset. (See “System Reset — Door Reversing Edge” on page 30.)

FINAL ADJUSTMENTS—INSTALLING COVERS

CHECKING PHOTO EYES

Front Set of Eyes

The two modules that make up the front set of photo eyes each have one indicator light. The eyes are receiving power and are aligned when the indicator on the emitter module (right-front eye) is green and the indicator on the receiver module (left-front eye) is red. If both indicators are green, the eyes are not aligned.

When the eyes are aligned and the beam of light between them is interrupted, the receiver module indicator will switch from red to green. Restoring the beam of light will cause the indicator to switch back to red.

Rear Set of Eyes

The rear set of eyes is powered up when the power indicator on each eye is lit (green). The eyes are aligned when the alignment indicator on the receiver module is lit (yellow). When the beam is interrupted, the alignment indicator will go out. Restoring the beam relights the indicator. (See Figure 87.)

NOTE: Photo eyes have been joined for illustration purposes only.

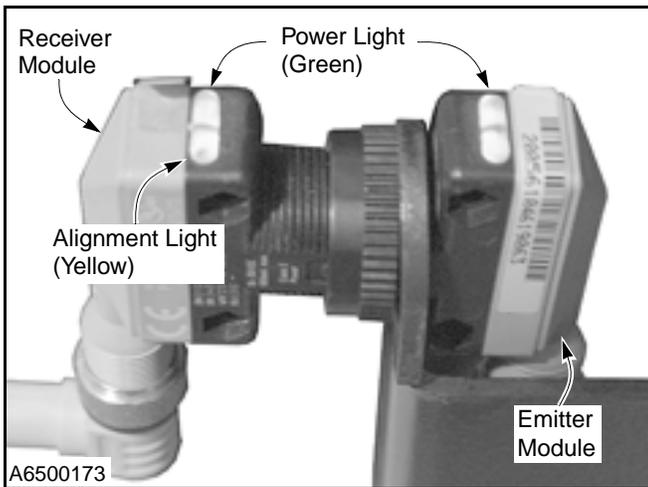


Figure 87

TESTING PHOTO EYE SYSTEM

⚠ WARNING

To prevent injury to personnel and damage to equipment, the photo eye circuit must be thoroughly tested to make sure the photo eye system is operating correctly.

1. With power applied to the control panel and the door in the fully open position, press the door close (▼) button to activate the door.

2. When the door is about halfway closed, break the beam of light between the front set of eyes only.

The moment the beam of light is interrupted, the control panel should immediately reverse the direction of the door and park it in the fully open position. When the beam of light is restored, the door should automatically move to the closed position.

NOTE: When the front beam of light is interrupted, the display on the control panel will read "Photoeye - Fr". When the rear beam of light is interrupted, the display will read "Photoeye - Rr".

3. Repeat the above procedure on the rear set of photo eyes.

INSTALLING COVERS

⚠ WARNING

The disconnect must be in the OFF position and properly locked and tagged before performing the following procedure.

1. Check to make sure the side columns and console assemblies have remained plumb, square, and level. Also check that all floor and wall anchors have remained securely fastened.
2. Install covers to the console assemblies as required. (See Figure 88.)

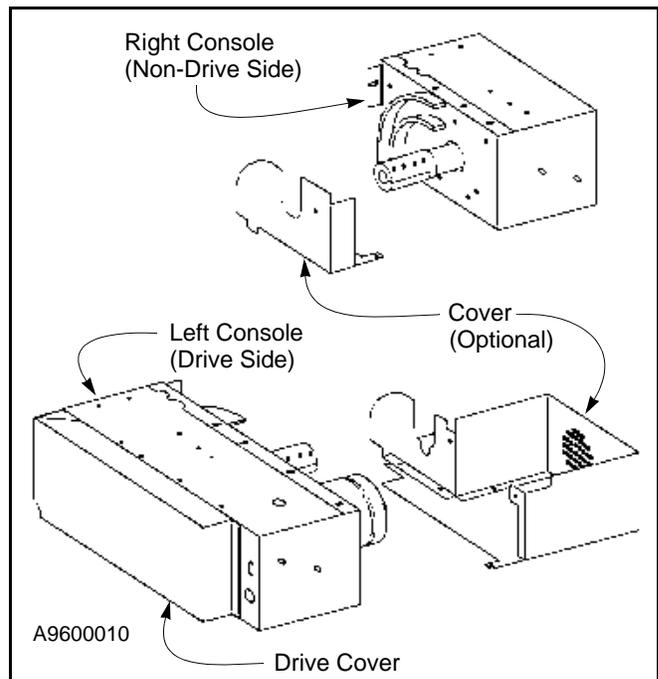


Figure 88

3. Mount the left- and right-hand cover brackets to the side columns. These brackets are located in the small parts carton. (See Figure 89.)

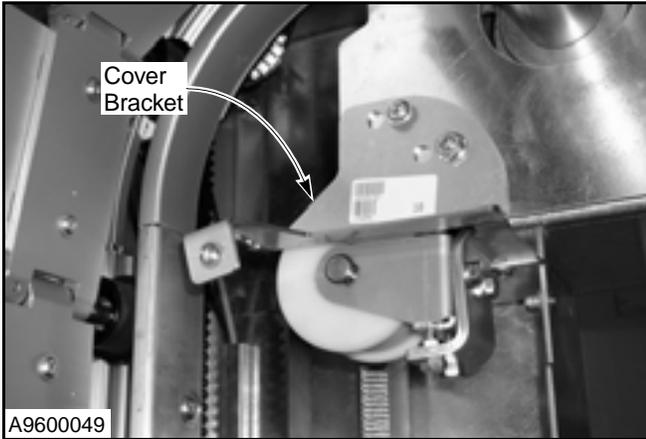


Figure 89

4. Attach the left- and right-hand side covers. (See Figure 90.)

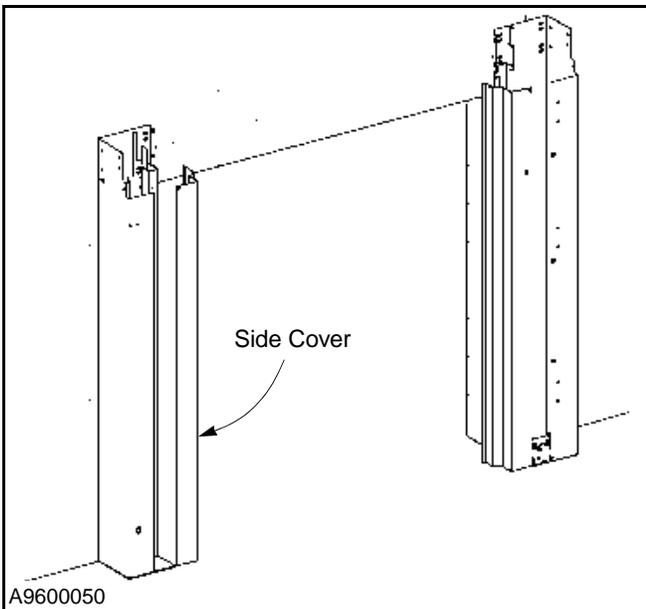


Figure 90

FINAL CHECK

NOTE: Check all of the following door components and systems once the door panel has been cycled at least 20 times.

Side Columns: Check that side columns are plumb and square and that all anchor bolts are secure and tight.

Head Assembly: Check that all mounting hardware is in place and tight.

Door Panel Track: Check the alignment of each door track, particularly where the tracks join up between the side columns and the head assembly.

Covers and Panels: Check that all covers and panels are in place and securely fastened.

Motor: Check that the door travels in the proper direction when the button is pressed. Measure the amperage draw of the motor. It should not exceed the amount listed on the schematic or the motor nameplate.

Reversing Edge: Check that it works properly. As the door is closing, if the reversing edge makes contact with an object, the door should immediately return to the fully open position as described in "TESTING REVERSING EDGE" on page 31.

Photo Eyes: Check that they work properly. As the door is closing, if the light beam between either set of photo eyes is interrupted, the door should immediately return to the fully open position as described in "TESTING PHOTO EYE SYSTEM" on page 32.

Spring Packs: Check that all spring packs are securely fastened to the bottom plate of the side column. Also make sure that each nylon spring strap is securely fastened to the clevis bracket at the top of the spring pack.

Nylon Spring Straps: Make sure each spring strap is securely fastened to the drive shaft, not twisted and running true to its respective spring pack.

Drive Belts: Check that each drive belt is properly tensioned and that the ends of each belt are securely clamped to the bracket assembly. Ensure that the pulley assembly is level and that the belt runs true.

Drive Belt Pulleys: Make sure each pulley bracket is properly secured to the base plate of the side column.

Timers: Automatic timers must be set to ensure that the door closes properly as described in the System 3 Drive & Control Installation & Control Manual.

Activators: Check that they operate as specified by the manufacturer.

Caulk: Ensure that the side columns and head assembly are caulked where they meet the wall of the building.

DIMENSIONAL VARIABLES

DRAWING NOT TO SCALE; DIMENSIONS IN INCHES

DOOR NO.	A	B	C	F	M	K1	K	H
MILLIMETERS								

ACTUAL DOOR SIZE IS PRODUCED IN MILLIMETERS
 REQUESTED DOOR SIZE IS CONVERTED TO MILLIMETERS
 AND ROUNDED UP TO THE NEAREST 10MM

ELECTRICAL OPTIONS

- 460v - 3ph
- 230v/208v - 3ph
- 230v/208v - 1ph
- 575v - 3ph
- OTHER

STANDARD FEATURES

1. ONE THRU-BEAM PHOTOEYE SET MOUNTED IN SIDE COLUMN AT 16" FROM FLOOR-FACTORY INSTALLED.
2. ONE THRU-BEAM PHOTOEYE SET-FIELD INSTALLED.
3. VARIABLE DOOR OPENING SPEED; UP TO 60"/SEC
4. DOOR CLOSING SPEED OF 30"/SECOND
5. PROGRAMMABLE UPPER AND LOWER LIMITS
6. SYSTEM 4 CONTROL BOX (B 1/2"x16 1/2")
7. BRAKE RELEASE LEVER ON SIDE COLUMN
8. ELECTRICAL FAIL SAFE REVERSING EDGE.
9. HEAVY DUTY ROLLERS AND GUIDE TRACK
10. INSULATED PANEL SLATS
11. HURRICANE RATED DESIGN PRESSURE +/-50PSF
12. DOOR APPROVED FOR USE IN AND OUTSIDE HVHZ
13. DOOR APPROVED FOR LARGE MISSILE IMPACT
14. APPROVED BY MIAMI-DADE BCCO NOA#08-1024.03
15. REFER TO PRODUCT SUBMITTAL DWG 9B963-R4 FOR APPROVED ANCHORING METHODS

STANDARD OPTIONS

- TOP DUST COVER
- SLANT HOOD
- FRONT AND BOTTOM HEAD COVERS
- RIGHT HAND DRIVE
- REMOTE MOUNTED EGRESS LEVER

ACTIVATION

- PRESENSE SENSOR
- PULLCORDS
- RADIO CONTROL w/2 X-MITTERS
- MOTION DETECTOR
- PUSHBUTTON
- FLOOR LOOP CONTROLLER
- OTHERS (DESCRIBE IN NOTES)

OPTION NOTES

ADDITIONAL NOTES:

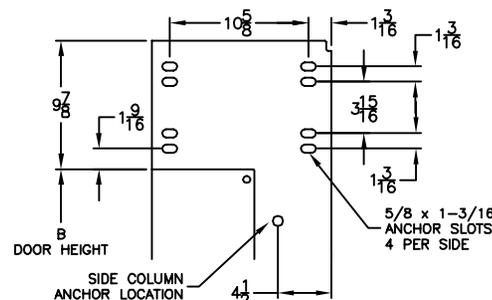
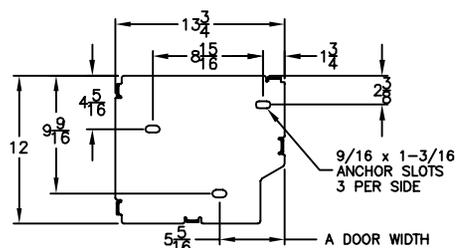
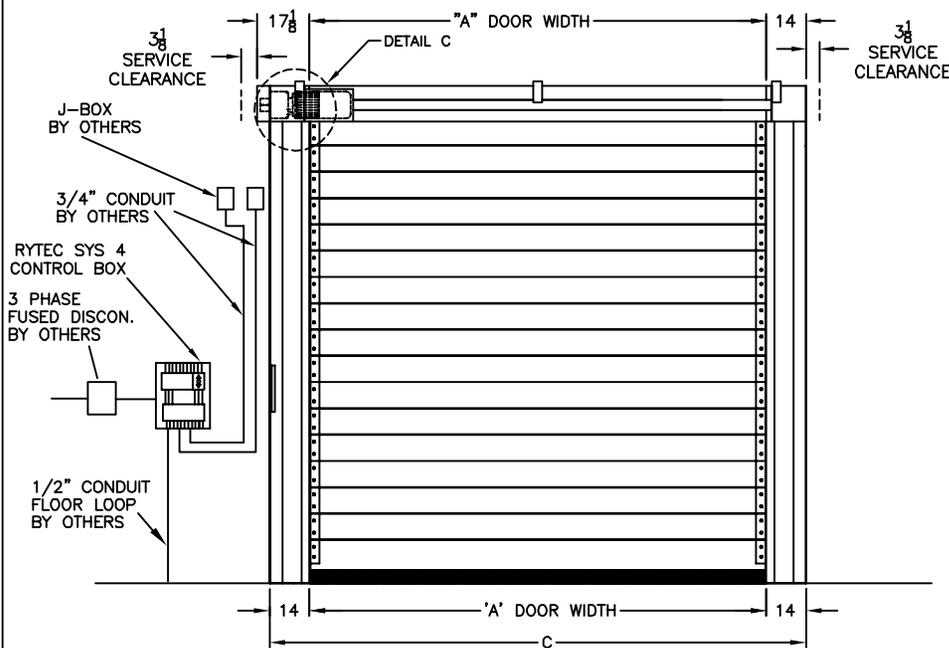
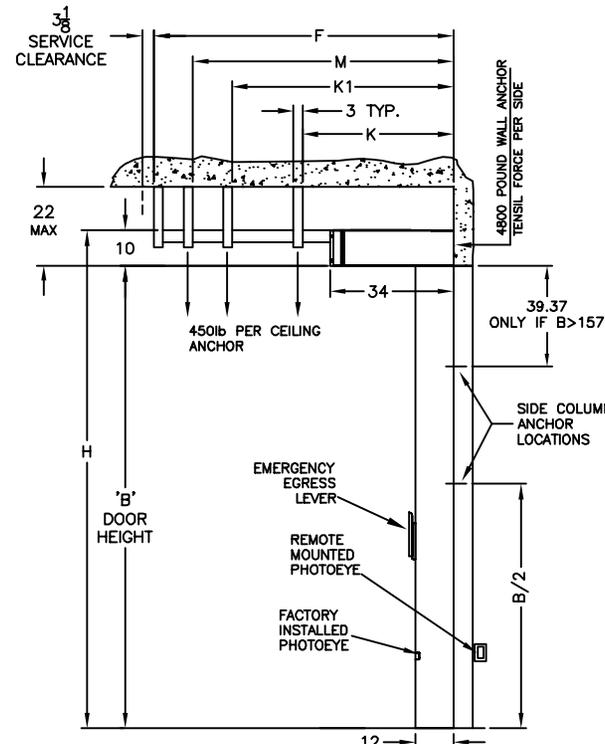
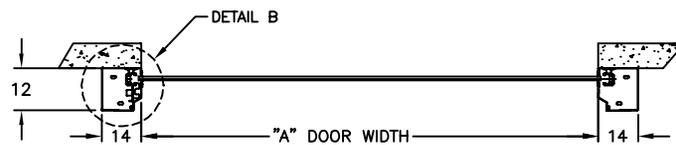
RYTEC CORPORATION

ONE CEDAR PARKWAY, JACKSON, WI 53037-0403

APPROVAL DRAWING

SPIRAL MODEL SSN-HZ SYSTEM 4
 FOR DOOR WIDTH UP TO 16'-0", HEIGHT UP TO 16'-4"

CUSTOMER: _____
 LOCATION: _____
 DATE: 12/2/11
 DRAWING NO.: 401074-13T REV.: _____



HANGER FORMULAS

K = NOT REQUIRED; FOR B<98
 K = 72; FOR B>98

K1 = NOT REQUIRED; FOR B<161
 K1 = 135; FOR B>161

M = B+20; FOR B<91
 M = B; FOR B>91

F = B+31; FOR B<91
 F = B+11; FOR B>91

APPROVAL SIGNATURE

FABRICATION CAN PROCEED ACCORDING TO THE
 SPECIFICATION SHOWN EXCEPT AS NOTED

APPROVED BY: _____
 PRINT NAME: _____
 SIGNATURE: _____
 DATE: _____

REV	DESCRIPTION	DATE	BY

ATTACHMENT C

KEMPER SYSTEMS WATERPROOFING

(ALTERNATE BID ITEM #5)

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Product Information

KEMPEROL® V210

Work pack includes:

Component A: Black Formulation, Component B: White Formulation, Component B: Catalyst Powder

Product Description

KEMPEROL® V210 is a three-component with catalyst, high performance seamless and self-terminating cold fluid-applied reinforced unsaturated polyester membrane system.

KEMPEROL® V210 membranes can be surfaced with a PMMA coating, light-reflective sand aggregate surfacing or other granular materials to match the appearance of the surrounding substrate.

Composition & Materials

A monolithic membrane is created in the field by combining the KEMPEROL® V210 2-part, cold-applied liquid polyester resin and catalyst powder with KEMPEROL® polyester reinforcing fleece. Membrane may be applied using standard fleece available in 4, 8, 10, 13, 20, 27, and 41-inch nominal widths.

Use

KEMPEROL® membranes are suitable for a wide range of exterior waterproofing applications, including insulated roof assemblies, non-insulating, lightweight insulating concrete roofs, re-roofing of existing bituminous roof systems, plazas and flashings.

Limitations

Without additional protection, KEMPEROL® is not resistant to hydrocarbon solvents or alkalines greater than pH 10, which should be removed from the membrane immediately.

Yield

Using 165 Fleece: 160 s.f. (14.8 m²) per work pack
Using 200 Fleece: 140 s.f. (13.0 m²) per work pack

Note: All yields are approximate and may vary depending upon smoothness and absorbency of substrate.

Storage

Always store in cool and dry location. Do not store in direct sunlight or in temperatures below 35 °F (1.7 °C) or above 80 °F (27 °C). Approximate shelf life 12 months with proper storage. Catalyst Powder must be stored separately.

For best use, 24 hours before application, the material is to be acclimated at temperatures between 65-70 °F (18-21 °C).

Precautions

Refer to KEMPEROL® Material Safety Data Sheet (MSDS) before using or handling.

Surface Preparation

All surfaces must be free from gross irregularities, loose, unsound or foreign material such as dirt, ice, snow, water, grease, oil, release agents, lacquers, or any other condition that would be detrimental to adhesion of the primer and membrane. This requires careful preparation of existing horizontal and vertical substrates; cracks are filled, expansion joints are prepared, flashings are removed or modified, and termination points are determined. Substrates and penetrations are prepared to rigorous industry standards, and may require scarifying, sandblasting or grinding in some cases to achieve a suitable substrate.

Priming

After substrate preparation, temporary watertightness is quickly achieved with the application of KEMPERTEC® D Primer or EP Primer and temporary joint filler. Alternatively, the use of quick-dry KEMPERTEC® AC Primer, R Primer, or EP5 Primer may allow same-day membrane application. KEMPERTEC® primer may be brushed or rolled onto any clean and prepared surface. Allow primer to cure completely prior to application of the KEMPEROL® membrane.

Component Properties

Property	Catalyst Powder	Component A	Component B
Color	White	Black	White
Physical state	Granular	Liquid	Liquid
Specific density	0.55	1.16	1.16
Viscosity	-	4000	4000
Flash point	-	>32 °C/90 °F	>32 °C/90 °F

Membrane Properties

Physical Property	Test Method	Typical Values
Color	-	Gray
Physical state	-	Cures to solid
Thickness (165 fleece/200 fleece)	ASTM D751	70 mils/80 mils
VOC content	-	42 g/l
Tensile strength @ break	ASTM D751	90 lb./in
Elongation	ASTM D751 B	55%
Tearing resistance	ASTM D751 Elmendorf	8.6 lbs
Puncture resistance	FTMS 101-2031	150 lbf
Dimensional stability	ASTM D1204 6hrs@158°F	0.1%
Water absorption	ASTM D471 72hrs@158°F	2.0%
Impact resistance	ASTM D2240	Shore A:78
Water vapor transmission	ASTM E96	0.27 Perms
Usage time*	-	15 minutes
Water resistant after*	-	30 minutes
Solid to walk on after*	-	6 hours
Can be driven on after*	-	24 hours
Apply overburden after*	-	2 days
Apply coating/surfacing after*	-	3 days
Completely hardened*	-	3 days
Crack spanning	-	2 mm/0.08 inch
Short-term temperature resistance	-	250 °C / 482 °F

* values obtained at 73°F, 50% relative humidity, may vary depending upon air flow, humidity and temperature.

Mixing of Resin

Note: Prior to opening the containers of KEMPEROL® V210 Resin, wear appropriate safety glasses and protect hands and wrists by wearing gauntlet-type neoprene gloves.

Step 1: Mix resin Component A (black formulation) with a spiral KEMPEROL® agitator, until the liquid is a uniform black color.

Step 2: Add the Catalyst Powder to resin Component A and mix with the same agitator for 5 minutes or until the powder is completely mixed. The dissolving time is 20 minutes to 2 hours, depending on the ambient temperature. The catalyst is completely dissolved when there are no white specks remaining.

Step 3: Mix resin Component B with a separate spiral agitator until the color is a uniform white. If the ambient temperature is below 50 °F (10 °C) or above 75 °F (24 °C), then a weather related additive should be combined and mixed into the Component B.

KEMPEROL® UP-A Cold Activator should be added to resin Component B when the ambient temperature is below 50 °F (10 °C). The activator should be mixed with the spiral agitator for 5 minutes or until both liquids are thoroughly blended.

KEMPEROL® UP-I Inhibitor should be added to resin Component B when the temperature exceeds 75 °F (24 °C). The mixing instructions are the same as the cold activator.

Step 4: Pour resin Component A and Component B into a third clean bucket at a 1:1 ratio (equal parts) and thoroughly mix the components with a clean spiral agitator. The Resin solution should be a uniform color, with no light or dark streaks present.

NOTE: Mix only that amount of resin Components A & B that can be used in 15 minutes.

Application (165 Fleece)

Step 1: After the Resin is mixed, apply approx. 4.5 gallons (16.9L) per 100 square feet (9 m²). The Resin should be rolled or brushed evenly onto the surface.

Step 2: Then roll the KEMPEROL® Fleece directly into the Resin, avoiding any folds and wrinkles. Use the roller to work the resin into the fleece, saturating from the bottom up. The appearance of the fleece should be a light opaque gray-green with no white spots. White spots are indications of unsaturated fleece or lack of adhesion. It is important to correct these faults before the resin cures.

Step 3: Add the top coat layer of Resin (approximately 2 gallons (7.5L) per 100 square feet (9 m²)) and finish the fleece's saturation. Roll this final coating into the fleece, which will result in a glossy appearance. The fleece can only hold so much resin and all excess should be rolled forward to the unsaturated fleece. Any excess resin left on the top of the fleece will weather and peel off. The correct amount of Resin will completely saturate the Fleece and no white color will be visible.

Surfacing

KEMPEROL® V210 Membrane can be coated with certain topcoats and aggregate surfacings for aesthetic or mechanical wear. KEMPEROL® V210 membrane must be allowed to fully cure, typically 2-3 days, prior to application of any surfacing material. The surface of the membrane must first be prepared by means of pressure washing with a heavy duty, non-toxic professional grade degreaser, scrubbing, and thoroughly rinsing to remove the paraffin film developed during the curing process and any other contaminants.

Disposal

Cured V210 resin may be disposed of in standard landfills. This is accomplished by thoroughly mixing all components. Note: Uncured V210 resin is considered a hazardous material and must be handled as such, in accordance with local, state and federal regulations. Do not throw uncured resin away.

Ordering Information

Item#:	Size:
Resin Component A - Black Formulation: 102-77-251	5.38 US GAL (20.35L) • 23.4 kg
Resin Component B - White Formulation: 102-77-252	5.50 US GAL (20.83L) • 25.0 kg
Catalyst Powder (when ordered with workpack): 202-77-253	556 oz (1600 g) plastic container

Guide Specifications

KEMPEROL® BR/BRM AND V210/V210M ROOFING & WATERPROOFING SYSTEM MASTER GUIDE SPECIFICATION

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

A. The following specification outlines the requirements for a fully reinforced cold fluid-applied unsaturated polyester liquid resin roofing and waterproofing membrane and flashing system, and all other ancillary waterproofing work including but not limited to installation of insulation, cover boards, overburden, sealants and metal work as specified.

1.2 SECTION INCLUDES

- A. Adhered fully reinforced, cold fluid-applied, unsaturated polyester liquid resin waterproofing membrane system including membrane, penetration flashings, base flashings, and expansion joints.
- B. Substrate preparation, cleaning, leveling and patching
- C. Insulation/cover board/cap sheet installation
- D. Temporary waterproofing and priming
- E. Waterproofing membrane installation
- F. Flashing installation and expansion joint installation
- G. Protective surfacing
- H. Alkalinity protection
- I. Preparation for overburden installation

1.3 RELATED SECTIONS

- A. Supplementary General Conditions
- B. Basic Requirements
- C. Wood Blocking and Nailers
- D. Sheet Metal Flashing and Trim
- E. Overburden Installation

1.4 REFERENCES

- A. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual.
- B. ACI-308 - Recommended Practice for Curing Concrete
- C. ASTM - D638 - Test Methods for Tensile Properties of Plastics
- D. ASTM - D4258 - Standard Practice for Surface Cleaning Concrete for Coatings
- E. ASTM - D4259 - Standard Practice for Abrading Concrete
- F. ASTM - D4541 - Method for Pull-Off Strength of Coatings using Portable Adhesion Tester
- G. ASTM - E96(A) - Test Methods of Moisture Transmission of Material
- H. ASTM E-108, ANSI/UL 790 for fire resistance.
- I. International Concrete Repair Institute Guideline 03732 Concrete Surface Preparation
- J. Steel Structures Painting Council (SSPC)

1.5 SUBMITTALS FOR REVIEW

- A. Membrane System Product Data: Provide current standard printed product literature indicating characteristics of membrane materials, flashing materials, components, and accessories product specification and installation.
- B. Product Samples: Submit product samples of membrane and flashing materials showing color, texture, thickness and surfacing representative of the proposed system for review and approval by the Owners Representative.

1.6 QUALITY ASSURANCE

- C. Submit sample copies of both the Manufacturer and Applicator warranties for the periods stipulated. Each specimen must be a preprinted representative sample of the issuing company's standard warranty for the system specified.
- D. Submit copies of current Material Safety Data Sheets (MSDS) for all components of the work.
- E. Membrane Shop Drawings: Submit shop drawings of cold fluid-applied reinforced unsaturated polyester system showing all a project plan, size, flashing details, and attachment for review and approval by the Owners Representative and Membrane Manufacturer.
- A. Membrane Manufacturer: Company specializing in manufacturing fully reinforced cold fluid applied liquid resin waterproofing membrane systems with a minimum of ten (10) years of documented applications in the United States. Membrane Manufacturer shall submit the following certifications for review:
 - 1. Substrates and conditions are acceptable for purpose of providing specified warranty.
 - 2. Materials supplied shall meet the specified requirements.
- B. Applicator: Company specializing in performing the work of this section with (3) years documented experience and approved by system manufacturer for warranted membrane installation. Applicator shall submit the following certification for review:
 - 1. Applicator shall submit documentation from the membrane manufacturer to verify contractor's status as an approved applicator for warranted installations.
- C. Evaluate moisture content of substrate materials. Contractor shall determine substrate moisture content throughout the work and record with Daily Inspection Reports or other form of reporting acceptable to the Owner or designated Representative, and Membrane Manufacturer.
- D. Random tests to determine tensile bond strength of membrane to substrate shall be conducted by the Contractor at the job site using an Elcometer Adhesion Tester Model 106 or similar device, or by the performance of a manual pull test. Contractor shall perform tests at the beginning of the Work, and at intervals as required to assure specified adhesion with a minimum of three (3) tests per 5000 square feet. Smaller areas shall receive a minimum of three (3) tests. Test results shall be submitted to the Owner or his designated Representative and the Membrane Manufacturer. Contractor shall immediately notify the Owner or his designated Representative and Membrane Manufacturer in the event bond test results are below specified values.
 - 1. Adequate surface preparation will be indicated by tensile bond strength of membrane to substrate greater than or equal to 220 psi (1.5 N/mm²), as determined by use of an adhesion tester.
 - 2. Adequate surface preparation will be indicated by 135° peel bond strength of membrane to substrate such that cohesive failure of substrate or membrane occurs before adhesive failure of membrane/ substrate interface.
 - 3. In the event the bond strengths are less than the minimum specified, additional substrate preparation is required. Repeat testing to verify suitability of substrate preparation.
- E. Monitor quantities of installed materials. Monitor application of resin mixture, reinforcing fleece and flashing. Perform Work in accordance with manufacturer's instructions.

******* [DELETE MOCK UP REQUIREMENT IF UNNECESSARY] *******

- F. Mock-up areas shall be used to determine required methods and tools to obtain degree of substrate preparation required by the membrane manufacturer. Conduct tests as required to verify that substrate preparation meets specified requirements. Tests shall include, but are not limited to, tensile bond strength and moisture content of substrate.
 - 1. Prepare and clean a three (3) foot (0.9 m) by three (3) foot (0.9 m) area of each substrate material type.
 - 2. Submit findings in writing to Owner or his designated Representative and Membrane Manufacturer.
 - 3. Mock-up areas shall be maintained for quality control for the entire project.
- A. Conform to applicable building and jurisdictional codes for roofing/waterproofing assembly and fire resistance requirements.

1.7 REGULATORY REQUIREMENTS

1.8 PRE- INSTALLATION MEETING

- B. Comply with requirements of OSHA, NIOSH or local governing authority for work place safety.
- C. Comply with authority or agency "Confined Space Policy" during and throughout all work to be performed.
- A. Convene a pre-installation meeting at the job site (1) week before starting work of this section. Require attendance of parties directly affecting work of this section, including but not limited to, Roofing/Waterproofing Specifier, Owner's Representative, Roofing/Waterproofing Contractor, and Membrane Manufacturer's Representative. Review roofing/waterproofing preparation and installation procedures, coordination and scheduling required with related work, and condition and structural loading limitations of deck/substrate.

1.9 FIELD INSPECTION SERVICES

- A. Manufacturer's technical representative shall provide the following inspections of the membrane application:
 - 1. Jobstart inspection at the beginning of each phase of the project, to review special detailing conditions and substrate preparation.
 - 2. Periodic in-progress inspections throughout duration of the project to evaluate membrane and flashing application.
 - 3. Final punch-list inspection at the completion of each phase of the project prior to installation of any surfacing or overburden materials.
 - 4. Warranty inspection to confirm completion of all punch list items, surfacing, and overburden application.

1.10 DELIVERY, STORAGE, AND PROTECTION

- A. The Contractor together with the Owner or his designated Representative shall define a storage area for all components. The area shall be cool, dry, out of direct sunlight, and in accordance with manufacturer's recommendations and relevant regulatory agencies. Materials shall not be stored in quantities that will exceed design loads, damage substrate materials, hinder installation or drainage.
- B. Store solvent-bearing solutions, resins, additives, inhibitors or adhesives in accordance with the MSDS and/or local fire authority. After partial use of materials replace lids promptly and tightly to prevent contamination.
- C. Roll goods shall be stored horizontally on platforms sufficiently elevated to prevent contact with water and other contaminants. DO NOT use rolls that are wet, dirty or have damaged ends.
- D. Roofing/waterproofing materials must be kept dry at all times. If stored outside, raise materials above ground or roof level on pallets and cover with a tarpaulin or other waterproof material. Plastic wrapping installed at the factory should not be used as outside storage covers.
- E. Follow manufacturer's directions for protection of materials prior to and during installation. Do not use materials that have been damaged to the point that they will not perform as specified. Fleece reinforcing materials must be clean, dry and free of all contaminants.
- F. Copies of all current MSDS for all components shall be kept on site. Provide any and all crew members with appropriate safety data information and training as it relates to the specific chemical compound he or she may be expected to deal with. Each crew member shall be fully aware of first-aid measures to be undertaken in case of incidents. Comply with requirements of OSHA, NIOSH or local governing authority for work place safety.

1.11 ENVIRON- MENTAL RE- QUIREMENTS

- A. Do not apply roofing/waterproofing membrane during or with the threat of inclement weather.
- B. Application of cold fluid-applied reinforced unsaturated polyester roofing/waterproofing membrane may proceed while air temperature is between 35°F (2°C) and 105°F (40°C) providing the substrate is a minimum of 5°F above the dew point.

- C. When ambient temperatures are at or expected to fall below 50°F (10°C), or reach 75°F (24°C) or higher, follow Membrane System Manufacturer's recommendations for weather related additives and application procedures.
- D. Ensure that substrate materials are dry and free of contaminants. DO NOT commence with the application unless substrate conditions are suitable. Contractor shall demonstrate that substrate conditions are suitable for the application of the materials.
- E. Where required by the Owner or his designated Representative, Contractor shall implement odor control and elimination measures prior to and during the application of the roofing/waterproofing materials. Control/elimination measures shall be field tested at off-hours and typically consists of one (1) or a multiple of the following measures:
 - 1. Sealing of air intakes with activated carbon filters. Install filters in accordance with requirements and recommendations of the filter manufacturer. Seal filters at joints and against building exterior walls to prevent leakage of unfiltered air.
 - 2. Sealing of doorways, windows, and skylights with duct tape and polyethylene sheeting to prevent leakage of air into the building.
 - 3. Erection and use of moveable enclosure(s) sized to accommodate work area(s) and stationary enclosure for resin mixing station. Enclosure shall be field constructed or pre-manufactured of fire retardant materials in compliance with local code requirements in accordance with requirements of the Owner or his designated Representative. Equipment enclosure(s) with mechanical air intake/exhaust openings and Odor Control Air Cleaners, as required to clean enclosed air volume and to prevent odor migration outside the enclosure. Exhaust opening shall be sealed with activated carbon filter.
 - 4. Protection of Contractor personnel and occupants of the structure and surrounding buildings as necessary to comply with requirements of OSHA, NIOSH and/or governing local authority.
- F. When disposing of all refuse or unused materials, observe all EPA, OSHA or local disposal requirements.

1.12 COORDINATION & PROTECTION

- A. Coordinate the work with the installation of associated metal flashings, accessories, appurtenances, etc. as the work of this section proceeds.
- B. Building components shall be protected adequately (with tarp or other suitable material) from soil, stains, or spills at all hoisting points and areas of application. Contractor shall be responsible for preventing damage from any operation under its Contract. Any such damage shall be repaired at Contractor's expense to Owner's satisfaction or be restored to original condition.
- C. Provide barricades, retaining ropes, safety elements (active/passive) and any appropriate signage required by OSHA, NIOSH, and NSC and/or the Owner or designated Representative.
- D. Protect finished roofing/waterproofing membrane from damage by other trades by the use of a cushioning layer such as 1" thick expanded polystyrene insulation and an impact layer such as ½" thick exterior-grade plywood.
- E. Do not allow waste products containing petroleum, grease, acid, solvents, vegetable or mineral oil, animal oil, animal fat, etc. or direct steam venting to come into direct contact with the membrane unless approved by manufacturer's chemical resistance chart.

1.13 WARRANTY

******* [SELECT ONE MANUFACTURER'S WARRANTY] *******

- A. Manufacturer's Material Warranty: Provide [(5) (10)] year manufacturer's material only warranty under provisions of this section. This warranty provides for supply of membrane only, limited to amounts necessary to effect repairs necessitated solely by material defective in content and composition.
- B. Manufacturer's Select Labor and Material Warranty: Provide [(10) (20)] year manufacturer's select warranty under provisions of this section. This warranty provides for cost of labor and materials required to address loss of watertightness, limited to amounts necessary to affect repairs necessitated by defective material, with total expenditure limited to the original cost to the Owner of Kemperol materials.

- C. Manufacturer's Standard Warranty: Provide [(10) (15) (20)] year manufacturer's standard warranty under provisions of this section. This warranty provides for cost of labor and materials for loss of watertightness, limited to amounts necessary to effect repairs necessitated by either defective material or defects in related installation workmanship, with total expenditure limited to the original cost to the Owner of Kemperol materials.
- D. Manufacturer's Premier Warranty: Provide [(10) (15) (20)] year manufacturer's premier warranty under provisions of this section. This warranty provides for cost of labor and materials for loss of watertightness, limited to amounts necessary to effect repairs necessitated by either defective material or defects in related installation workmanship, with no dollar limitation ("NDL").
- E. Manufacturer's Full Assembly Premier Warranty: Provide [(10) (15) (20)] year manufacturer's premier warranty under provisions of this section. This warranty provides for cost of labor and materials for loss of watertightness, limited to amounts necessary to effect repairs necessitated by either defective material or defects in related installation workmanship, with no dollar limitation ("NDL"). Removal and reinstallation of insulation, pavers, ballast, and vegetated overburden is included in warranty coverage.
- F. Manufacturer's Vehicular and Pedestrian Traffic System Warranty: Provide [(10)] year manufacturer's premier warranty under provisions of this section. This warranty provides for cost of labor and materials for loss of watertightness, limited to amounts necessary to effect repairs necessitated by either defective material or defects in related installation workmanship, with no dollar limitation ("NDL"). Functional deterioration of the traffic-bearing surfacing is included in warranty coverage.
- G. Waterproofing Contractor's Warranty: Provide [(2) (5)] year "Applicator Maintenance Warranty" covering workmanship for all work of this section including installation of membrane, flashings, metal work, and roofing/waterproofing accessories.
- H. Submit (2) executed copies of both the manufacturer and applicator warranties for the periods stipulated, starting from the date of substantial completion. Each warranty must be signed by an authorized representative of the issuing company.

1.14 MATERIAL SUBSTITUTIONS

- A. Materials proposed for use in the performance of the work that are not specified herein must be submitted to the Owner/Owner's Representative for evaluation no later than ten days prior to bid.

PART 2 PRODUCTS

2.1 GENERAL

- A. The products herein specified are totally pre-engineered products of the listed manufacturer and establish criteria for the approval of substitutions. Products must be part of a pre-engineered, low VOC fully reinforced cold liquid applied polymeric resin waterproofing membrane system, equivalent in function, quality, composition and method of application to be considered for approval as an "Approved Substitute". Substitute materials must meet or exceed the physical performance characteristics of the specified materials. PMMA or single component primers or resin systems will not be accepted. A minimum [165] [200] g/m² fleece reinforcement is required.

2.2 MEMBRANE

******* [SELECT ONE MEMBRANE TYPE] *******

- A. Membrane: Two- or three-component with catalyst, cold fluid-applied reinforced unsaturated polyester waterproofing membrane with a 360 degree needle punched non-woven [165] [200] g/m² polyester reinforcing fleece, for a finished dry film membrane thickness of .070 [.080] inch nominal per ply. Provide products manufactured and supplied by the following:
 1. Kemper System America, Inc.'s Kemperol BR resin (three-component) for use in an adhered waterproofing system.
 2. Kemper System America, Inc.'s Kemperol BRM resin (two-component) for use in an adhered waterproofing system.
 3. Kemper System America, Inc.'s Kemperol V210 resin (three-component) for use in an adhered waterproofing system.
 4. Kemper System America, Inc.'s Kemperol V210M resin (two-component) for use in an adhered waterproofing system.

B. Physical Properties:

Physical Property	Test Method	Typical Values
Color	-	Amber/Gray
Physical state	-	Cures to solid
Thickness (165 fleece)	-	70 mils/80 mils
Tensile strength @ break	ASTM D-751	90 lb/in
Elongation	ASTM D-751	55%
Tearing resistance	ASTM D-751	3.7 lbs
Puncture resistance	FTMS 101-2031	145 lbf
Dimensional stability	ASTM D-1204	0.1%
Water absorption	ASTM D-471	2.2%
Surface hardness	ASTM D-2240	Shore A 75
Water vapor transmission	ASTM E-96	0.27 perms
Usage time*	-	15 minutes
Water resistant after*	-	30 minutes
Solid to walk on after*	-	4-6 hours
Can be driven on after*	-	24 hours
Surfacing to be applied between*	-	2 days
Apply overburden after	-	2 days
Completely hardened	-	3 days
Crack spanning	-	2mm/0.08 inch
Short-term temperature resistance*	-	250°C/482°F

* values obtained at 73°F, 50% relative humidity, may vary depending upon air flow, humidity and temperature.

2.3 FLASHINGS

A. Membrane Flashings: A composite of the same resin material as field membrane with 165 g/m2 fleece r reinforcement.

2.4 SUBSTRATE PRIMERS AND RESIN ADDITIVES

A. Polyurethane Primer: Two-component, solvent-free polyurethane resin for use in improving adhesion of membrane to wood, metal and bituminous substrate surfaces, as provided by the following manufacturer:

1. Kemper System's Kempertec D/R primer.

B. Epoxy Primer: Two-component, solvent-free epoxy resin for use in improving adhesion of membrane to cementitious/masonry substrate surfaces, as provided by the following manufacturer:

1. Kemper System's Kempertec EP/EP5 primer.

C. Acrylic Primer: Single-component, water-borne copolymerisates-based resin for use in improving adhesion of membrane to existing asphaltic bituminous roofing substrate surfaces and coated glass-faced polyisocyanurate foam insulation, as provided by the following manufacturer:

1. Kemper System's Kempertec BSF-R primer.

D. PMMA Primer: Two-component, quick-dry reactive cure methyl methacrylate resin for use in improving adhesion of membrane to wood, metal, and cementitious/masonry substrate surfaces, as provided by the following manufacturer:

1. Kemper System's Kempertec AC primer.

A. Hot Weather Additive: Additive specifically designed to slow resin catalyzation process at ambient temperatures above 75°F (24°C). Do not use inhibitor at ambient temperatures of 75°F (24°C) or less. Inhibitor to be used with white resin prior to mixing of multi-component resin, as provided by the following manufacturer:

1. Kemper System's Kemperol UP-I Inhibitor.

D. Cold Weather Additive: Additive specifically designed to increase resin catalyzation process at ambient temperatures below 50°F (10°C). Cold activator to be used with white resin prior to mixing of multi-component resin, as provided by the following manufacturer:

1. Kemper System's Kemperol UP-A Cold Activator.

2.5 SURFACINGS AND COATINGS

- A. Aggregate Finish Coating Resin: Two-component methyl methacrylate-based coating suitable for use to both bond and seal aggregate, as provided by the following Manufacturer:
1. Kemper System America, Inc.'s Kemperdur AC Finish.
- B. Color Coating: Single-component, water-borne acrylic-based coating suitable for use as a colored coating, as provided by the following Manufacturer:
1. Kemper System America, Inc.'s Kemperdur BSF-R Primer/Sealant.
- C. Color Coating: Two-component methyl methacrylate-based coating suitable for use as a colored coating, as provided by the following Manufacturer:
1. Kemper System America, Inc.'s Kemperdur AC Finish.

2.6 TRAFFIC-BEARING AGGREGATE SURFACING

- A. Coating: Two-component methyl methacrylate-based resin with graded mineral filler, as provided by the following Manufacturer:
1. Kemper System America, Inc.'s Kemperdur AC Traffic Coating, Components A, B and C.
- B. Sealer: Two-component methyl methacrylate-based sealer, as provided by the following Manufacturer:
1. Kemper System America, Inc.'s Kemperdur AC Finish.

2.7 ACCESSORIES

- A. Application Tools, Accessories, and Cleaners: Supplied and/or approved by membrane manufacturer for product installation.
- B. Solvent-Based Cleaner for Tools and Membrane Tie-Ins: Methyl Ethyl Ketone (MEK) or acetone.
- C. Water-Based Cleaner for Membrane: Simple Green HD.
- D. Topcoat Surfacing Aggregate: Silica sand, ceramic-coated quartz, or specialty aggregate shall be washed, kiln-dried, and dust-free with the following size specification:
- | | |
|----------------------------------|--------------|
| 1. Utility/Fire Rating: | 0.5 - 1.2 mm |
| 2. Alkalinity/Adhesion Key: | 0.5 - 1.2 mm |
| 3. Aesthetic/Pedestrian Traffic: | 0.4 - 1.0 mm |
| 4. Light Vehicular Traffic: | 0.5 - 1.2 mm |
| 5. Heavy Vehicular Traffic: | 0.8 - 1.5 mm |
- E. Leveling and Patching Aggregate: Silica sand shall be washed, kiln-dried, and dust-free, suitable for troweling or pourable self-leveling, round grain or angular with the following size specification:
- | | |
|-------------------------------------|--------------------|
| 1. For voids less than 1" in depth: | #00 (0.3 - 0.6 mm) |
| 2. For voids 1" to 2" in depth: | #0 (0.5 - 1.2 mm) |
- Mixing Proportions shall be a ratio of resin to sand at 1:2 by volume for leveling, 1:4 by volume for patching, or as approved by membrane manufacturer.
- F. Backer Rod: Expanded, closed-cell polyethylene foam designed for use with cold-applied joint sealant.
- G. Caulking: Single component, non-sag elastomeric polyurethane sealant meeting ASTM C920, Type S, Grade NS, Class 35 for use in sealing cracks and joints, and making watertight seals where required.
- H. Wood Nailers and Cant Strips: New wood nailers and cant strips shall be pressure treated for rot resistance (e.g., "Wolmanized" or "Osiose K-33"), #2 or better lumber. Asphaltic or creosote treated lumber is not acceptable.

***** [DELETE FOLLOWING SECTION IF NOT SPECIFIED] *****

***** [CAP SHEETS ARE TYPICALLY USED AS TEMPORARY ROOFING/VAPOR RETARDERS] *****

2.8 CAP SHEET

***** [SELECT ONE CAP SHEET TYPE IF SPECIFIED] *****

- A. SBS Cap Sheet: Mineral-surfaced fiberglass or polyester-reinforced SBS-modified bitumen cap sheet conforming to ASTM D-6163 (fiberglass) or ASTM D-6164 (polyester), suitable for torch, hot asphalt, or self-adhered application.

2.9 INSULATION COVER BOARD

B. APP Cap Sheet: Mineral-surfaced polyester-reinforced APP-modified bitumen cap sheet conforming to ASTM D-6222, suitable for torch application.

***** [DELETE FOLLOWING SECTION IF NOT SPECIFIED] *****

A. Cementitious Cover Board (Permabase): High compressive strength underlayment board consisting of aggregated portland cement slurry with polymer-coated glass-fiber mesh, with the following characteristics:

- | | |
|-------------------------|--|
| 1. Board Weight | 2.5 lb/sq. ft |
| 2. Board Size | [48 x 96] inches |
| 3. Board Thickness | 1/2 inch |
| 4. Thermal Conductivity | R-value of 0.39 as determined by ASTM C518 |
| 5. Board Edges | square |

B. Polyisocyanurate Insulation Cover Board (H-Shield HD): High compressive strength (100 psi) underlayment board with heavy-duty coated glass non-perforated facers with the following characteristics:

- | | |
|-------------------------|---|
| 1. Board Weight | 0.34 lb/sq. ft |
| 2. Board Size | [48 x 96] inches |
| 3. Board Thickness | 1/2 inch |
| 4. Thermal Conductivity | R-value of 2.5 as determined by ASTM C518 |
| 5. Board Edges | square |

C. Plywood Cover Board (APA-rated C-C Plugged): Exterior-grade plywood sheathing board, installed plugged side up, with the following characteristics:

- | | |
|-------------------------|--|
| 1. Board Weight | 2.1 lb/sq. ft |
| 2. Board Size | [48 x 96] inches |
| 3. Board Thickness | 5/8 inch |
| 4. Thermal Conductivity | R-value of 0.77 as determined by ASTM C518 |
| 5. Board Edges | tongue & groove |

D. Oriented-Strand Cover Board (AdvanTech): Exterior-grade oriented-strand sheathing board, with the following characteristics:

- | | |
|-------------------------|--|
| 1. Board Weight | 2.4 lb/sq. ft |
| 2. Board Size | [48 x 96] inches |
| 3. Board Thickness | 5/8 inch |
| 4. Thermal Conductivity | R-value of 0.74 as determined by ASTM C518 |
| 5. Board Edges | tongue & groove |

***** [DELETE FOLLOWING SECTION IF NOT SPECIFIED] *****

***** [INSULATION WITHOUT COATED GLASS FACER REQUIRES COVER BOARD] *****

2.10 INSULATION

A. Polyisocyanurate Insulation with Coated Glass Facers: With heavy-duty coated glass non-perforated facers meeting or exceeding the requirements for ASTM C1289-06, Type II, Class 2, [Grade 2 (20 psi)] [Grade 3 (25 psi)], 1.5 inch minimum thickness, with the following characteristics:

- | | |
|-------------------------|---|
| 1. Board Density | 2.0 lb/cu ft |
| 2. Board Size | [48x48][48 x 96] inches |
| 3. Board Thickness | [] inches |
| 4. Thermal Conductivity | K factor of [0.17] [] as determined by ASTM C177, aged 12 months at 75 degrees F |
| 5. Board Edges | square |

B. Polyisocyanurate Insulation with Nonasphaltic Facers: With nonasphaltic facers meeting or exceeding the requirements for ASTM C1289-06, Type II, Class 1, [Grade 2 (20 psi)] [Grade 3 (25 psi)], 1.5 inch minimum thickness, with the following characteristics:

- | | |
|-------------------------|---|
| 1. Board Density | 2.0 lb/cu ft |
| 2. Board Size | [48x48][48 x 96] inches |
| 3. Board Thickness | [] inches |
| 4. Thermal Conductivity | K factor of [0.17] [] as determined by ASTM C177, aged 12 months at 75 degrees F |
| 5. Board Edges | square |

2.11 TAPERED INSULATION

C. Extruded Polystyrene Insulation: Meeting ASTM C578, Type [IV] [VI] [VII] physical properties with natural skin surfaces; 1.5 inch minimum thickness, with the following characteristics:

1. Board Density [] lb/cu ft
2. Board Size [x] inches
3. Board Thickness [] inches
4. Thermal Conductivity K factor of [0.20] [] as determined by ASTM C177
5. Board Edges square

***** [DELETE FOLLOWING SECTION IF NOT SPECIFIED] *****

***** [INSULATION WITHOUT COATED GLASS FACER REQUIRES COVER BOARD] *****

A. Tapered Polyisocyanurate Insulation with Coated Glass Facers: With heavy-duty coated glass non-perforated facers meeting or exceeding the requirements for ASTM C1289-06, Type II, Class 2, [Grade 2 (20 psi)] [Grade 3 (25 psi)], 1.0 inch minimum thickness, with the following characteristics:

1. Board Density 2.0 lb/cu ft
2. Board Size [48x48] inches
3. Board Taper [] inch per foot
4. Total Thickness [] inches minimum [As required to achieve an average R value of [] for tapered insulation system].
5. Thermal Conductivity K factor of [0.17] [] as determined by ASTM C177, aged 12 months at 75 degrees F
6. Board Edges square

B. Tapered Polyisocyanurate Insulation with Nonasphaltic Facers: With nonasphaltic facers meeting or exceeding the requirements for ASTM C1289-06, Type II, Class 1, [Grade 2 (20 psi)] [Grade 3 (25 psi)], 1.0 inch minimum thickness, with the following characteristics:

7. Board Density 2.0 lb/cu ft
8. Board Size [48x48][48 x 96] inches
9. Board Taper [] inch per foot
10. Total Thickness [] inches minimum [As required to achieve an average R value of [] for tapered insulation system].
11. Thermal Conductivity K factor of [0.17] [] as determined by ASTM C177, aged 12 months at 75 degrees F
12. Board Edges square

C. Tapered Extruded Polystyrene Insulation: Meeting ASTM C578, Types [IV] [VI] [VII] physical properties with natural skin surfaces; 1.0 inch minimum thickness, with the following characteristics:

1. Board Density [] lb/cu ft
2. Board Size [x] inches
3. Board Taper [] inch per foot
4. Total Thickness [] inches minimum [As required to achieve an average R value of [] for tapered insulation system].
5. Thermal Conductivity K factor of [0.20] [] as determined by ASTM C177
6. Board Edges square

***** [DELETE FOLLOWING SECTION IF NOT SPECIFIED] *****

***** [SELECT ONE OR MORE ATTACHMENT METHODS. HOT ASPHALT ATTACHMENT NOT ACCEPTABLE WITH EXTRUDED POLYSTYRENE OR COVER BOARDS] *****

2.12 INSULATION AND COVER BOARD SECUREMENT

A. Mechanical Fasteners: FM-approved corrosion resistant insulation fasteners of appropriate length with plates. Securement pattern shall be in accordance with specified wind uplift rating for system application. Roofing fasteners shall be a type approved by membrane and insulation manufacturer.

B. Polyurethane Adhesive: FM-approved single component moisture-cured, or two component reactive-cured polyurethane adhesive. Adhesive application rate shall be in accordance with specified wind uplift rating for system application. Roofing adhesive shall be a type approved by membrane and insulation manufacturer.

C. Asphalt Adhesive: FM-approved steep roofing asphalt conforming to ASTM D-312, Type III. Provide label on each container indicating flash point, finished blowing temperature, softening point, and equiviscous temperature. Asphalt primer, cutback solvent type, conforming to ASTM D-41, is required for concrete, masonry, and metal surfaces.

2.13 DRAINAGE/ PROTECTION BOARD

***** [DELETE FOLLOWING SECTION IF NOT SPECIFIED] *****
***** [DRAINAGE/PROTECTION BOARD IS TYPICALLY INSTALLED UNDER MOST OVERBURDEN ASSEMBLIES DIRECTLY ON TOP OF WATERPROOFING MEMBRANE, AND OVER EXTRUDED POLYSTYRENE INSULATION IN VEGETATED ROOF ASSEMBLIES] *****

A. Drainage Board (Enkadrain/W 3601): Entangled filament polypropylene core with nonwoven geotextile filtering fabric suitable for all overburden applications, with the following characteristics:

1. Minimum Core Weight: 16 oz/sq.yd.
2. Core Thickness: 0.30 in.
3. Minimum Flow Rate: 9.7 gpm/ft @ 1000 psf, 1.0 gradient

***** [DELETE FOLLOWING SECTION IF NOT SPECIFIED] *****
***** [WATER RETENTION/PROTECTION BOARD IS TYPICALLY INSTALLED UNDER NON-TRAY VEGETATED ROOF ASSEMBLIES DIRECTLY ON TOP OF WATERPROOFING MEMBRANE] *****

2.14 WATER RETENTION/ PROTECTION BOARD

A. Water Retention Board (EnkaRetain & Drain 3111): Entangled filament polypropylene core with synthetic water absorbent mat and nonwoven geotextile filtering fabric suitable for all overburden applications, with the following characteristics:

1. Minimum Core Weight: 16 oz/sq.yd.
2. Core Thickness: 0.40 in.
3. Total Thickness: 0.60 in.
4. Water Storage Capacity: 0.11 gal/sf
5. Minimum Flow Rate: 23.0 gpm/ft @ 1000 psf, 1.0 gradient

***** [DELETE FOLLOWING SECTION IF NOT SPECIFIED] *****
***** [OVERBURDEN INSULATION IS TYPICALLY INSTALLED AS PART OF PROTECTED MEMBRANE, PLAZA DECK, AND VEGETATED ROOF ASSEMBLIES] *****

2.15 OVERBUR- DEN INSULATION

A. Insulation: Extruded polystyrene board meeting ASTM C578, Type [VI] [VII] [V] physical properties with natural skin surfaces; 1.5 inch minimum thickness, with the following characteristics:

1. Board Density [] lb/cu ft
2. Board Size [x] inches
3. Board Thickness [] inches
4. Thermal Conductivity K factor of [0.20] [] as determined by ASTM C177
5. Board Edges square

***** [DELETE FOLLOWING SECTION IF NOT SPECIFIED] *****

2.16 FILTER FABRIC

A. Plaza Assembly Filter Fabric: Non-woven polyester fabric, minimum 4.0 oz/sq.yd., for use under stone ballast, sand setting bed, and similar overburden; as supplied or approved by membrane manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck/substrate openings, curbs, and protrusions through deck/substrate, wood cant strips and reglets are in place and solidly set.
- C. Verify deck/substrate is structurally supported, secure and sound.

3.2 PREPARATION OF SUBSTRATE

- A. General: Surfaces to be prepared as a substrate for the new waterproofing system as follows:
 1. The contractor shall determine the condition of the existing structural deck/substrate. All defects in the deck or substrate shall be corrected before new waterproofing work commences. Areas of deteriorated deck/substrate, porous or other affected materials must be removed and replaced with new to match existing.

2. Prepare flashing substrates as required for application of new waterproofing membrane flashings.
3. Inspect substrates, and correct defects before application of new waterproofing. Fill all surface voids greater than 1/8 inch wide with an acceptable fill material.
4. Remove all ponded water, snow, frost and/or ice from the work substrate prior to installing new waterproofing materials.
5. The final substrate for waterproofing shall be clean, dry, free of loose, spalled or weak material including coatings, mineral aggregate, and flood coat/gravel surfacing, oil, grease, contaminants, abrupt changes in level, waterproofing agents, curing compounds, and free of projections which could damage membrane materials.

******* [SELECT REQUIRED SUBSTRATE PREPARATION METHOD(S)] *******

B. Existing Asphaltic Bituminous Waterproofing:

1. Existing flashings shall be removed down to the structural substrate/penetration at all flashing areas.
2. Damaged/saturated areas of existing roofing membrane and underlying assembly shall be removed and replaced, or repaired in kind.
3. Smooth-surfaced membrane with applied coating shall have all loose coating removed, and an adhesion test performed by Waterproofing Manufacturer's Technical representative to confirm acceptable adhesion.
4. Granule-surfaced membrane shall have all loose granules removed from the surface by vacuuming and power brooming.
5. Gravel-surfaced membrane shall have all loose gravel removed and the roof surface thoroughly cleaned with all ridges and high points removed. A layer of coated glass-faced polyisocyanurate foam insulation (R=6 min.) shall be adhered in urethane foam roof adhesive over the roof surface, or mechanically attached through the existing roof assembly into the structural deck.

C. Existing Coal Tar Pitch Bituminous Waterproofing:

1. Existing flashings shall be removed down to the structural substrate/penetration at all flashing areas.
2. Damaged/saturated areas of existing roofing membrane and underlying assembly shall be removed and replaced, or repaired in kind.
3. Gravel-surfaced membrane shall have all loose gravel removed and the roof surface thoroughly cleaned with all ridges and high points removed. A layer of coated glass-faced polyisocyanurate foam insulation (R=20 min. or greater as required to prevent the pitch from reaching 85°F) shall be adhered in urethane foam roof adhesive over the roof surface.

D. Existing Polymeric Single Ply Waterproofing:

1. Existing flashings shall be removed down to the structural substrate/penetration at all flashing areas.
2. Damaged/saturated areas of existing roofing membrane and underlying assembly shall be removed and replaced, or repaired in kind.
3. A layer of coated glass-faced polyisocyanurate foam insulation (R=6 min.) shall be adhered in urethane foam roof adhesive over the roof surface, or mechanically attached through the existing roof assembly into the structural deck.

E. Structural Concrete:

1. New concrete shall have cured a minimum of 28 days in accordance with ACI-308, or as approved by Waterproofing Manufacturer's Technical Department.
2. New or existing concrete shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, bituminous products and previous waterproofing materials.
3. New or existing concrete shall be dry with a maximum moisture content of five (5) percent. Determinations of moisture content shall be performed by the Contractor. Contractor shall be responsible to perform periodic evaluations of moisture content during the work. Moisture evaluation results shall be submitted in writing to the Owner or his designated Representative and Waterproofing manufacturer for acceptance.
4. Where required, concrete shall be abrasively cleaned in accordance with ASTM D4259 to provide a sound substrate free from laitance. Achieve an open concrete surface in accordance with ICRI surface profiles CSP 3-5. When using mechanical methods to remove existing waterproofing products or surface deterioration, the surface profile is not to exceed ¼ inch (peak to valley).

5. The substrate shall be sound and all spalls, voids and blow holes on vertical or horizontal surfaces must be repaired prior to placement of the primer coat. Spalls and other deterioration shall be repaired in accordance with the requirements of the Owner or his designated Representative and Membrane manufacturer.
6. Areas of minor surface deterioration of 0.25" (6 mm) or greater in depth shall be repaired to prevent possible pooling of the liquid applied materials, leading to excessive usage of primer and resin.
7. Hollow-core panels, T-panels, and Twin-T panels shall have grouted joints between panels and shall be provided with mechanical securement from panel to panel.
8. For concrete materials with a compressive strength of less than 3,000 psi contact Waterproofing Manufacturer's Technical Department for substrate preparation requirements.

F. Masonry:

1. Walls shall be built with hard kiln dried brick or waterproof concrete block construction.
2. Areas of soft or scaling brick or concrete, faulty mortar joints, or walls with broken, damaged or leaking coping shall be repaired in accordance with the requirements of the Owner or his designated Representative and Flashing Membrane Manufacturer.

G. Steel/Metal:

1. Clean and prepare metal surfaces to near white metal in accordance with SSPC - SP3 (power tool clean) or as required by membrane manufacturer. Extend preparation a minimum of one (1) inch beyond the termination of the membrane flashing materials.
2. In addition to cleaning, all metal surfaces shall be abraded to provide a rough open surface. A wire brush finish is not acceptable.

H. Wood/Plywood:

1. Plywood shall be identified with American Plywood Association (APA) grade trade marks and shall meet the requirements of product standard PS1. Strip plywood joints with four inch (4") wide strip of flashing membrane. Cover knot holes or cracks with strips of flashing membrane.

I. Other Flashing Surfaces:

1. Remove all contaminants as required by membrane manufacturer. Surface preparation shall be performed by means approved by Owner or his designated Representative.

J. Finish Leveling, Patching and Crack Preparation:

1. General: epoxy primer/sand mix is the preferred material for all concrete and masonry substrate finish leveling, crack and wall/deck preparation and patching. Epoxy primer/sand patching mix provides a set time of approximately twelve (12) hours and does not require surface grinding. Kemperol primer/sand mix is typically applied in conjunction with general surface priming.
2. Concrete and Masonry Substrate Leveling & Patching: Substrate conditions are to be evaluated by the Contractor, the Owner, or his designated Representative, and Membrane manufacturer. Perform leveling and patching operations as follows:
 - a) Level uneven surfaces with a leveling mixture of primer and approved kiln-dried silica sand in a 1:2 primer to sand ratio by volume. Spread and plane this compound with a squeegee and trowel to achieve a flat surface.
 - b) Fill cavities with a patching mixture of primer and approved kiln-dried sand in a 1:4 primer to sand ratio by volume.
 - c) Silica sand must be kept absolutely dry during storage and handling.
 - d) Any surface to be leveled or filled must first be primed with an appropriate primer.
3. Joint and Crack Preparation: Joints, cracks and fractures in the structural deck/substrate shall be prepared as defined below prior to installation of the waterproofing membrane. Note: Joints, cracks, and fractures may telegraph through the waterproofing membrane.
 - a) Non-Moving Cracks, Joints, and Voids: Determine that crack/joint is non-moving. Clean out crack/joint by brushing and oil-free compressed air. Fill crack/joint with polyurethane sealant. Voids require the installation of backer rod or other backing material prior to application of the polyurethane sealant. Allow for a minimum of twelve (12) hours cure or as required by sealant Manufacturer.

3.3 WOOD NAILER LOCATION AND INSTALLATION

b) Moving Cracks: Determine that crack is moving. Clean out crack by brushing and oil-free compressed air. Fill crack with polyurethane sealant. Allow for a minimum of twelve (12) hours cure or as required by sealant Manufacturer. Following full curing of primer, apply waterproofing resin and 4 inch (10 cm) wide strip of membrane (resin and fleece) in strict accordance with Membrane manufacturer's written instructions.

- A. Install pressure-treated wood nailers as specified, and as required by the Membrane manufacturer. Wood nailers are required to match the thickness of insulation and cover board, and are to be secured directly to the structural deck. Wood nailers shall be installed at all roof edges and on either side of expansion joints, as well as beneath any equipment flanges.
- B. Secure Wood Nailer: Wood nailers shall be firmly fastened to the deck. The wood nailer attachment must be able to resist a minimum force of 200 lbs. per lineal foot, in any direction. Mechanically fasten wood nailers as required to resist a force of 200 lbs per lineal foot, but with no less than 5 fasteners per 8 foot or 6 fasteners per 10 foot length of nailer. Refer to current FM Loss Prevention Bulletin 1-49 for additional attachment recommendations.

******* [DELETE FOLLOWING SECTION IF NOT SPECIFIED] *******

3.4 CAP SHEET TEMPORARY ROOF/VAPOR RETARDER INSTALLATION

- A. Install Cap Sheet: Install mineral-surfaced cap sheet in accordance with sheet manufacturer's current published specifications and recommendations for use with adhered roofing.
1. Mineral Surfaced Cap Sheet Torch-Applied Attachment: Follow cap sheet manufacturer's recommendations for the appropriate application procedure. Roll each cap sheet into molten bitumen. Limit bitumen bleed-out at laps to 1/4" or less.
 2. Mineral Surfaced Cap Sheet Solid-Adhered Attachment: Follow cap sheet manufacturer's recommendations for the appropriate asphalt application rate and application procedure. Roll each cap sheet into a full mopping of hot steep asphalt (Type III) at the recommended EVT range. Broom in the cap sheet to spread the roofing asphalt for maximum contact. Limit bitumen bleed-out at laps to 1/4" or less.
 3. Mineral Surfaced Cap Sheet Self-Adhered Attachment: Follow cap sheet manufacturer's recommendations for the appropriate application procedure.
- B. Fit Cap Sheet: Neatly fit cap sheet to all penetrations, projections, curbs, and walls. Extend over all nailers. Cap sheet shall be overlapped a minimum of 3" for side laps and 6" for end laps. Seal at penetrations, projections, curbs and walls with urethane-based sealant. Do not use asphaltic flashing cement.

******* [DELETE FOLLOWING SECTION IF NOT SPECIFIED] *******

3.5 INSULATION/ COVER BOARD INSTALLATION

- A. General: Insulation and cover board shall be installed in accordance with the insulation/cover board manufacturer's current published specifications and recommendations for use with adhered roofing.
- B. Install Insulation/Cover Board: Install only as much insulation and cover board as can be primed, sealed, and protected before the end of the day's work or before the onset of inclement weather.
- C. Fit Insulation/Cover Board: Neatly fit insulation/cover board to all penetrations, projections, and nailers. Insulation shall be loosely butted, with gaps not greater than 1/4". All gaps greater than 1/4" shall be filled with acceptable insulation. Cover board shall be loosely butted, with gaps not greater than 1/4". All gaps greater than 1/8" shall be filled with primer; all gaps greater than 1/4" shall be filled with polyurethane sealant.
- D. Strip In Insulation/Cover Board Joints: Strip all insulation/cover board joints with four inch (4") wide strip of flashing membrane. Under no circumstances shall the membrane be left unsupported over a space greater than 1/4".
- E. Stagger Insulation/Cover Board Joints: When installing multiple layers of insulation, all joints between succeeding layers shall be staggered a minimum of 6" in each direction.
- F. Steel Deck Substrates: Place boards perpendicular to steel deck flutes with edges over flute surface for bearing support. Edges shall be checked so that no edges are left substantially unsupported along the flutes.

- G. Drain Sumps: Insulation shall be feathered or tapered to provide a sump area a minimum of 36" x 36" where possible at all drains. Taper insulation around roof drains so as to provide proper slope for drainage. In areas where feathered or tapered insulation leaves insulation core exposed, cover with an appropriate cover board or base sheet/cap sheet assembly to provide a sound and smooth substrate surface.
- H. Tapered Insulation: Place the constant thickness first layer and the tapered thickness insulation to the required slope pattern in accordance with insulation manufacturer's instructions.
- I. Mechanical Attachment: Follow insulation/cover board and fastener manufacturers' recommendations for the appropriate fastener and plate type, size and length. Reference FM approvals for fastening patterns that satisfy FM wind uplift requirements. Typical application is one fastener and plate per 2 square feet of insulation/cover board to be attached. Note: additional fasteners are required in the corner and perimeter regions of the roof. Secure insulation/cover board in accordance with approval requirements.
- J. Polyurethane Adhesive Attachment: Follow insulation/cover board and adhesive manufacturers' recommendations for the appropriate adhesive application rate and application procedure. Under normal application rate, dispense the first bead 3" inside the outside edges of the insulation/cover board to be attached, with sequential beads equidistant. Place the boards onto the roofing adhesive beads. Walk on the boards to spread the roofing adhesive for maximum contact. Periodically walk on the boards until firmly attached. Reference FM approvals for adhesive application patterns that satisfy FM wind uplift requirements. Typical application is a 3/4" bead of roofing adhesive at a rate of one lineal foot per square foot of insulation/cover board to be attached. Note: additional adhesive is required in the corner and perimeter regions of the roof. Secure insulation/cover board in accordance with approval requirements.
- K. Asphalt Adhesive Attachment: Follow insulation manufacturer's recommendations for the appropriate asphalt application rate and application procedure. Set each insulation panel layer in a full mopping of hot steep asphalt (Type III) at the recommended EVT range. Walk on the boards to spread the roofing adhesive for maximum contact. Periodically walk on the insulation boards until firmly attached. Reference FM approvals for asphalt application rates that satisfy FM wind uplift requirements. Typical application is 25 lbs. per 100 square feet of insulation board to be attached. Secure insulation in accordance with approval requirements.

******* [SELECT PRIMER(S) AS REQUIRED FOR SUBSTRATE(S)] *******

3.6 PRIMER APPLICATION

- A. General:
 - 1. Mix and apply single and two-component primer in strict accordance with written instructions of Membrane Manufacturer. Use only proprietary materials, as supplied by the membrane manufacturer.
 - 2. The substrate surface must be dry, with any remaining dust or loose particles removed using clean, dry, oil-free compressed air, industrial vacuum, cloth wipe or a combination of methods.
 - 3. Do not install primer on any substrate containing newly applied and/or active asphalt, coal-tar pitch, creosote or penta-based materials unless approved in writing by Membrane Manufacturer. Some substrates may require additional preparation before applying primer.
- B. Mixing of Kempertec EP and Kempertec D Primers:
 - 1. Premix primer Component A thoroughly with a spiral agitator or stir stick. Pour primer Component B into Component A and mix the components for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks. DO NOT AERATE. The Primer solution should be a uniform color, with no light or dark streaks present.
 - 2. Do not thin primer. Determine required primer coverage for each substrate material/condition and apply in strict accordance with written instructions of Membrane Manufacturer.
 - 3. Mix only that amount of primer components A & B that can be used in 30 minutes.
- C. Mixing of Quick-Dry Kempertec EP5 Primer:
 - 1. Premix primer Component A thoroughly with a spiral agitator or stir stick. Pour primer Component B into Component A and mix the components for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks. DO NOT AERATE. The Primer solution should be a uniform color, with no light or dark streaks present.
 - 2. Do not thin primer. Determine required primer coverage for each substrate material/condition and apply in strict accordance with written instructions of Membrane Manufacturer.
 - 3. Mix only that amount of primer components A & B that can be used in 20 minutes.

D. Mixing of Quick-Dry Kempertec R Primer:

1. Premix primer Component A within clear pouch to obtain consistent appearance. Remove separation cord. Knead primer Component B into Component A and mix the components for approximately 1 minute. The Primer solution should be a uniform color, with no light or dark streaks present.
2. Do not thin primer. Determine required primer coverage for each substrate material/condition and apply in strict accordance with written instructions of Membrane Manufacturer.
3. Primer must be applied within 5 minutes of mixing.

E. Mixing of Kempertec BSF-R Primer:

1. Mix primer thoroughly for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks. DO NOT AERATE. The Primer solution should be a uniform color, with no light or dark streaks present.

F. Mixing of Kempertec AC Primer:

1. Premix primer Component A thoroughly with a spiral agitator or stir stick.
2. Determine the correct amount of catalyst Component B based upon ambient temperature in accordance with written instructions of Membrane Manufacturer.
3. Add primer catalyst Component B into Component A and mix the components for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks. DO NOT AERATE. The Primer solution should be a uniform color, with no light or dark streaks present.
4. Do not thin primer. Determine required primer coverage for each substrate material/condition and apply in strict accordance with written instructions of Membrane Manufacturer.
5. Mix only that amount of primer components A & B that can be used in 15 minutes.

G. Application of Primer:

1. Roll or brush the primer evenly onto the surface to fully saturate the substrate in one application. Do not allow primer to pond or collect in low areas. Follow manufacturer's recommended application rates to ensure that a thin layer of cured primer remains on the substrate surface.
2. Apply primer only up to the edge of the membrane flashing terminations. Primer application past the membrane terminations requires surfacing with an approved material.
3. For EP/EP5 and AC primer applications over cementitious substrates where protection from substrate wetness is required, apply primer coat at a heavier application rate until pore saturation is achieved.
4. For all EP/EP5 primer applications, apply kiln-dried sand into the final coat of EP/EP5 primer while still wet at the rate of 50 lbs. per 100 square feet.
5. Allow standard primers to cure for a minimum of twelve (12) hours before membrane application. Allow quick-dry and water-borne primers to cure for a minimum of four (4) hours before membrane application. Allow PMMA primer to cure for a minimum of one (1) hour before membrane application. Membrane must be applied to primer only when completely dry and without tack.
6. Exposure of the primer in excess of eight (8) days or premature exposure to moisture may require removal and application of new primer. DO NOT apply new primer over exposed primer older than eight (8) days, primer prematurely exposed to moisture, or primer used as temporary waterproofing, unless approved in writing by the Membrane Manufacturer.

H. Disposal of Primer:

1. Cured primer may be disposed of in standard landfills. This is accomplished by thoroughly mixing all components.
2. Uncured primer is considered a hazardous material and must be handled as such, in accordance with local, state and federal regulation. Do not through uncured resin away.

A. General:

1. It is recommended to apply the waterproofing membrane immediately following full curing of the primer in order to obtain the best bond between primer and membrane.
2. Mix and apply cold fluid-applied reinforced unsaturated polyester waterproofing membrane in strict accordance with written instructions of Membrane Manufacturer. Use only proprietary membrane resins and materials, as supplied by the membrane manufacturer.

3.7 MEMBRANE APPLICATION

3. The primed substrate surface shall be dry, with any remaining dust or loose particles removed using clean, dry, oil-free compressed air, industrial vacuum, cloth-wipe or a combination.
4. Protect all areas where membrane has been installed. Do not work off installed membrane during application of remaining work before forty-eight (48) hours of curing. Movement of materials and equipment across installed membrane is not acceptable. If movement is necessary, provide complete protection of affected areas.
5. Closely follow the Membrane Manufacturer's recommendation for hot and cold weather application. Monitor surface and ambient temperatures, including the effects of wind chill.

B. Mixing of Kemperol BR and V210 Resin:

1. Mix resin Component A (black formulation) with a spiral agitator until the liquid is a uniform black color.
2. Add the Catalyst Powder to resin Component A and mix with the same agitator for 5 minutes or until the powder is completely mixed. The dissolving time is 20 minutes to 2 hours, depending on the ambient temperature. The catalyst is completely dissolved when there are no white specs remaining.
3. Mix resin Component B (white formulation) with a separate spiral agitator until the color is a uniform white. If the ambient temperature is below 50°F (10°C) or above 75°F (24°C), then a weather related additive should be combined and mixed into the Component B.
 - a) Cold Activator should be added to resin Component B when the ambient temperature is 50°F (10°C) and below. The activator should be mixed with the spiral agitator for 5 minutes or until both liquids are thoroughly blended.
 - b) Inhibitor should be added to resin Component B when the temperature is 75°F (24°C) and above. The inhibitor should be mixed with the spiral agitator for 5 minutes or until both liquids are thoroughly blended.
4. Pour resin Component A and Component B into a third clean bucket at a 1:1 ratio (equal parts) and thoroughly mix the components with a clean spiral agitator. The Resin solution should be a uniform color, with no light or dark streaks present.
5. Mix only that amount of resin components A & B that can be used in 20 minutes.

C. Mixing of Kemperol BRM and V210M Resin:

1. Mix the liquid resin with a spiral agitator until the liquid is a uniform color, with no light or dark streaks present.
2. If the ambient temperature is below 50°F (10°C) or above 75°F (24°C), then a weather related additive should be combined and mixed into the liquid resin.
 - a) Cold Activator should be added to the liquid resin when the ambient temperature is 50°F (10°C) and below. The activator should be mixed with the spiral agitator for 5 minutes or until both liquids are thoroughly blended.
 - b) Inhibitor should be added to the liquid resin when the temperature is 75°F (24°C) and above. The inhibitor should be mixed with the spiral agitator for 5 minutes or until both liquids are thoroughly blended.
3. Add the Catalyst Powder to the mixed liquid resin and mix with the same agitator for 5 minutes or until the powder is completely mixed. It is not necessary to wait for the catalyst powder to dissolve before using the resin.
4. Mix only that amount of resin that can be used in 20 minutes.

D. Application of Resin/Fleece:

1. Apply mixed resin to the prepared surface at the manufacturer's recommended application rate. The resin should be rolled or brushed liberally and evenly onto the surface using a broad, even stroke. Cover one working area at a time, between 15 – 20 ft.2 (1.4 – 1.9 m²).
2. Roll out dry polyester fleece onto the liquid resin mix, making sure the SMOOTH SIDE IS FACING UP (natural unrolling procedure), avoiding any folds and wrinkles. The fleece will begin to rapidly saturate with the liquid resin mix. Use a medium nap roller or brush to work the resin into the fleece, saturating from the bottom up, and eliminating air bubbles, wrinkles, etc. The appearance of the saturated fleece should be light opaque amber with no white spots. White spots are indications of unsaturated fleece or lack of adhesion. It is important to correct these faults before the resin cures.

3.8 FLASHING APPLICATION

3. Apply additional liquid resin mix on top of fleece at the manufacturer's recommended application rate to finish the saturation of the fleece. Roll this final coating into the fleece, which will result in a glossy appearance. The fleece can only hold so much resin and all excess should be rolled forward to the unsaturated fleece, eliminating ponding or excessive build-up of the resin. The correct amount of resin will leave no whiteness in fleece and there will be a slightly fibrous surface texture. The final resin coating should be smooth and uniform.
 4. Approximately 2/3 of the total resin should be applied to the substrate below the fleece reinforcement, and 1/3 of the total resin should be applied over the fleece reinforcement.
 5. Prevent contact between mixed/unmixed resin and new/existing membrane. If any unmixed resin contacts membrane surface remove immediately and clean thoroughly with a cloth rag.
 6. At all fleece seams, allow a 2" (5 cm) overlap for all side joints and a 4" (10 cm) overlap for all end joints.
 7. At membrane tie-offs, clean in-place membrane with MEK (methyl ethyl ketone) solvent or acetone once resin has cured. Allow solvents to fully evaporate before application of new resin.
- E. Disposal of Resin:
1. Cured resin may be disposed of in standard landfills. This is accomplished by thoroughly mixing all components.
 2. Uncured resin is considered a hazardous material and must be handled as such, in accordance with local, state and federal regulation. Do not throw uncured resin away.
- A. General:
1. Install flashing system in accordance with the requirements/recommendations of the Membrane manufacturer and as depicted on standard drawings and details. Provide system with base flashing, edge flashing, penetration flashing, counter flashing, and all other flashings required for a complete watertight system.
 2. Wherever possible, install the flashings before installing the field membrane to minimize foot traffic over newly installed field membrane.
 3. All membrane flashings shall be installed concurrently with the waterproofing membrane as the job progresses. Temporary flashings are not allowed without prior written approval from the Membrane manufacturer. Should any water penetrate the new waterproofing membrane because of incomplete flashings, the affected area shall be removed and replaced at the contractor's expense.
 4. Provide a minimum vertical height of 8" for all flashing terminations. Flashing height shall be at least as high as the potential water level that could be reached as a result of a deluging rain and/or poor slope. Do not flash over existing through-wall flashings, weep holes and overflow scuppers.
 5. All flashings shall be terminated as required by the Membrane Manufacturer.
 6. Alkalinity surface protection consisting of one application of AC primer and one application of approved broadcast mineral aggregate surfacing shall be applied wherever stone, concrete, or masonry elements will be placed directly over the flashing.
- B. Metal Flashing – General:
1. Metal flashings shall be fabricated in accordance with the current recommendations of SMACNA and in accordance with standard drawings and project details.
 2. Metal flashing flanges to which membrane is to be bonded shall be a minimum of four (4) inches in width, and secured to the substrate or wood nailers six (6) inches on center staggered with fasteners appropriate to the substrate type. The flanges shall be provided with a roughened surface that has been cleaned of all oil and other residue.
 3. Metal edges that will be overlaid with membrane shall be provided with a 1/4" min. hemmed edge.
 4. Apply primer, resin and fleece to metal flange, extending membrane to outside face of metal edging, and to vertical face of metal base/curb flashing.
- C. Membrane Flashing – General:
1. Membrane flashings shall be fabricated with primer appropriate for the substrate surface, resin of the same base chemical type as the field membrane, and fleece of the same weight as the field membrane unless specified otherwise.

2. Primer, resin, and fleece mixing and application methods as specified for field membranes are also suitable for membrane flashing.
3. Fleece shall overlap 2" (5 cm) minimum for all joints. Fleece shall be cut neatly to fit all flashing conditions without a buildup of multiple fleece layers. Work wet membrane with a brush or roller to eliminate blisters, openings, or lifting at corners, junctions, and transitions.

D. Pipes, Conduits, and Unusually Shaped Penetrations:

1. Flashing is typically constructed as a two part assembly consisting of a vertical wrap and a horizontal target patch. There must be a minimum of a two (2) inch (5 cm) overlap between vertical and horizontal flashing components.

E. Drains and Scuppers:

1. Acceptable drain and scupper materials are cast iron, cast aluminum, and copper.
2. Connect new drains and scuppers to existing storm sewer system.
3. Alternatively, replace all broken or damaged parts of existing drains and scuppers.
4. Flashing material shall extend four (4) inches minimum onto drain or scupper flange and into drain/scupper body.
5. Install clamping ring if provided as part of the drain or scupper design. Install a strainer basket to prevent debris from clogging the drainage line.

F. Hot Stacks:

1. Protect the membrane components from direct contact with steam or heat sources when the in-service temperature exceeds 170 degrees F. In all such cases flash to an intermediate "cool" sleeve.
2. Fabricate "cool" sleeve in the form of a flanged metal cone using galvanized metal, mechanically attached to the structure or wood nailers.
3. Flashing is typically constructed as a two part assembly consisting of a vertical wrap and a horizontal target patch. There must be a minimum of a two (2) inch (5 cm) overlap between vertical and horizontal flashing components.

G. Flexible Penetrations:

1. Provide a weathertight gooseneck of round cross-section for each penetration or group of penetrations. Set in water cut-off mastic and secure to the structural substrate.
2. Acceptable gooseneck material is copper, of a sheet weight appropriate for the application.
3. Flashing is typically constructed as a two part assembly consisting of a vertical wrap and a horizontal target patch. There must be a minimum of a two (2) inch (5 cm) overlap between vertical and horizontal flashing components.

H. Walls, Curbs and Base Flashings:

1. Wall, curb and base flashings shall be installed to solid substrate surfaces only. Adhering to gypsum-based panels, cementitious stucco, synthetic stucco, wood or metal siding, and other similar materials is not acceptable.
2. Reinforce all transition locations and other potential wear areas with a four (4) inch wide membrane strip evenly positioned over the transition prior to installing the exposed flashing layer.
3. Reinforce all inside and outside corners with a four (4) inch diameter conical piece of membrane prior to installing the exposed flashing layer.
4. All pins, dowels and other fixation elements shall be flashed separately with a vertical flashing component prior to installing the exposed flashing layer.
5. Extend flashing a minimum of four (4) inches onto the field substrate surface.

I. Drip Edges and Gravel Stops:

1. Metal drip edges and gravel stops shall be installed to solid substrate surfaces or wood nailers only. Securement to gypsum-based panels, cementitious stucco, synthetic stucco, wood or metal siding or coping, and other similar materials is not acceptable.

3.9 MEMBRANE PREPARATION FOR SURFACINGS AND COATINGS

2. Flash all drip edges and gravel stops by extending the field membrane all the way to the edge of the exposed face prior to installing the metal edging. Strip in the metal flange with a separate 8 inch wide strip of membrane adhered to both the securement flange and to the field membrane.
 3. For conditions where water infiltration behind the exposed drip edge or gravel stop face is possible, install a separate membrane layer positioned behind the face area and extending a minimum of four (4) inches past the securement flange onto the field substrate prior to installing the drip edge or gravel stop.
- J. Field Fabricated Control or Expansion Joint Flashing:
1. Control or expansion joints in excess of two (2) inches in width and all expansion joints subject to vehicular traffic require the use of a separate engineered joint system.
 2. Grind or otherwise bevel the inside edges of the joint opening to provide a smooth transition edge for the fleece.
 3. Flashing typically consists of a fully saturated membrane bottom layer looped into the joint as a cradle, a compressible foam or rubber insert at 25% compression fitted into the joint, and a membrane top layer applied over the joint. Extend both fleece layers four (4) inches minimum onto the field substrate on both sides of the joint.
 4. Apply the field membrane over the entire joint area.
- K. Electrical Conduit, Gas Lines and Lightning Protection
1. Supports for electrical conduit and gas lines greater than one (1) inch in diameter require the use of a separate engineered support system.
 2. Supports for electrical conduit and gas lines one (1) inch or less in diameter, and bases for lightning protection rods and cable, can be adhered directly to the membrane surface with a single-component, high quality polyurethane sealant.
- A. Membrane must be clean and dry, and free of all contaminants that may interfere with the adhesion of the surfacing and coating to the membrane surface. This includes the waxy, sticky paraffin film that develops on the membrane surface as a byproduct of curing.
- B. Membrane exposed less than 48 hours prior to application of surfacing and coating materials should not be coated.
- C. Membrane exposed longer than 48 hours will require surface preparation. The membrane surface must not evidence the paraffin film curing byproduct in order to achieve the desired bond of the surfacing or coating to the membrane. Removal of any remaining paraffin residue by means of an MEK solvent wipe, or by power washing with an approved cleaner and a thorough rinsing, is required.

3.10 SURFACING AND FINISHES

******* [SELECT SURFACING METHOD(S) AS SPECIFIED] *******

- A. Aggregate Finish Surfacing
1. Where specified, provide and install approved kiln-dried silica sand, or other approved mineral surfacing to achieve an aesthetic and/or non-skid surface.
 2. Pre-mix single-component and two-component coatings prior to application to achieve an even consistency.
 3. Broadcast specified and approved sand or aggregate in excess into a bonding coat application of Membrane Manufacturer's approved methyl methacrylate-based aggregate coating system applied over clean, cured membrane at the manufacturer's recommended application rate. Aggregate shall be applied to excess to obtain uniform and full coverage.
 4. Following minimum 2 hour cure time remove loose/un-embedded mineral aggregate by blowing with oil-free compressed air or with a vacuum. Re-broadcast clean mineral aggregate as required to provide full embedment and coverage of membrane.
 5. Seal aggregate surface with a sealing coat application of Membrane Manufacturer's approved aggregate coating, applied at the manufacturer's recommended application rate. After completion of surfacing, avoid any traffic for a minimum of three (3) hours to allow for surfacing to cure.
- B. Coating-Type Finish Surfacing

1. Where specified, provide and install Membrane Manufacturer's approved methyl methacrylate-based or acrylic-based coating applied over clean, fully cured membrane at the manufacturer's recommended application rate.
2. Pre-mix single-component and two-component coatings prior to application to achieve an even consistency and color. Mix thoroughly for approximately 2 minutes with a clean spiral agitator or stir stick without creating any bubbles or streaks. DO NOT AERATE.
3. Apply coating at the manufacturer's recommended application rate. Two coating applications are recommended for best coverage and appearance. After completion of coating, avoid any traffic for a minimum of two (2) hours to allow for surfacing to cure.

C. Alkalinity Protection

1. Where placement of concrete, mortar or adhesive setting beds are required over sections of the waterproofing membrane or flashing, apply manufacturer's methyl methacrylate primer/coating at the manufacturer's recommended coverage rate, with broadcast to excess of kiln-dried silica sand into wet primer/coating.
2. Protection shall extend a minimum of one (1) foot (0.3m) past the concrete form on all sides.
3. Provide continuous cleaning with water and brush to eliminate settlement of concrete residues on in-place waterproofing membrane adjacent to area of concrete placement.

D. Adhesion Key:

1. Where placement of non-cementitious material such as asphalt pavement is required over sections of the waterproofing membrane or flashing, apply manufacturer's methyl methacrylate primer/coating at the manufacturer's recommended coverage rate, with broadcast to excess of kiln-dried silica sand into wet primer/coating.

******* [DELETE FOLLOWING SECTION IF NOT REQUIRED] *******
******* [TRAFFIC SURFACING IS NOT SUITABLE FOR FLASHINGS] *******

3.11 TRAFFIC SURFACING

A. Mixing of Kemperdur AC Traffic Coating

1. Mix Component A (light brown formulation) and Component B (white formulation) in a separate clean mixing bucket with a spiral Kemperol agitator for 15-20 seconds, until the liquid is a uniform beige color.
2. Gradually add Component C (white graded fillers) to the liquid while mixing continues for an additional 30-40 seconds until a smooth, lump free mix is produced.
3. Mix only that amount of surfacing that can be used in 10 minutes. Do not exceed mixing times.

B. Application of Surfacing and Aggregate

1. Empty mixing bucket of all Kemperdur AC mix onto the prepared surface and spread with a ¼" x ¼" x ¼" notched metal trowel at the manufacturer's specified coverage rate.
2. Allow the surfacing mix to self-level and reach an initial set for 5 minutes until material will retain a peak after being touched by a finger.
3. Broadcast aggregate to excess into surfacing until a uniform dry aggregate layer has been achieved. Aggregate will initially sink into surfacing, requiring the application of additional aggregate.
4. Allow the aggregate-filled surfacing to cure for approximately 2 hours, then remove excess aggregate by brooming and vacuuming.

C. Sealing

1. Apply Kemperdur AC Finish sealer at the manufacturer's specified coverage rate to provide a sealed, maintainable surface finish.
2. After completion of mineral aggregate surfacing, avoid any traffic for a minimum of three (3) hours.

3.12 TEMPORARY CLOSURES & WATERSTOPS

- A. Contractor shall be responsible to ensure that moisture does not damage any completed section of the new waterproofing system. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition. All temporary closures shall be made as recommended or required by the membrane manufacturer.

3.13 PROTECTION

- A. Upon completion of waterproofing and flashings (including all associated work), institute appropriate procedures for surveillance and protection of roofing during remainder of construction period. Protect all areas where membrane has been installed.

3.14 FLOOD TEST

- A. A flood test of the completed membrane and flashing system shall be conducted prior to the installation of any overburden/surfacing. The flood test shall be of a 24 hr. minimum duration, and shall apply a water head of 2" over the entire application area. Any incidents of water entry shall be evaluated and all necessary repairs conducted, followed by an additional flood test.

******[DELETE FOLLOWING SECTION IF NOT REQUIRED]******

3.15 DRAINAGE/ PROTECTION MAT INSTALLATION

- A. Place the drainage mat fabric side up on top of the finished waterproofing membrane. Secure the drainage mat in place by placing temporary ballast on top of the drainage mat.
- B. Connect adjacent panels at the longitudinal edge by pulling the filter fabric back to expose the flange. Butt one panel edge to the edge of the adjacent panel. Panel ends are to be butted in the same manner. Tape the fabric overlaps, and seal the butt joints with tape as well. Overlap fabric in the direction of water flow. Cover all terminal edges with the filter fabric flap by tucking the fabric behind the core.
- C. The drainage mat should be channeled into an internal drain or perimeter drain system. Create openings in the drainage core to correspond with all discharge holes in the drain at the structural deck level. Fabric must be left intact at these holes to prevent intrusion of soil, grout, sand, or concrete into the drainage core.
- D. At roof penetrations, cut the drainage core around the protrusion, cut an X in the fabric, and tape the fabric around the protrusion to prevent intrusion of overburden materials into the core.

******[DELETE FOLLOWING SECTION IF NOT REQUIRED]******

3.16 WATER RETENTION/ PROTECTION MAT INSTALLATION

- A. Place the drainage mat fabric side up on top of the finished waterproofing membrane. Secure the drainage mat in place by placing temporary ballast on top of the drainage mat. Dimple openings must be facing up.
- B. Connect adjacent panels at the longitudinal edge by pulling the filter fabric back to expose the flange. Butt one panel edge to the edge of the adjacent panel. Panel ends are to be butted in the same manner. Tape the fabric overlaps, and seal the butt joints with tape as well. Overlap fabric in the direction of water flow. Cover all terminal edges with the filter fabric flap by tucking the fabric behind the core.
- C. The water retention mat should be channeled into an internal drain or perimeter drain system. Create openings in the drainage core to correspond with all discharge holes in the drain at the structural deck level. Fabric must be left intact at these holes to prevent intrusion of soil, grout, sand, or concrete into the drainage core.
- D. At roof penetrations, cut the drainage core around the protrusion, cut an X in the fabric, and tape the fabric around the protrusion to prevent intrusion of overburden materials into the core.

******[DELETE FOLLOWING SECTION IF NOT REQUIRED]******

3.17 EXTRUDED POLYSTYRENE INSULATION INSTALLATION

- A. General: Insulation shall be installed in accordance with the insulation manufacturer's current published specifications and recommendations for use in an above-membrane application.
- B. Install Insulation: Install only as much insulation as can be covered with overburden or otherwise secured in place before the end of the day's work or before the onset of inclement weather.
- C. Fit Insulation: Neatly fit insulation to all penetrations and projections. Insulation shall be loosely butted, with gaps not greater than 1/4".

****** [DELETE FOLLOWING SECTION IF NOT REQUIRED] ******

3.18 FILTER FABRIC INSTALLATION

- A. Roll out filter fabric over the extruded polystyrene insulation, avoiding wrinkles. Overlap all side and end laps by 12”.
- B. Cut filter fabric neatly around all penetrations and projections.

******* [EXPAND OR DELETE SPECIFIC OVERBURDEN SECTION AS REQUIRED] *******

3.19 SOLID OVERBURDEN APPLICATION

- A. General: Pavers, tiles, stone ballast, or wood decking shall be installed in accordance with the overburden manufacturer’s current published specifications and recommendations for use in an above-membrane plaza application.
- B. Install Overburden: Install overburden neatly, level and even. Cracked, broken or otherwise damaged overburden materials must be removed and discarded. Fit overburden neatly around all penetrations and projections, and at the perimeter. Ensure that overburden is properly supported to provide even weight distribution to underlying assembly.

******* [EXPAND OR DELETE SPECIFIC OVERBURDEN SECTION AS REQUIRED] *******

3.20 VEGETATIVE OVERBURDEN APPLICATION

- A. General: Irrigation systems, dirt or other growing media, and plantings shall be installed in accordance with the irrigation system manufacturer’s current published specifications and recommendations for use in an above-membrane garden application.
- B. Install Overburden: Install overburden neatly, level and even. Dead, broken or otherwise damaged overburden materials must be removed and discarded. Fit overburden neatly around all penetrations and projections, and at the perimeter. Protect plantings from damage and provide with sufficient water until entire installation is complete.

3.21 CLOSEOUT

- A. Correction of Work:
 - 1. Work that does not conform to specified requirements including tolerances, slopes, and finishes shall be corrected and/or replaced. Any deficiencies of membrane application, termination and/or protection as noted during the Membrane Manufacturer’s inspections shall be corrected and/or replaced at Contractor’s expense.
- B. Clean-Up:
 - 1. Site clean-up, including both interior and exterior building areas that have been affected by construction, shall be restored to preconstruction condition.

END OF SECTION

Application Procedures

KEMPEROL® BR/BRM/V210/V210M SYSTEM APPLICATION PROCEDURES

Design Evaluation

Review project specification to ensure conformance with Kemper System America, Inc. (KSA) requirements. Notify design professional and Kemper System America, Inc. technical department of any discrepancies prior to the performance of any work.

Evaluate site and building conditions. It is recommended that test cuts and test cores be performed to determine the layer-by-layer composition of the substrate assembly that the KSA materials will be applied over. Excessive moisture within the substrate assembly, including the presence of an entrapped waterproofing membrane in a split slab condition or a thin slab over cinder fill, is likely to result in blistering of the KSA materials, particularly in hot weather. This can be alleviated by primer application in the late afternoon, with two applications of primer required in a limited number of instances.

The performance of a mock-up application is recommended if there is a question regarding substrate assembly moisture, or regarding adhesion to uncommon substrate surfaces. This will help ensure the best possible application method.

Material Storage

All KSA components will be delivered to the site in original sealed containers/packaging. Define a storage area for all components that is cool, dry, out of direct sunlight, and in accordance with recommendations of KSA and relevant regulatory agencies. Roll goods must be stored horizontally on platforms sufficiently elevated to prevent contact with water and other contaminants. DO NOT use rolls with damaged ends. Store solvent-bearing solutions, resins, additives, inhibitors and adhesives in accordance with the MSDS and/or local fire and regulatory authorities. Materials should not be stored in quantities that will exceed design loads, damage substrate materials, hinder installation or drainage.

Optimum storage of materials is between 65 and 70 °F (18–21 °C) in a controlled environment to facilitate mixing and fleece saturation. DO NOT store materials outside in cold weather, as the cooled materials will be difficult to mix and apply due to their thick consistency. DO NOT store materials outside in hot weather, as the heated materials will react too quickly and reduce working times significantly.

Work Place Safety

Provide and maintain positive ventilation and protection to workers for concealed and/or interior application or applications lacking sufficient natural air movements. Protect air intake path(s) of the building to prevent odor infiltration to the building interior. Coordinate protective measures with the Owner or his designated Representative.

Comply with requirements of OSHA, NIOSH or governing local authority for work place safety. When required, provide barricades, retaining ropes, safety elements (active/passive) and any appropriate signage required by OSHA, NIOSH, and NSC and/or the Owner or his designated Representative. Contractor must be familiar with and observe OSHA Regulations CFR 1926/1910 (current issue) for use and handling of polyester resins, catalysts (organic peroxide).

NOTE: Copies of all current MSDS for all components must be kept on site. Provide all crewmembers with appropriate safety data information and training as is related to the specific chemical compound he or she may be expected to deal with. Each crewmember shall be fully aware of first-aid measures to be undertaken in case of accidents.

Environmental Requirements

Application of Kemper System materials may proceed while air temperature is between 35 and 105 °F (2–41 °C) providing the substrate is a minimum of 5 degrees above the dew point. Consult with KSA outside of this temperature range. Do not commence with the application of any KSA material during or with the threat of inclement weather and ensure that substrate materials are dry and free of contaminants.

Application of Kempertec primer and Kemperdur surfacing materials in temperatures between 35 and 40°F is possible but not recommended due to extended curing times and, in the case of mineral-filled surfacing, poor self-leveling properties. Storage of materials in a warm location until application will help accelerate cure somewhat, as will the use of cold weather additives.

Application of Kemper materials in temperatures below 35°F is discouraged due to the potential for primer application to a frozen or frosted deck, and for materials to be applied to a damp surface that is below the dew point. Such applications must proceed with caution.

Application of Kemper materials in temperatures above 85°F is possible but not recommended due to the potential for blistering from substrate vapor drive and reduced working times. Storage of materials in a cool location until application will retard cure somewhat, as will the use of hot weather additives, and application of materials in the late afternoon can alleviate the potential for blistering related to vapor drive.

NOTE: Interior applications are not recommended due to odor and curing considerations.

Protection

Protect building adequately (with tarp or other suitable material) from soil, stains, or spills at all hoisting points and areas of application. Provide protection for Contractor personnel and occupants of the structure and surrounding buildings as required complying with requirements of OSHA, NIOSH and/or governing local authority.

Odor Control

Where required by the Owner or his designated Representative, implement odor control and elimination measures before and during the application of the roofing/waterproofing materials. Control/elimination measures must be field tested at off-hours and typically consists of one (1) or multiple of the following measures:

1. Sealing of air intakes with activated carbon filters, and at joints against building exterior walls to prevent leakage of unfiltered air into occupied spaces.
2. Sealing of doorways, windows, and skylights with duct tape and polyethylene sheeting to prevent leakage of air into the building.
3. Erection and use of moveable enclosure(s) sized to accommodate work area(s) and stationary enclosure for resin mixing station equipped with mechanical air intake/exhaust openings, odor control air cleaners, and activated carbon filter at exhaust openings as required to clean enclosed air volume and to prevent odor migration outside the enclosure. Placement of odor elimination stations inside and outside of the enclosure(s) as required.

System Application

The Kemper System is a four-step application:

1. Preparation and cleaning of the substrate;
2. Application of primer suitable for substrate;
3. Application of the membrane;
4. Application of surfacing.

Immediately before the application of any component of the system, the substrate shall be dry, with any remaining dust or loose particles removed using clean, dry, oil-free compressed air, industrial vacuum, cloth-wipe or a combination.

NOTE: Before opening the containers of any Kemperol material, protect hands and wrists with gauntlet-style neoprene gloves, and wear OSHA-approved eye protection. Use respiratory equipment if recommended by MSDS sheet for specific Kemperol material being applied.

System Assemblies

Kemper System materials are often installed in roofing and waterproofing assemblies that utilize additional materials not discussed in this Application Guide, including: asphaltic base and cap sheets; polyisocyanurate and extruded polyurethane foam insulation; high density polyisocyanurate foam and cementitious cover boards; drainage mats; water retention mats; concrete pavers; vegetated-type overburden. Please refer to individual Kemper System guide specifications for application information regarding the incorporation of these materials into a Kemper System assembly.

Substrate Preparation

Concrete

New concrete shall have cured a minimum of 28 days in accordance with ACI-308, or as approved by the KSA Technical Department. New or existing concrete shall be free of oil, grease, curing compounds, loose particles, moss, algae growth, laitance, friable matter, dirt, bituminous products and previous waterproofing materials. New or existing concrete shall be dry with a maximum moisture content of five (5) percent. Where required, concrete shall be abrasively cleaned in accordance with ASTM D4259 to provide a sound substrate free from laitance. Achieve an open concrete surface in accordance with ICRI surface profiles CSP 3-5. When using mechanical methods to remove existing waterproofing products or surface deterioration, the surface profile is not to exceed ¼ inch (peak to valley). The substrate shall be sound and all spalls, voids and blow holes on vertical or horizontal surfaces must be repaired prior to placement of the primer coat. Areas of minor surface deterioration of 0.25" (6 mm) or greater in depth shall be repaired to prevent possible ponding of the system, leading

to excessive usage of primer and resin. For concrete materials with a compressive strength of less than 3,000 psi contact the KSA Technical Department for substrate preparation requirements. Hollow-core panels, T-panels, and Twin-T panels shall have grouted joints between panels and shall be provided with mechanical securement from panel to panel.

Masonry

Walls shall be built with hard kiln dried brick or waterproof concrete block construction. Areas of soft or scaling brick or concrete, recessed or faulty mortar joints, or walls with broken, damaged or leaking coping shall be repaired prior to placement of the primer coat. Repair in a manner previously described for structural concrete repair. Walls shall be dry with a maximum moisture content of five (5) percent.

Steel/Metal

Clean and prepare metal surfaces to near white metal in accordance with SSPC - SP3 (power tool clean) or as required by membrane manufacturer. Extend preparation a minimum of three (3) inches beyond the termination of the membrane flashing materials. Notch steel surfaces to provide a rust-stop. In addition to cleaning, all metal surfaces shall be abraded to provide a rough open surface. A WIRE BRUSH FINISH IS NOT ACCEPTABLE. Wipe prepared metal surface with MEK or other acceptable solvent cleaner prior to application of primer.

Wood/Plywood

Plywood shall be identified with American Plywood Association (APA) grade trademarks and shall meet the requirements of product standard PS1. Strip plywood joints with four inch (4") wide strip of Kemperol® membrane. Cover knot holes or cracks with strips of Kemperol® membrane.

Existing Asphaltic Bituminous Waterproofing

Existing flashings shall be removed down to the structural substrate/penetration at all flashing areas. Damaged/saturated areas of existing roofing membrane and underlying assembly shall be removed and replaced, or repaired in kind. Smooth-surfaced membrane with applied coating shall have all loose coating removed, and an adhesion test performed by KSA technical representative to confirm acceptable adhesion. Granule-surfaced membrane shall have all loose granules removed from the surface by vacuuming and power brooming. Gravel-surfaced membrane shall have all loose gravel removed and the roof surface thoroughly cleaned with all ridges and high points removed. A layer of coated glass-faced polyisocyanurate foam insulation (R=6 min.) shall be adhered in urethane foam roof adhesive over the roof surface, or mechanically attached through the existing roof assembly into the structural deck.

Existing Coal Tar Pitch Bituminous Waterproofing

Existing flashings shall be removed down to the structural substrate/penetration at all flashing areas. Damaged/saturated areas of existing roofing membrane and underlying assembly shall be removed and replaced, or repaired in kind. Gravel-surfaced membrane shall have all loose gravel removed and the roof surface thoroughly cleaned with all ridges and high points removed. A layer of coated glass-faced polyisocyanurate foam insulation (R=20 min. or greater as required to prevent the pitch from reaching 85°F) shall be adhered in urethane foam roof adhesive over the roof surface.

Existing Polymeric Single Ply Waterproofing

Existing flashings shall be removed down to the structural substrate/penetration at all flashing areas. Damaged/saturated areas of existing roofing membrane and underlying assembly shall be removed and replaced, or repaired in kind. A layer of coated glass-faced polyisocyanurate foam insulation (R=6 min.) shall be adhered in urethane foam roof adhesive over the roof surface, or mechanically attached through the existing roof assembly into the structural deck.

Other Substrate Surfaces

Contact the KSA Technical Department for acceptance and preparation of other substrate surfaces.

Substrate Leveling, Patching, and Repairing

Kempertec primer/sand mix are the preferred materials for all substrate leveling, crack and wall/deck repair and patching. Kempertec primer/sand mix is not intended to be used as a structural repair material.

Commercially-available cementitious repair mortars can also be used to make surface repairs to concrete, masonry, stone, and terra cotta substrate surfaces. Commercially-available single-component, gun-grade polyurethane sealant can be used to fill and seal defects in wood and metal substrate surfaces. Gaps between materials are typically filled by the use of compressible backer rod, followed by application of polyurethane sealant.

A sound and even substrate surface shall be provided for all KSA material applications. Kemper System materials are not intended to span unsupported gaps and voids.

Primer/Sand Options

Kempertec EP or D primer/sand patching mix allows patching to be conducted as part of the priming operation. Kemperol membrane may be applied following an 8-12 hour curing period. EP Primer is recommended for repairs to concrete and masonry surfaces; D Primer is recommended for repairs to metal and wood surfaces. In addition, recommended for creating slope to drain to address localized drainage deficiencies.

Kempertec EP5 or R quick-dry primer/sand patching mix allows patching to be conducted as part of the priming operation. Kemperol membrane may be applied following a 3-4 hour curing period. EP5 Primer is recommended for repairs to concrete and masonry surfaces; R Primer is recommended for repairs to metal and wood surfaces. Recommended for vertical repairs due to fast-set time. In addition, recommended for creating slope to drain to address localized drainage deficiencies.

Sand Aggregate Specification and Size

All sand must be washed; kiln-dried and dust-free suitable for troweling, broadcast or pourable self-leveling, round grain or angular sized as follows:

For voids less than 1" in depth: #00 sand (0.3 – 0.6 mm)

For voids 1" to 2" in depth: #0 sand (0.5 – 1.2 mm)

Silica sand must be kept absolutely dry during storage and handling.

Substrate Leveling, Sloping and Patching

Substrate conditions are to be evaluated by the Contractor, the Owner, or his designated Representative, and KSA.

Note: Any surface to be leveled or patched with primer/sand must first be primed with an appropriate Kemperol primer.

The ratio of primer to sand can be varied to create a mixture that provides the proper consistency for the intended application.

The leveling mixture typically consists of a slurry of primer and approved kiln-dried silica sand in a 1:2 primer to sand ratio *by volume*. Spread and plane this compound with a squeegee and trowel to achieve a flat surface.

The patching mixture typically consists of a mortar of primer and approved kiln-dried sand in a 1:4 primer to sand ratio *by volume*. Fill cavities with this compound with a trowel to achieve a flat surface.

The sloping mixture typically consists of a mortar of primer and approved kiln-dried sand in a 1:3/1:3.5 resin to sand ratio *by volume*. Create required slope (maximum 2" thickness in maximum 1" lifts) with a trowel to achieve an even surface.

Preparation of Joints and Cracks

Joints, cracks, and fractures in the structural deck shall be prepared as defined below before installation of waterproofing membrane. Note: Joints, cracks, and fractures may telegraph through the waterproofing membrane.

Non-Moving Cracks

Determine that crack is non-moving. Clean out crack by brushing and oil-free compressed air. Fill crack with Kempertec resin/sand mix, primer/sand mix, or polyurethane sealant. Allow for a minimum of twelve (12) hours cure or as required by Sealant Manufacturer.

Moving Cracks

Determine that crack is moving. Clean out crack by brushing and oil-free compressed air. Fill crack with resin/sand mix, primer/sand mix, or polyurethane sealant. Allow for a minimum of twelve (12) hours cure or as required by Sealant Manufacturer. Apply resin and 4-inch (10 cm) wide strip of membrane (resin and fleece) over crack in strict accordance with KSA's written instructions.

Final Substrate Inspection

All surfaces must be free from gross irregularities, loose, unsound or foreign material such as dirt, ice, snow, water, grease, oil, release agents, lacquers, or any other condition that would be detrimental to adhesion of the primer and substrate. This requires careful preparation of existing horizontal and vertical substrates; cracks are filled, expansion joints are prepared, flashings are removed or modified, and termination points are determined. Substrates and penetrations are prepared to rigorous industry standards, and may require scarifying, sandblasting or grinding in some cases to achieve a suitable substrate.

The Contractor should perform random tests to determine tensile bond strength of membrane to substrate at the job site using an Elcometer Adhesion Tester Model 106 or similar device, or by the performance of a manual pull test. Contractor shall perform tests on completely cured membrane at the beginning of the Work, and at intervals as required assuring specified adhesion with a minimum of three (3) tests per 5000 ft² (464.5 m²).

KSA requires a tested tensile bond strength of membrane to substrate greater than or equal to 220 psi (1.5 N/mm²). Alternatively, a manual 135° peel bond strength of membrane to substrate must confirm that cohesive failure of substrate or membrane occurs before adhesive failure of primer/substrate interface.

This can be achieved through correct and proper surface preparation. Before priming of the surfaces, inspect and check the prepared substrate.

**Kempertec
Primer
Selection,
Mixing and
Application**

In the event the bond strengths are lower than the minimum specified and cohesive failure of the substrate is not the mode of failure, additional substrate preparation is required. Repeat testing to verify suitability of substrate preparation. Contractor shall immediately notify the KSA in the event tensile bond test results are below specified values.

Selection of Primer

Refer to the Primer Selection Table to select the appropriate primer for the intended substrate.

Mixing of Standard D and EP Primers

Step 1: Premix resin Component A thoroughly with a spiral agitator or stir stick.

Step 2: Pour resin Component B into Component A and mix the components for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks. DO NOT AERATE. DO NOT THIN PRIMER. The Resin solution should be a uniform color, with no light or dark streaks present.

NOTE: Mix only that amount of resin components A & B that can be used in 20-30 minutes. DO NOT break down workpacks into smaller quantities – mix the entire workpack.

Mixing of Standard D and EP Primer Sachets

Step 1: Remove bag from the aluminum packaging. Knead cream-colored resin Component A thoroughly until a uniform color is achieved.

Step 2: Pull away the rubber cord separating the two components so that Components A and B can be mixed together. Knead the bag quickly and thoroughly for approximately 1 minute so that a homogenous primer is formed. The primer should be a uniform color, with no light or dark streaks present.

NOTE: Mix only that amount of sachets that can be used in 15-20 minutes.

Mixing of Quick Dry EP5 Primer

Step 1: Premix resin Component A thoroughly with a spiral agitator or stir stick.

Step 2: Pour resin Component B into Component A and mix the components for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks. DO NOT AERATE. DO NOT THIN PRIMER. The Resin solution should be a uniform color, with no light or dark streaks present.

NOTE: Mix only that amount of resin components A & B that can be used in 15-20 minutes. DO NOT break down workpacks into smaller quantities – mix the entire workpack.

Mixing of Quick-Dry R Primer Sachet

Step 1: Remove bag from the aluminum packaging. Knead cream-colored resin Component A thoroughly until a uniform color is achieved.

Step 2: Pull away the rubber cord separating the two components so that Components A and B can be mixed together. Knead the bag quickly and thoroughly for approximately 1 minute so that a homogenous primer is formed. The primer should be a uniform color, with no light or dark streaks present.

NOTE: Kemperol R primer is extremely fast curing. Excessive mixing time reduces the available working time for the primer. Apply primer within 5 minutes.

Mixing of BSF-R Primer

Step 1: Premix resin with a clean spiral agitator or stir stick until a uniform consistency is obtained. DO NOT AERATE. DO NOT THIN PRIMER.

NOTE: Premix only that amount of resin that can be used in 1 hour to prevent development of skin on top of resin.

Mixing of Quick-Dry AC Primer

Step 1: Premix primer Component A thoroughly with a clean spiral agitator or stir stick.

Step 2: Determine the correct amount of catalyst Component B based upon ambient temperature in accordance with written instructions of KSA.

For 5 kg primer workpacks, the following catalyst quantities are recommended:

- 35 -50°: Two (2) 100g bags of catalyst Component B;
- 50 -70°: One and One-Half (1-1/2) 100g bags of catalyst Component B;
- 70 -85°: One (1) 100g bag of catalyst Component B;
- > 85°: One-Half (1/2) 100g bag of catalyst Component B;

Step 3: Add primer catalyst Component B into Component A and mix the components for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks. DO NOT AERATE. DO NOT THIN PRIMER. The Primer solution should be a uniform color, with no light or dark streaks present.

NOTE: Mix only that amount of primer components A & B that can be used in 15 minutes. DO NOT break down workpacks into smaller quantities – mix the entire workpack.

Primer Application

Determine required primer coverage for each substrate material/condition and apply in strict accordance with written instructions of KSA.

After the Primer resin is mixed, apply approximately 0.7 – 1.4 gallons (2.65-5.30L) per 100 square feet (9 m²). The higher application rate is primarily for EP, EP5, and AC primers applied to concrete and masonry substrates that require additional primer to achieve pore saturation. The primer should be rolled or brushed evenly onto the surface to fully saturate the substrate in one application.

For EP and EP5 Primer applications only, broadcast #0 (0.5-1.2 mm) kiln-dried sand at the rate of 50 lbs. per 100 SF into the wet primer to enhance membrane/primer bond. Remove excess sand after primer has fully cured prior to membrane application.

Curing time is approximately 8-12 hours for standard D and EP primers, approximately 3-4 hours for quick-dry R and EP5 primers, approximately 4-5 hours for BSF-R primer, and approximately 1 hour for quick-dry AC primer. Kemperol membrane may be applied when the primer is completely dry and without tack. Do not apply Kemperol membrane to tacky or wet primer.

NOTE: Exposure of primer in excess of eight (8) days or premature exposure to moisture may require removal and application of new primer. Primer application past the Kemperol membrane terminations requires surfacing with an approved material.

Temporary Waterproofing: For waterproofing operations requiring removal of the existing waterproof membrane system, application of the primer may be used as temporary waterproofing of solid, continuous substrates such as concrete prior to application of the Kemperol membrane and specified overburden/surfacing. Multiple applications and surfacing with broadcast of kiln-dried silica sand may be required. Observe application and exposure limitation of primer. TEMPORARY WATERPROOFING SHALL NOT BE APPLIED TO EXPOSED INSULATION AND COVER BOARD MATERIALS.

Mixing of BR/V210 Three-Component Resin

Step 1: Mix resin Component A (black formulation) with a spiral Kemperol agitator, until the liquid is a uniform black color.

Step 2: Add the Catalyst Powder to resin Component A and mix with the same agitator for 5 minutes or until the powder is completely mixed. The dissolving time is 20 minutes to 2 hours, depending on the ambient temperature. The catalyst is completely dissolved when there are no white specks remaining.

Step 3: Mix resin Component B (white formulation) with a separate spiral agitator until the color is a uniform white. If the ambient temperature is below 50 °F (10 °C) or above 75 °F (23.9 °C), then a weather related additive should be combined and mixed into the Component B.

Kemperol UP-A Cold Activator should be added to resin Component B when the ambient temperature is below 50 °F (10 °C). The activator should be mixed with the spiral agitator for 5 minutes or until both liquids are thoroughly blended.

Kemperol Inhibitor should be added to resin Component B when the temperature exceeds 75 °F (23.9 °C). The inhibitor should be mixed with the spiral agitator for 5 minutes or until both liquids are thoroughly blended.

Step 4: Pour resin Component A and Component B into a third clean bucket at a 1:1 ratio (equal parts) and thoroughly mix the components with a clean spiral agitator. The Resin solution should be a uniform color, with no light or dark streaks present.

NOTE: Mix only that amount of resin components A & B that can be used in 15 - 20 minutes.

Mixing of BRM/V210M Two-Component Resin

Step 1: Mix resin with a spiral Kemperol agitator until the liquid is a uniform color, with no light or dark streaks present.

Step 2: If the ambient temperature is below 50 °F (10 °C) or above 75 °F (23.9 °C), then a weather related additive should be combined and mixed into the liquid resin.

Kemperol UP-A Cold Activator should be added to the liquid resin when the ambient temperature is below 50 °F (10 °C). The activator should be mixed with the spiral agitator for 5 minutes or until both liquids are thoroughly blended.

Kemperol Inhibitor should be added to the liquid resin when the temperature exceeds 75 °F (23.9 °C). The inhibitor should be mixed with the spiral agitator for 5 minutes or until both liquids are thoroughly blended.

Step 3: Add the Catalyst Powder to the mixed liquid resin and mix with the same agitator for 5 minutes or until the powder is completely mixed. It is not necessary to wait for the catalyst powder to dissolve before using the resin.

NOTE: Mix only that amount of resin that can be used in 15 - 20 minutes. DO NOT break down workpacks into smaller quantities – mix the entire workpack.

Resin/Fleece Application

Step 1: After the Resin is mixed, apply approximately 4.5 gallons (16.9L) per 100 square feet (9 m²). The Resin should be rolled or brushed evenly onto the surface. Apply liberally to the prepared surface with a roller or brush using a broad, even stroke. Cover one working area at a time, between 15 - 20 sq. ft.

Step 2: Then roll the Kemperol Fleece directly into the Resin, making sure the SMOOTH SIDE IS FACING UP (natural unrolling procedure), avoiding any folds and wrinkles. Use a medium nap roller or brush to work the resin into the fleece, saturating from the bottom up. The appearance of the fleece should be light opaque amber with no white spots. White spots are indications of unsaturated fleece or lack of adhesion. It is important to correct these faults before the resin cures.

Step 3: Apply approximately 2 gallons (7.5L) per 100 square feet (9 m²) additional liquid resin mix on top of fleece until fully saturated and continue to work resin. The topcoat layer of Resin should finish the saturation of the fleece. Roll this final coating into the fleece, which will result in a glossy appearance. The fleece can only hold so much resin and all excess should be rolled forward to the unsaturated fleece. Any excess resin left on the top of the fleece will weather and peel off. The correct amount of Resin will completely saturate the Fleece and no white color will be visible.

NOTE: Prevent contact between mixed/unmixed resin, new membrane or old (remaining) membrane. IF ANY UNMIXED RESIN contacts membrane surface remove immediately and clean thoroughly with a cloth rag.

Tool Use and Care

Brushes and rollers will remain supple and usable if they are kept moving in liquid resin. If allowed to sit, they will harden quickly as resin begins to cure. Rollers must be discarded once they stiffen. Brushes may be discarded or cleaned with MEK or acetone-based solvent. Roller handles can also be cleaned with MEK or acetone-based solvent. If solvent is used, the tool must air dry for twenty-four (24) hours before being reused for mixing and/or application. To minimize cleaning, wipe handle with clean, dry cloth every fifteen (15) to twenty (20) minutes and schedule work to avoid stopping.

Laps, Seams and Tie-offs

At all fleece seams, allow a 2" (5 cm) overlap for all side joints and a 4" (10 cm) overlap for all end joints. At membrane tie-offs, clean in-place membrane with MEK when resin has cured. Allow solvents to fully evaporate before application of new resin. DO NOT PRIME EXISTING KEMPEROL MEMBRANE.

Flashings

Install membrane flashings in accordance with the requirements/recommendations of KSA and as depicted on standard drawings and details. Provide system with base flashing, edge flashing, penetration flashing, counter flashing, and all other flashings required for a complete watertight system. Work wet membrane to avoid any blisters, openings, or lifting at corners, junctions, and transitions. Assure full resin saturation of fleece.

Curing and Staging

Polyester resins cure most quickly and completely when exposed to UV light. For nighttime or concealed applications where exposure to natural light cannot be obtained, exposure to a UV light source or a supplemental source of hot air blown over the membrane surface will improve membrane cure.

Once the Kemperol membrane is in place, a minimum of one hour exposure at a distance of 24 inches (from the surface of the membrane to the face of the protective grill) using a UV source that casts a minimum of 6.5% UV-B is recommended.

Protect all areas where membrane has been installed. Do not work off installed membrane during application of remaining work before forty-eight (48) hours of curing. Movement of materials and equipment across installed membrane is not acceptable. If movement is necessary, provide complete protection of affected areas.

Protect finished membrane from damage by other trades by the use of a cushioning layer such as 1" thick expanded polystyrene insulation and an impact layer such as ½" thick exterior-grade plywood.

General

Wherever possible, install the flashings before installing the field membrane to minimize foot traffic over newly installed field membrane.

All membrane flashings shall be installed concurrently with the waterproofing membrane as the job progresses. Temporary flashings are not allowed without prior written approval from the Membrane manufacturer. Should any water penetrate the new waterproofing membrane because of incomplete flashings, the affected area shall be removed and replaced at the contractor's expense.

Provide a minimum vertical height of 8" for all flashing terminations. Flashing height shall be at least as high as the potential water level that could be reached as a result of a deluging rain and/or poor slope. Do not flash over existing through-wall flashings, weep holes and overflow scuppers.

Metal Flashing – General

Metal flashings shall be fabricated in accordance with the current recommendations of SMACNA and in accordance with standard drawings and project details.

Metal flashing flanges to which membrane is to be bonded shall be a minimum of four (4) inches in width, and secured to the structural deck, or to treated wood nailers secured to the structural deck, six (6) inches on center staggered with fasteners appropriate to the substrate type. The flanges shall be provided with a roughened surface that has been cleaned of all oil and other residue.

Metal edges that will be overlaid with membrane shall be provided with a 1/4" min. hemmed edge.

Apply primer, resin and fleece to metal flange, extending membrane to outside face of metal edging, and to vertical face of metal base/curb flashing.

Membrane Flashing – General

Membrane flashings shall be fabricated with primer appropriate for the substrate surface, resin of the same base chemical type as the field membrane, and fleece of the same weight as the field membrane unless specified otherwise.

Primer, resin, and fleece mixing and application methods as specified for field membranes are also suitable for membrane flashing.

Fleece shall overlap 2" (5 cm) minimum for all joints. Fleece shall be cut neatly to fit all flashing conditions without a buildup of multiple fleece layers. Work wet membrane with a brush or roller to eliminate blisters, openings, or lifting at corners, junctions, and transitions.

Pipes, Conduits, and Unusually Shaped Penetrations

Flashing is typically constructed as a two part assembly consisting of a vertical wrap and a horizontal target patch. There must be a minimum of a two (2) inch (5 cm) overlap between vertical and horizontal flashing components.

Drains and Scuppers

Acceptable drain and scupper materials are cast iron, cast aluminum, and copper.

Connect new drains and scuppers to existing storm sewer system.

Alternatively, replace all broken or damaged parts of existing drains and scuppers.

Flashing material shall extend four (4) inches minimum onto drain or scupper flange and into drain/scupper body.

Install clamping ring if provided as part of the drain or scupper design. Install a strainer basket to prevent debris from clogging the drainage line.

Hot Stacks

Protect the membrane components from direct contact with steam or heat sources when the in-service temperature exceeds 170 degrees F. In all such cases flash to an intermediate "cool" sleeve.

Fabricate "cool" sleeve in the form of a flanged metal cone using galvanized metal, mechanically attached to the structure or wood nailers.

Flashing is typically constructed as a two part assembly consisting of a vertical wrap and a horizontal target patch. There must be a minimum of a two (2) inch (5 cm) overlap between vertical and horizontal flashing components.

Flexible Penetrations

Provide a weathertight gooseneck of round cross-section for each penetration or group of penetrations. Set in water cut-off mastic and secure to the structural substrate.

Acceptable gooseneck material is copper, of a sheet weight appropriate for the application.

Flashing is typically constructed as a two part assembly consisting of a vertical wrap and a horizontal target patch. There must be a minimum of a two (2) inch (5 cm) overlap between vertical and horizontal flashing components.

Walls, Curbs and Base Flashings

Wall, curb and base flashings shall be installed to solid substrate surfaces only. Adhering to gypsum-based panels, cementitious stucco, synthetic stucco, wood or metal siding, and other similar materials is not acceptable.

Reinforce all transition locations and other potential wear areas with a four (4) inch wide membrane strip evenly positioned over the transition prior to installing the exposed flashing layer.

Reinforce all inside and outside corners with a four (4) inch diameter conical piece of membrane prior to installing the exposed flashing layer.

All pins, dowels and other fixation elements shall be flashed separately with a vertical flashing component prior to installing the exposed flashing layer.

Extend flashing a minimum of four (4) inches onto the field substrate surface.

Drip Edges and Gravel Stops

Metal drip edges and gravel stops shall be installed to solid substrate surfaces or treated wood nailers only. Securement to gypsum-based panels, cementitious stucco, synthetic stucco, wood or metal siding or coping, and other similar materials is not acceptable.

Flash all drip edges and gravel stops by extending the field membrane all the way to the edge of the exposed face prior to installing the metal edging. Strip in the metal flange with a separate 8 inch wide strip of membrane adhered to both the securement flange and to the field membrane.

For conditions where water infiltration behind the exposed drip edge or gravel stop face is possible, install a separate membrane bottom layer positioned behind the face area and extending a minimum of four (4) inches past the securement flange onto the field substrate prior to installing the drip edge or gravel stop.

Field Fabricated Control or Expansion Joint Flashing

Control or expansion joints in excess of two (2) inches in width and all joints subjected to vehicular traffic require the use of a separate engineered joint system.

Grind or otherwise bevel the inside edges of the joint opening to provide a smooth transition edge for the fleece.

Flashing typically consists of a fully saturated membrane bottom layer looped into the joint as a cradle, a compressible foam or rubber insert at 25% compression fitted into the joint, and a membrane top layer applied over the joint. Extend both fleece layers four (4) inches minimum onto the field substrate on both sides of the joint.

Apply the field membrane over the entire joint area.

For insulated assemblies, wood nailers of a thickness to match the insulation/cover board must be installed on either side of an expansion joint.

Electrical Conduit, Gas Lines and Lightning Protection

Supports for electrical conduit and gas lines greater than one (1) inch in diameter require the use of a separate engineered support system.

Supports for electrical conduit and gas lines one (1) inch or less in diameter, and bases for lightning protection rods and cable, can be adhered directly to the membrane surface with a single-component, high quality polyurethane sealant.

Approved urethane, acrylic, and polymethyl methacrylate coatings and sealers, kiln-dried silica sand, or ceramic granule surfacing may be applied to Kemperol membranes to achieve various performance and/or aesthetic purposes.

Polyester-based membrane resins develop a waxy paraffin film on the membrane surface. DO NOT apply coatings and sealers directly to this sticky surface. Membrane exposed less than 48 hours prior to application of surfacing and coating materials SHOULD NOT be coated. Membrane exposed longer than 48 hours will require surface preparation. The membrane surface must not evidence the paraffin film curing byproduct in order to achieve the desired bond of the surfacing or coating to the membrane. Removal of any remaining paraffin residue by means of an MEK solvent wipe, or by power washing with an approved cleaner and a thorough rinsing, is required.

When mixing coatings and sealers prior to application, DO NOT AERATE the material as this will result in bubbles and pinholes in the applied finish.

Mixing of Kemperdur BSF-R Primer/Sealer (acrylic)

Step 1: Premix resin with a clean spiral agitator or stir stick until a uniform consistency is obtained.

NOTE: Premix only that amount of resin that can be used in 1 hour to prevent development of skin on top of resin.

Mixing of Kemperdur 2KS-FR Finish (urethane)

Step 1: Premix resin Component A thoroughly with a spiral agitator or stir stick. Resin solution should be a uniform color, with no light or dark streaks present.

Step 2: Premix resin Component B thoroughly with a spiral agitator or stir stick. Resin solution should be a uniform color, with no light or dark streaks present.

Step 3: Pour resin Component A and Component B into a third clean bucket at a 1:1 ratio (equal parts) and thoroughly mix the components with a clean spiral agitator. The Resin solution should be a uniform color, with no light or dark streaks present.

NOTE: Mix only that amount of resin components A & B that can be used in 30 minutes.

Mixing of Kemperdur Deko Finish (urethane)

Step 1: Premix resin with a clean spiral agitator with a spiral agitator or stir stick.

Step 2: For aggregate bonding, apply resin directly to the membrane surface.

Step 3: For aggregate sealing only, add 1K-Thinner into resin and mix the two liquid components for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks. This will thin the resin and facilitate even sealer application.

NOTE: Mix only that amount of resin that can be used in 1 hour to prevent development of skin on top of resin.

Mixing of Kemperdur AC Finish (polymethyl methacrylate)

Step 1: Premix primer Component A thoroughly with a clean spiral agitator or stir stick.

Step 2: Determine the correct amount of catalyst Component B based upon ambient temperature in accordance with written instructions of KSA.

For 5 kg finish workpacks, the following catalyst quantities are recommended:

35 -50°: Two (2) 100g bags of catalyst Component B;

50 -70°: One and One-Half (1-1/2) 100g bags of catalyst Component B;

70 -85°: One (1) 100g bag of catalyst Component B;

> 85°: One-Half (1/2) 100g bag of catalyst Component B;

Step 3: Add resin catalyst Component B into Component A and mix the components for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks. The Resin solution should be a uniform color, with no light or dark streaks present.

NOTE: Mix only that amount of resin components A & B that can be used in 15 minutes. DO NOT break down workpacks into smaller quantities – mix the entire workpack.

Aggregate Specification and Size

All surfacing aggregates shall be washed, kiln-dried, dust-free, suitable for broadcast, round grain or angular, and sized as follows:

Utility/Fire Rating	0.5 - 1.2 mm
Alkalinity/Adhesion Key:	0.5 - 1.2 mm
Aesthetic/Pedestrian Traffic:	0.4 - 1.0 mm
Light Vehicular Traffic:	0.5 - 1.2 mm
Heavy Vehicular Traffic:	0.8 – 1.5 mm

KSA recommends blending a minimum of two different colored aggregates to create a uniform surface finish for best aesthetic appearance and effectiveness in hiding of dirt and imperfections.

Aggregate Bonding and Sealing Resins

For roof surfacing applications, the following combinations of bonding resin, aggregate, and sealing resin are acceptable

Kemperol BR/BRM/V210/V210M resin (w/o fleece)/aggregate/Kemperdur BSF-R Primer/Sealer (special application-prior written approval from KSA Technical Department required).

Kemperdur AC Finish/aggregate/AC Finish.

Kemperdur 2KS-FR Finish/aggregate/2KS-FR Finish.

Kemperdur Deko Transparent/aggregate/Deko Transparent. (not fire-rated).

For alkalinity protection surfacing or adhesion key, apply Kempertec AC/EP/EP5 Primer/kiln-dried sand.

Roofing and Flashing Aggregate Surfacing Application

Broadcast specified and approved sand or aggregate in excess into a bonding coat application of Kemperol BR/BRM/V210/V210M resin over semi-cured membrane, or Kemperdur polymethyl methacrylate or urethane-based aggregate coating system applied over clean, cured membrane at the rate of approximately 0.8 gal. per 100 square feet. Aggregate shall be applied at the rate of 60 lbs. per 100 square feet. Obtain uniform and full coverage.

Following minimum 24 hour cure time remove loose/un-embedded mineral aggregate by blowing with oil-free compressed air or with a vacuum. Re-broadcast clean mineral aggregate as required to provide full embedment and coverage of membrane.

Seal aggregate surface with a sealing coat application of Kemperdur acrylic, methyl methacrylate or urethane-based aggregate coating, applied at the rate of approximately 0.8 gal. per 100 square feet. After completion of mineral aggregate broadcasting, avoid any traffic for a minimum of three (3) days to allow for surfacing to cure.

Alkalinity Protection Against Fresh Concrete

Where placement of concrete or other cementitious material is required over sections of the roofing/waterproofing membrane and flashings, apply one heavy coat of AC, EP or EP5 primer at 1.5 gal (5.7L)/100 SF (9 m²) total application, with broadcast of kiln-dried silica sand at the rate of 50 lbs. per 100 SF into wet primer. This provides a protective surfacing to resist deterioration of membrane from the alkalinity of fresh concrete and other cementitious materials.

NOTE: Provide temporary surface protection and continuous cleaning with water and brush (high-pressure water if necessary) to eliminate settlement of concrete residues on in-place roofing/waterproofing membrane adjacent to area of concrete placement.

Adhesion Key Surfacing Application

Where placement of asphalt pavement or other adhered-type overburden is required over sections of the roofing/waterproofing membrane and flashings, apply one coat of AC, EP or EP5 primer at 1.0 gal (3.8L)/100 SF (9 m²) per coat, with broadcast of kiln-dried silica sand at the rate of 50 lbs. per 100 SF into wet primer. This provides a membrane surface profile for enhanced bonding capability.

Coatings

For roof coating applications, the following are acceptable:

Kemperdur AC Finish.

Kempertec BSF-R Primer/Sealer.

Kemperdur 2KS-FR Finish.

For architectural detailing, apply Kemperdur Deko Finish.

Smooth Coating Application

Roller-apply Kempertec acrylic, Kemperdur urethane or polymethyl methacrylate-based coating over clean, cured membrane at the rate of approximately 0.8 gal. per 100 square feet. Obtain uniform and full coverage, eliminating roller marks, but do not overwork.

Following minimum 12 hour cure time, apply an additional coat of Kempertec acrylic, Kemperdur urethane or polymethyl methacrylate-based coating at the rate of approximately 0.8 gal. per 100 square feet per coat. The application of two coats of all smooth coatings is recommended to achieve best appearance and longest performance life.

After completion of coating, avoid any traffic for a minimum of two (2) days.

Mixing of Kemperdur AC Surfacing

Step 1: Pre-mix Kemperol AC Surfacing Component A (white formulation) with a spiral Kemperol agitator for 1 minute, until the liquid is a uniform beige color and all solids that may have settled to the bottom of the can have been mixed.

**Smooth
Coating Finish
Surfacing**

**Mineral-Filled
Aggregate
Traffic
Surfacing**

Step 2: Mix Component A (light brown formulation) and Component B (white formulation) in a separate clean mixing bucket with a spiral Kemperol agitator for 15-20 seconds, until the liquid is a uniform beige color without light or dark streaks.

For 10 kg resin/23 kg mineral filler workpacks, the following catalyst quantities are recommended:

35 -50°: Four (4) 100g bags of catalyst Component B;
50 -70°: Three (3) 100g bags of catalyst Component B;
70 -85°: Two (2) 100g bags of catalyst Component B;
> 85°: One (1) 100g bag of catalyst Component B;

Step 3: Gradually add Component C (white graded fillers) to the liquid while mixing continues for an additional 30-40 seconds until a smooth, lump free mix is produced.

NOTE: Mix only that amount of surfacing that can be used in 10 minutes. Do not exceed mixing times.

Application of Kemperdur AC Surfacing and Aggregate

Empty mixing bucket of all Kemperol AC mix onto the prepared surface and spread with a ¼" x ¼" x ¼" square-notched steel trowel at the specified coverage rate, approximately 33 kilograms per 100 square feet (9 m²).

Allow the Kemperol AC mix to self-level and reach an initial set for 5 minutes until material will retain a peak after being touched by a finger.

Broadcast approved aggregate to excess into Kemperol AC until a uniform dry aggregate layer has been achieved, at the rate of approximately 100 lbs. per 100 square feet. Aggregate will initially sink into AC, requiring the application of additional aggregate until wet spots no longer occur and only dry aggregate is visible.

Allow the aggregate-filled Kemperol AC to cure for approximately 2 hours, then remove excess aggregate by brooming and vacuuming.

Mixing of Kemperdur AC Finish (polymethyl methacrylate)

Step 1: Premix primer Component A thoroughly with a clean spiral agitator or stir stick.

Step 2: Determine the correct amount of catalyst Component B based upon ambient temperature in accordance with written instructions of KSA.

For 5 kg finish workpacks, the following catalyst quantities are recommended:

35 -50°: Two (2) 100g bags of catalyst Component B;
50 -70°: One and One-Half (1-1/2) 100g bags of catalyst Component B;
70 -85°: One (1) 100g bag of catalyst Component B;
> 85°: One-Half (1/2) 100g bag of catalyst Component B;

Step 3: Add resin catalyst Component B into Component A and mix the components for approximately 2 minutes with a clean spiral agitator on slow speed or stir stick without creating any bubbles or streaks. The Resin solution should be a uniform color, with no light or dark streaks present.

NOTE: Mix only that amount of resin components A & B that can be used in 15 minutes. DO NOT break down workpacks into smaller quantities – mix the entire workpack.

Application of Sealer

Roller-apply Kemperdur polymethyl methacrylate-based sealer at the rate of approximately 0.8 gal. per 100 square feet per coat to provide a sealed, maintainable surface finish. For colored aggregate for pedestrian usage, apply transparent Kemperdur AC Finish. For natural kiln-dried sand for vehicular traffic, apply colored Kemperdur AC Finish.

After completion of mineral aggregate surfacing and sealing, avoid any traffic for a minimum of three (3) days.

Protection

Protect finished application from all other contractors and activities during and after completion. Any damage to the system must be repaired as recommended by Kemper System America, Inc.

Clean-Up & Disposal

Remove all masking, protection, equipment, materials, and debris from the work and storage areas and leave those areas in an undamaged and acceptable condition.

Cured Kemper primers, resins, and surfacings may be disposed of in standard landfills. This is accomplished by thoroughly mixing all components. **NOTE:** Uncured Kemper primers, resins, and surfacings are considered hazardous materials and must be handled as such, in accordance with local, state and federal regulations. Do not throw uncured primer, resin and surfacing away.

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