

SECTION 062020

EXTERIOR PVC RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and other Contract Documents, listed in the agreement between the Owner and Contractor, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Exterior PVC railings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, and colors and include construction and application details.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.
- D. Samples for Verification:
 - 1. For cellular PVC railing components, with half of exposed surface finished; 50 sq. in.
- E. Delegated-Design Submittal: For railing systems, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Cellular PVC.
- B. Warranties: Provide sample warranties.

1.5 QUALITY ASSURANCE

- A. Engineer PVC railing system to withstand design loads indicated on Drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials flat with spacers between bundles to provide air circulation. Protect materials with waterproof covering.
- B. Do not store packaging materials in direct sunlight to prevent heat build up.

1.7 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed.
- B. Do not install PVC materials that are damaged.

1.8 WARRANTY

- A. Manufacturer's Warranty for Cellular PVC Railings Systems: Manufacturer agrees to replace components that fails due to defects in manufacturing within specified warranty period.
 - 1. Warranty Period: Limited Lifetime Warranty. Refer to manufacturer's website for details.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. INTEX Millwork Solutions, LLC; 20 Bogden Blvd., Millville, NJ 08332; Tel: (856) 293-4100, Fax: (856) 293-4102.

2.2 HAMPTON EXTRUDED RAIL SYSTEM

- A. Cellular PVC: Extruded, expanded PVC with a small-cell microstructure, recommended by manufacturer for exterior use, made from UV- and heat-stabilized, rigid material.
 - 1. Basis of Design Product: Subject to compliance with requirements, provide the following: Intex Millwork Solutions; Hampton Extruded Rail System.
- B. Top Rail Base: 1-1/2 inch high by 2-15/16 inch wide extruded rigid cellular PVC contoured rail profile.
- C. Bottom Rail: 1-1/2 inch high by 2-15/16 inch wide extruded rigid cellular PVC contoured rail profile.
- D. Aluminum Reinforcing Insert: 1 inch high by 1-3/4 inch wide 6063-T5 extruded aluminum "C" section (0.12 inch thick web; 0.06 inch thick flanges) with four raceway channels running the entire length. Used in top and bottom rail of all systems.
- E. Balusters: Model # RS40BAL-42. 1-1/4 in square extruded rigid cellular PVC pickets.

- F. Newel Caps and Trim: Model # RS40PYCAP5 (Pyramidal cap), and #RS40BT5-WM75 (Base trim ring).
- G. Decorative Panels: Manufacturer's [**standard**] [**custom**] design.
- H. Support Block: 1-1/4 in square extruded rigid cellular PVC picket cut to length and secured to the underside of the bottom rail.
- I. Rail to Post Connection: Manufacturer's standard.
- J. Support Post: Preservative-treated wood (Southern Pine) 4 by 4 inches.

2.3 DARTMOUTH EXTRUDED RAIL SYSTEM

- A. Cellular PVC: Extruded, expanded PVC with a small-cell microstructure, recommended by manufacturer for exterior use, made from UV- and heat-stabilized, rigid material.
 - 1. Basis of Design Product: Subject to compliance with requirements, provide the following: Intex Millwork Solutions; Dartmouth Extruded Rail System.
- B. Top Rail Base: 1-1/2 inch high by 2-15/16 inch wide extruded rigid cellular PVC contoured rail profile.
- C. Bottom Rail: 1-1/2 inch high by 2-15/16 inch wide extruded rigid cellular PVC contoured rail profile.
- D. Aluminum Reinforcing Insert: 1 inch high by 1-3/4 inch wide 6063-T5 extruded aluminum "C" section (0.12 inch thick web; 0.06 in thick flanges) with four raceway channels running the entire length. Used in top and bottom rail of all systems.
- E. Balusters: Model # RS40BAL-42. 1-1/4 in square extruded rigid cellular PVC pickets.
- F. Newel Caps and Trim: Model # RS40PYCAP5 (Pyramidal cap), and #RS40BT5-WM75 (Base trim ring).
- G. Decorative Panels: Manufacturer's [**standard**] [**custom**] design.
- H. Column Wraps: Manufacturer's "Flat Panel" in height and width as indicated on Drawings.
- I. Support Block: 1-1/4 in square extruded rigid cellular PVC picket cut to length and secured to the underside of the bottom rail.
- J. Rail to Post Connection: Manufacturer's standard.
- K. Support Post: Preservative-treated wood (Southern Pine) 4 by 4 inches.

2.4 NAUTILUS MILLED RAIL SYSTEM

- A. Cellular PVC: Extruded, expanded PVC with a small-cell microstructure, recommended by manufacturer for exterior use, made from UV- and heat-stabilized, rigid material.

1. Basis of Design Product: Subject to compliance with requirements, provide the following: Intex Millwork Solutions; Nautilus Milled Rail System.
- B. Top Rail Base: 1-1/2 inch high by 2-15/16 inch wide extruded rigid cellular PVC contoured rail profile.
- C. Bottom Rail: 1-1/2 inch high by 2-15/16 inch wide extruded rigid cellular PVC contoured rail profile.
- D. Aluminum Reinforcing Insert: 1 inch high by 1-3/4 inch wide 6063-T5 extruded aluminum "C" section (0.12 inch thick web; 0.06 inch thick flanges) with four raceway channels running the entire length. Used in top and bottom rail of all systems.
- E. Balusters: Model # RS40BAL-42. 1-1/4 in square extruded rigid cellular PVC pickets.
- F. Newel Caps and Trim: Model # RS40PYCAP5 (Pyramidal cap), and #RS40BT5-WM75 (Base trim ring).
- G. Decorative Panels: Manufacturer's [standard] [custom] design.
- H. Column Wraps: Manufacturer's "Flat Panel" in height and width as indicated on Drawings.
- I. Support Block: 1-1/4 in square extruded rigid cellular PVC picket cut to length and secured to the underside of the bottom rail.
- J. Rail to Post Connection: Manufacturer's standard.
- K. Support Post: Preservative-treated wood (Southern Pine) 4 by 4 inches.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners for PVC Railing Components: Provide manufacturer's recommended fasteners.
 1. (A) Rail Bracket Screws: #8 x 1-1/4 inches Flat Head Square Drive.
 2. (B) Rail Attachment Screws: #10 x 3 inches Slot Hex Washer Head.
 3. Top Rail Cap Attachment Screws:
 - a. (C) #8 x 1-3/4 inches Flat Head Square Drive (RS40 Flat Cap ONLY).
 - b. (D) #8 x 2-1/4 inches Flat Head Square Drive (RS40 Peaked Cap ONLY).
 4. (E) Baluster Screws: #8 x 2-1/2 inches Flat Head Square Drive.
 5. (F) Baluster Lock Screws: #8 x 1-1/2 inches Flat Head Square Drive.
 6. (G) Rail Attachment Screws: #12 x 4 inches Slot Hex Washer Head. For level sections greater than 8 ft. long and all stair rails.
- B. Adhesive for Cellular PVC: Product recommended by manufacturer.
- C. Sealants: Type as recommended by manufacturer and complying with ASTM C 834 and with applicable requirements in Division 07 Section "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine PVC materials before installation. Reject materials that are damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound or warped.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Scribe and cut PVC components to fit adjoining work.
 - 2. Coordinate PVC components with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.4 INSTALLATION - GENERAL

- A. Install PVC railing systems in strict accordance with manufacturer's written installation instructions, and detailed shop drawings.
- B. Refer to manufacturer's website for latest information and installation videos.

3.5 INSTALLATION – HAMPTON RAILING SYSTEM

- A. Level Rail Section Application (NOTE: for 3-Line Rail, read section 5 first before starting at Section 1).
 - 1. Measure to determine baluster layout, cut rail sections to length.
 - a. Insure newels or columns to which rail will be mounted are plumb and sturdy enough to support rail. If newel/column covers are used, ensure they have blocking at each location where railing will be attached.
 - b. Measure span at top and bottom rail locations.
 - c. For standard baluster spacing (with the variable spaces at the ends of each rail section), use the pre-marked locations inside the top/bottom common rail. Hold

one section of the Top/Bottom Common Rail at the bottom of the newels, and using the pre-marked locations as a reference, determine the best end baluster spacing by either locating a baluster directly at the center of the rail section, or the mid-point between two balusters as the center of the rail section. Once the best end baluster spacing is decided, mark both ends of the rail at the newels and square cut using a miter box. The Top and Bottom Common Rail must be cut with exactly the same spacing, to ensure that the balusters will be plumb. Cut the Rail Top Cap to the required length.

- d. If equal spacing between all balusters and the newels/columns is desired, disregard section 'c' above and determine spacing based upon width and number of balusters (Note: check local building codes for maximum spacing allowed).
2. Drill and assemble rail/baluster section.
 - a. Using the decided upon spacing, at the center of the location for each Baluster, drill a 1/8 inch hole through the Top and Bottom Common Rail at the centerline.
 - b. Secure each Baluster with one baluster screw (E) through the Top Common Rail, and one through the Bottom Common Rail. Ensure Balusters are straight and aligned and secure with one baluster lock screw (F) through the Bottom Common Rail (offset from center) to preclude Baluster from rotating after installation.
 3. Prepare aluminum reinforcements.
 - a. Cut the aluminum rail reinforcements to length, 3/8 inch shorter than the vinyl rails.
 - b. Attach a mounting bracket to both ends of each Aluminum Rail Reinforcement, using four rail bracket screw (A). Lubricate the threads with oil or soap to avoid binding or stripping screws.
 - c. Locate crush block(s) provided to the bottom Aluminum Rail Reinforcement, with spacing no greater than 36 inches from the end, or between Crush Blocks.
 - d. Drill a 3/16 inch hole through the Aluminum Rail Reinforcement, and secure each crush block using one baluster screw (E).
 - e. Drill one additional 3/16 inch hole at each end of the bottom Aluminum Rail Reinforcement for drainage.
 4. Install rail.
 - a. Position bottom Aluminum Rail Reinforcement, with crush block(s) attached, between newels or columns, centered in newel or column face, and secure each end with two rail attachment screws (B).
 - b. Position vinyl rail/baluster assembly between newels or columns and seat fully down on bottom aluminum rail reinforcement.
 - c. Seat remaining aluminum reinforcement into Top Common Rail.
 - d. Ensure rail is centered on face of newel or column and secure each end with two rail attachment screws (B). NOTE: in order to maintain CCRR rating for rail lengths in excess of 8 feet, replace the 3 inch rail attachment screws (B) on the top rail with 4 inch rail attachment screw (G), which are included in 10 foot rail kits.
 - e. Drill a 3/16 inch hole through the aluminum reinforcement over every third baluster (note: offset to avoid the screw which attaches the Baluster to the Top Common Rail) and secure the aluminum reinforcement to the rail/baluster assembly using baluster screws (E).

- f. Drill a 3/16 inch hole down through the aluminum reinforcement and the Baluster Cap between the first and second baluster at both ends and near the center of the span (all between balusters). Countersink holes from underside of baluster cap for a #8 Screw to ensure that screw seats flush with PVC and to prevent stripping.
 - g. Apply a bead of latex caulk at the contact areas where the Rail Top Cap seats on the Top Common Rail. Seat the Rail Top Cap fully onto the Top Common Rail, and use the screws provided to attach the Rail Cap, screwing up through the underside of the Baluster Cap, be sure not to over-tighten screw to prevent stripping. Note: screws provided for RS40 flat Cap Rail are top rail attachment screws (C), and screws for RS40 peaked cap rail are top rail attachment screws (D).
5. 3-Line Rail.
- a. Cut all Balusters to height (24 inches for 36 inch finished rail height, 30 inches for 42 inch finished rail height). Cut the remaining short pieces of the balusters to 3-7/8 inches. These will be the spacer balusters for the upper section, and can be aligned one over each longer baluster, or other spaced as desired.
 - b. Follow steps 1 through 4e above to install lower rail section.
 - c. 3-Line rail sections use the 'flat' top rail cap as the bottom for the upper section. Determine the spacer baluster locations and mark this flat cap and the upper rail Baluster Cap at the desired locations. Secure the 3-7/8 inch spacer balusters as in section 2 above.
 - d. Install the lower rail section as described in Section 4b through 4f above.
 - e. Install the upper rail section as described in Section 4b through 4f above.
- B. Stair or Rake Rail Application:
1. Determine angle, measure rail lengths and determine baluster layout/spacing.
 - a. Ensure newels or columns to which rail will be mounted are plumb and sturdy enough to support rail. If newel/column covers are used, ensure they have blocking at each location where railing will be attached.
 - b. Determine and mark angle.
 - c. For standard baluster spacing (with the variable spaces at the ends of each rail section), use the pre-marked locations inside the Top and Bottom Common Rail. Determine best end spacing by either locating a baluster directly at the center of the rail section, or the mid-point between two balusters as the center of the rail section. Once Baluster spacing is determined, cut end(s) of Top and Bottom Common Rail to angle and length. Note: do not cut Rail Top Cap until section is assembled and secured at all 4 mounting points.
 - d. If equal spacing between all balusters and newels/columns is desired, disregard section 'c' above and determine spacing based upon width and number of balusters (Note: check local building codes for maximum spacing allowed).
 2. Assemble rail/baluster section.
 - a. Trim Balusters to required length and angle.
 - b. Using the decided upon spacing, at the center of the location for each Baluster, drill a 1/8 inch hole through the Bottom Rail at the centerline, at the angle of the

- Baluster attachment. Repeat this for process for the Baluster Cap, using the same spacing.
- c. Secure each baluster with one baluster screw (E) through the top Common Rail, and one through the bottom Common Rail. Ensure balusters are straight and aligned and secure with one baluster lock screw (F) through the bottom rail (offset from center) to prevent the baluster from rotating after installation.
3. Prepare aluminum reinforcements.
 - a. Attach a Lower Stair Bracket (90 degree bend) using two rail bracket screw (A) to the lower end of each reinforcement. Lubricate the threads with glycerin or soap to avoid binding or stripping screws Note: Do not cut this end of the reinforcement to the rail angle.
 - b. Measure and cut the upper end of both reinforcements to the rail angle determined in Step 1, include the protruding portion of the lower bracket as part of the total length. Attach an upper stair bracket to the angle cut end of the top rail reinforcement, with the bracket flush with the top of the reinforcement, using four rail bracket screw (A). Attach an upper stair bracket to the angle cut end of the bottom rail reinforcement, with the bracket flush with the bottom of the reinforcement, using four rail bracket screw (A). Lubricate the threads with oil or soap to avoid binding or stripping screws.
 - c. Cut one end of Crush Block to angle of rail and locate to the bottom aluminum rail reinforcement, with spacing no greater than 32 inches from the end, or between Crush Blocks. Ensure that the Crush Block(s) will be located on a stair tread.
 - d. Drill a 3/16 inch hole through the Aluminum Rail Reinforcement, and secure each Crush Block using one baluster screw (E).
 4. Install rail.
 - a. Position bottom aluminum rail reinforcement, with crush block(s) attached, between newels or columns, centered on newel or column face, and secure each end with two rail attachment screws (B).
 - b. Position vinyl rail/baluster assembly between newels or columns and seat fully down on bottom aluminum rail reinforcement.
 - c. Seat remaining aluminum reinforcement into baluster cap.
 - d. Ensure rail is centered on face of newel or column and secure each end with two 4 inch rail attachment screws (G).
 - e. Drill a 3/16 inch hole through the aluminum reinforcement over every third baluster (note: offset to avoid the screw which is into the top of each baluster) and secure the aluminum reinforcement to the rail/baluster assembly using baluster screw (E).
 - f. Measure and cut Top Cap to required angle and length. Drill a 3/16 inch hole down through the aluminum reinforcement and the Top Common Rail between the first and second baluster at both ends and near the center of the span (all between balusters). Countersink holes from underside of baluster cap for a #8 Screw to ensure that screw seats flush with PVC and to prevent stripping.
 - g. Apply a bead of latex caulk at the contact areas where the Rail Top Cap seats on the Top Common Rail. Seat the Rail Cap fully onto the Top Common Rail, and use the screws provided to attach Rail Cap, screwing up through the underside of the Baluster Cap, be sure not to over-tighten screw to prevent stripping. Note: screws

provided for RS40 flat Cap Rail are top rail attachment screws (C), and screws for RS40 peaked cap rail are top rail attachment screws (D).

3.6 INSTALLATION – DARTMOUTH RAILING SYSTEM

A. Horizontal Application.

1. Measure and cut rail sections to length.
 - a. Insure newels or columns to which rail will be mounted are plumb and sturdy enough to support rail. If newel/column covers are used, insure they have blocking at each location where railing will be attached.
 - b. Measure span at top and bottom rail locations.
 - c. Cut all vinyl portions of rail to required length.
2. Determine baluster layout and assemble rail/baluster section.
 - a. For standard baluster spacing (with the variable spaces at the ends of each rail section) use the template provided. Align the template reference edge as indicated to the inside of the bottom rail. Determine best end spacing by either locating a baluster directly at the center of the rail section, or the mid-point between two balusters as the center of the rail section, and tape template in center and at ends. Drill a 1/8 inch hole through the template and bottom rail using the appropriate spacing line marked 'bottom rail'. Repeat this for process for the baluster cap, using the same template, but drill through the spacing line marked 'baluster cap'.
 - b. If equal spacing between all balusters and newels/columns is desired, disregard section 'a' above and determine spacing based upon width and number of balusters (Note: check local building codes for maximum spacing allowed).
 - c. Secure each baluster with one #8 x 2-1/2 inch Square Drive T17 18-8SS screw through the baluster cap, and one through the bottom rail. Insure balusters are straight and aligned and secure with one #8 x 1-1/2 inch Square Drive T17 18-8SS screw through the bottom rail (offset from center) to preclude baluster from rotating after installation.
3. Prepare aluminum reinforcements.
 - a. Cut aluminum rail reinforcements to length, 1/4 inch shorter than the vinyl rails.
 - b. Attach mounting brackets to both ends of the upper (mill finish) aluminum rail reinforcement, using four #8 x 1-1/4 inch Square Drive T17 18-8SS screws supplied.
 - c. Place gaskets provided between the mounting brackets and the reinforcement on the lower (white painted) aluminum rail reinforcement and secure using four #8 x 1-1/4 inch Square Drive T17 18-8SS screws supplied. Lubricate the threads with oil or soap to avoid binding or stripping screws.
 - d. Locate crush block(s) provided to the bottom (white painted) aluminum rail reinforcement, with spacing no greater than 36" from the end, or between crush blocks.
 - e. Drill a 3/16 inch hole through the aluminum rail reinforcement, and secure each crush block using one #8 x 2-1/2 inch Square Drive T17 18-8SS screw.

- f. Drill additional 3/16 inch holes at each end of aluminum rail reinforcement for drainage.
4. Install rail.
 - a. Position bottom aluminum rail reinforcement, with crush blocks attached, between newels or columns, centered in newel or column face, and secure each end with two #10 x 3 inch Slot Hex Washer Head TA 18-8SS screws supplied.
 - b. Position vinyl rail/baluster assembly between newels or columns and seat fully down on bottom aluminum rail reinforcement.
 - c. Seat remaining aluminum reinforcement into baluster cap.
 - d. Insure rail is centered on face of newel or column and secure each end with three #10 x 3 inch Slot Hex Washer Head TA 18-8SS screws supplied.
 - e. Drill a 3/16 inch hole through the aluminum reinforcement over every third baluster (note: offset to avoid the screw which attaches the baluster to the Baluster Cap) and secure the aluminum reinforcement to the rail/baluster assembly using #8 x 2-1/2 inch Square Drive T17 18-8SS screws
 - f. Drill a 3/16 inch hole down through the aluminum reinforcement and the baluster cap, plumb, at both ends and near the center of the span (all between balusters). Seat the Rail Cap fully onto Baluster Cap, and use the screws provided to attach Rail Cap, screwing up through the underside of the Baluster Cap. Note: screws provided for RS30350 rail are #8 x 1-7/8 inch Square Drive T17 18-8SS, and screws for RS30400 rail are #8 x 2-1/4 inch Square Drive T17 18-8SS white heads.
- B. Stair or Rake Application.
1. Determine angle, measure and cut rail sections to length.
 - a. Insure newels or columns to which rail will be mounted are plumb and sturdy enough to support rail. If newel/column covers are used, insure they have blocking at each location where railing will be attached.
 - b. Determine and mark angle.
 - c. Determine location and cut Lower Rail and Baluster Cap to required length.
 2. Determine baluster layout and assemble rail/baluster section.
 - a. Trim Balusters to desired length and angle.
 - b. For standard baluster spacing (with the variable spaces at the ends of each rail section) use the template provided. Align the template reference edge as indicated to the inside of the bottom rail. Determine best end spacing by either locating a baluster directly at the center of the rail section, or the mid-point between two balusters as the center of the rail section, and tape template in center and at ends. Drill a 1/8 inch hole through the template and bottom rail using the appropriate spacing line marked 'bottom rail'. Repeat this for process for the baluster cap, using the same template, but drill through the spacing line marked 'baluster cap'.
 - c. If equal spacing between all balusters and newels/columns is desired, disregard section 'a' above and determine spacing based upon width and number of balusters (Note: check local building codes for maximum spacing allowed).
 - d. Secure each baluster with one #8 x 2-1/2 inch Square Drive T17 18-8SS screw through the baluster cap, and one through the bottom rail. Insure balusters are straight and aligned and secure with one #8 x 1-1/2 inch Square Drive T17 18-8SS

screw through the bottom rail (offset from center) to preclude baluster from rotating after installation.

3. Prepare aluminum reinforcements.
 - a. Attach a lower stair bracket (90 degree bend) using two #8 x 1-1/4 inch Square Drive T17 18-8SS screws supplied to the lower end of each reinforcement. Note: on the bottom (white) rail reinforcement, insert one of the gaskets supplied between the bracket and the aluminum reinforcement. Lubricate the threads with oil or soap to avoid binding or stripping screws. Note: Do not cut this end of the reinforcement to the rail angle.
 - b. Measure and cut the upper end of both reinforcements to the rail angle determined in Step 1, include the protruding portion of the lower bracket as part of the total length. Attach an upper stair bracket to the angle cut end of the top (mill finish) rail reinforcement, with the bracket flush with the top of the reinforcement, using four #8 x 1-1/4 inch Square Drive T17 18-8SS screws supplied. Attach an upper stair bracket to the angle cut end of the bottom (white) rail reinforcement, with the bracket flush with the bottom of the reinforcement, using four #8 x 1-1/4 inch Square Drive T17 18-8SS screws supplied. Note: on the bottom (white) rail reinforcement, insert one of the gaskets supplied between the bracket and the aluminum reinforcement. Lubricate the threads with oil or soap to avoid binding or stripping screws.
 - c. Cut one end of crush block to angle of rail and locate to the bottom (white painted) aluminum rail reinforcement, with spacing no greater than 32 inches from the end, or between crush blocks. Insure that crush block(s) will be located on a stair tread.
 - d. Drill a 3/16 inch hole through the aluminum rail reinforcement, and secure each crush block using one #8 x 2-1/2 inch Square Drive T17 18-8SS screw.
4. Install rail.
 - a. Position bottom aluminum rail reinforcement, with crush blocks attached, between newels or columns, centered in newel or column face, and secure each end with two #10 x 3 inch Slot Hex Washer Head TA 18-8SS screws supplied.
 - b. Position vinyl rail/baluster assembly between newels or columns and seat fully down on bottom aluminum rail reinforcement.
 - c. Seat remaining aluminum reinforcement into baluster cap.
 - d. Insure rail is centered on face of newel or column and secure each end with three #10 x 3 inch Slot Hex Washer Head TA 18-8SS screws supplied.
 - e. Drill a 3/16 inch hole through the aluminum reinforcement over every third baluster (note: offset to avoid the screw which attaches the baluster to the Baluster Cap) and secure the aluminum reinforcement to the rail/baluster assembly using #8 x 2-1/2 inch Square Drive T17 18-8SS screws
 - f. Measure and cut Top Cap. Drill a 3/16 inch hole down through the aluminum reinforcement and the baluster cap, plumb, at both ends and near the center of the span (all between balusters). Seat the Rail Cap fully onto Baluster Cap, and use the screws provided to attach Rail Cap, screwing up through the underside of the Baluster Cap. Note: screws provided for RS30350 rail are #8 x 1-7/8 inch Square Drive T17 18-8SS, and screws for RS30400 rail are #8 x 2-1/4 inch Square Drive T17 18-8SS white heads.

3.7 INSTALLATION – NAUTILUS RAILING SYSTEM

A. Horizontal Application.

1. Measure and cut rail sections to length.
 - a. Insure newels or columns to which rail will be mounted are plumb and sturdy enough to support rail.
 - b. Measure span at top and bottom rail locations.
 - c. Cut all vinyl portions of rail (and rail top cap w/aluminum supplemental support which is pre-attached), to required length.
2. Determine baluster layout and assemble rail/baluster section. (Note: check local building codes for maximum spacing allowed).
 - a. Pre-drill for balusters through both the bottom rail and the lower section of the top rail.
 - b. Secure each baluster with one screw through the lower section of top rail, and two through the bottom rail to preclude baluster from rotating after installation. (#8A x 2-1/4 inch Phillips head stainless steel screws are recommended and available through Intex in bags of 150).
3. Prepare aluminum reinforcements.
 - a. Cut aluminum rail reinforcements to length, 1/4 inch shorter than the vinyl rails. (1/2 inch shorter for rails used in stair applications).
 - b. Attach mounting brackets to both ends of each aluminum rail reinforcement, using four #8A x 1-1/4 inch Phillips head stainless steel screws supplied. Lubricate the threads with oil or soap to avoid binding or stripping screws.
 - c. Locate crush blocks provided to bottom of one aluminum rail reinforcement, spacing no greater than 32 inches from the end, or between crush blocks.
 - d. Drill a 3/16 inch hole through the aluminum rail reinforcement, and secure each crush block using a screw. (#8A x 2-1/4 inch Phillips head stainless steel screws are recommended and available through Intex in bags of 150).
4. Install rail.
 - a. Position bottom aluminum rail reinforcement, with crush blocks attached, between newels or columns, centered in newel or column face, and secure each end with two #10A x 3 inch Pan head stainless steel screws supplied.
 - b. Position vinyl rail/baluster assembly between newels or columns and seat fully down on aluminum rail reinforcement.
 - c. Seat remaining aluminum reinforcement into lower section of top rail.
 - d. Insure rail is centered on face of newel or column and secure each end with two #10A x 3 inch Pan head stainless steel screws supplied.
 - e. Drill a 3/16 inch hole through the aluminum reinforcement over every third baluster (note: offset to avoid the screw which is into the top of each baluster) and secure the aluminum reinforcement to the rail/baluster assembly using screws. (#8A x 2-1/4 inch Phillips head stainless steel screws are recommended and available through Intex in bags of 150).

- f. Locate rail cross-section drawing matching the rail type you are installing to determine caulk location for applying rail top cap.
- g. Apply an exterior grade caulk as indicated and seat the top cap onto the lower section of the top rail. (For 5 inch and 7 inch rail, use Velcro straps supplied to secure until caulk cures).

B. Stair or Rake Application.

1. Determine angle, measure rail lengths and determine baluster layout/spacing.
 - a. Insure newels or columns to which rail will be mounted are plumb and sturdy enough to support rail. If newel/column covers are used, insure they have blocking at each location where railing will be attached.
 - b. Determine and mark angle
 - c. Based upon Baluster spacing determined for the other rails on the job, determine the best end spacing by either locating a baluster directly at the center of the rail section, or the mid-point between two balusters as the center of the rail section. Be sure to take the angle into consideration when determining 'center'. Once Baluster spacing is determined, cut end(s) of Baluster Cap and Bottom Rail to angle and length. (Note: do not cut Rail Top Cap until section is assembled and secured at all four mounting points).
 - d. If equal spacing between all balusters and newels/columns is desired, disregard section 'c' above and determine spacing based upon width and number of balusters (Note: check local building codes for maximum spacing allowed).
2. Assemble rail/baluster section.
 - a. Trim Balusters to required length and angle.
 - b. Using the spacing from 1c or 1d above, at the center of the location for each Baluster, drill a 1/8 inch hole through the Bottom Rail at the centerline, at the angle of the Baluster attachment. Repeat this for process for the Baluster Cap, using the same spacing. Again remember to take the angle into consideration.
 - c. Secure each baluster with one #8 x 2-1/2 inch Square Drive T17 18-8SS screw through the Baluster Cap, and one through the bottom rail. Insure balusters are straight and aligned and secure with one #8 x 2-1/2 inch Square Drive T17 18-8SS screw through the bottom rail (offset from center) to preclude baluster from rotating after installation. (#8A x 2-1/4 inch Phillips head stainless steel screws are recommended and available through Intex in bags of 150).
3. Prepare aluminum reinforcements.
 - a. Attach a lower stair bracket (90 degree bend) using two #8 x 1-1/4 inch Square Drive T17 18-8SS screws supplied to the lower end of each reinforcement. Lubricate the threads with glycerin or soap to avoid binding or stripping screws
Note: Do not cut this end of the reinforcement to the rail angle.
 - b. Measure and cut the upper end of both reinforcements to the rail angle determined in Step 1, include the protruding portion of the lower bracket as part of the total length. Attach an upper stair bracket to the angle cut end of the top rail reinforcement, with the bracket flush with the top of the reinforcement, using four #8 x 1-1/4 inch Square Drive T17 18-8SS screws supplied. Attach an upper stair bracket to the angle cut end of the bottom rail reinforcement, with the bracket flush

with the bottom of the reinforcement, using four #8 x 1-1/4 inch Square Drive T17 18-8SS screws supplied. Lubricate the threads with glycerin or soap to avoid binding or stripping screws.

- c. Cut one end of crush block to angle of rail and locate to the bottom aluminum rail reinforcement, with spacing no greater than 32 inches from the end, or between crush blocks. Insure that crush block(s) will be located on a stair tread.
 - d. Drill a 3/16 inch hole through the aluminum rail reinforcement, and secure each crush block using one #8 x 2-1/2 inch Square Drive T17 18-8SS screw.
4. Install rail.
- a. Position bottom aluminum rail reinforcement, with crush block(s) attached, between newels or columns, centered in newel or column face, and secure each end with three #10 x 3 inch Slot Hex Washer Head TA 18-8SS screws supplied.
 - b. Position vinyl rail/baluster assembly between newels or columns and seat fully down on bottom aluminum rail reinforcement.
 - c. Seat remaining aluminum reinforcement into baluster cap.
 - d. Insure rail is centered on face of newel or column and secure each end with three #10 x 3 inch Slot Hex Washer Head TA 18-8SS screws supplied.
 - e. Drill a 3/16 inch hole through the aluminum reinforcement over every third baluster (note: offset to avoid the screw which is into the top of each baluster) and secure the aluminum reinforcement to the rail/baluster assembly using screws. (#8A x 2-1/4 inch Phillips head stainless steel screws are recommended and available through Intex in bags of 150).
 - f. Locate rail cross-section drawing matching the rail type you are installing to determine caulk location for applying rail top cap.
 - g. Apply an exterior grade caulk as indicated and seat the top cap onto the lower section of the top rail.

3.8 ADJUSTING

- A. Replace PVC components that is damaged or does not comply with requirements. Adjust joinery for uniform appearance.

3.9 CLEANING

- A. Clean exposed and semiexposed PVC surfaces.

3.10 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace PVC materials that are damaged.

END OF SECTION