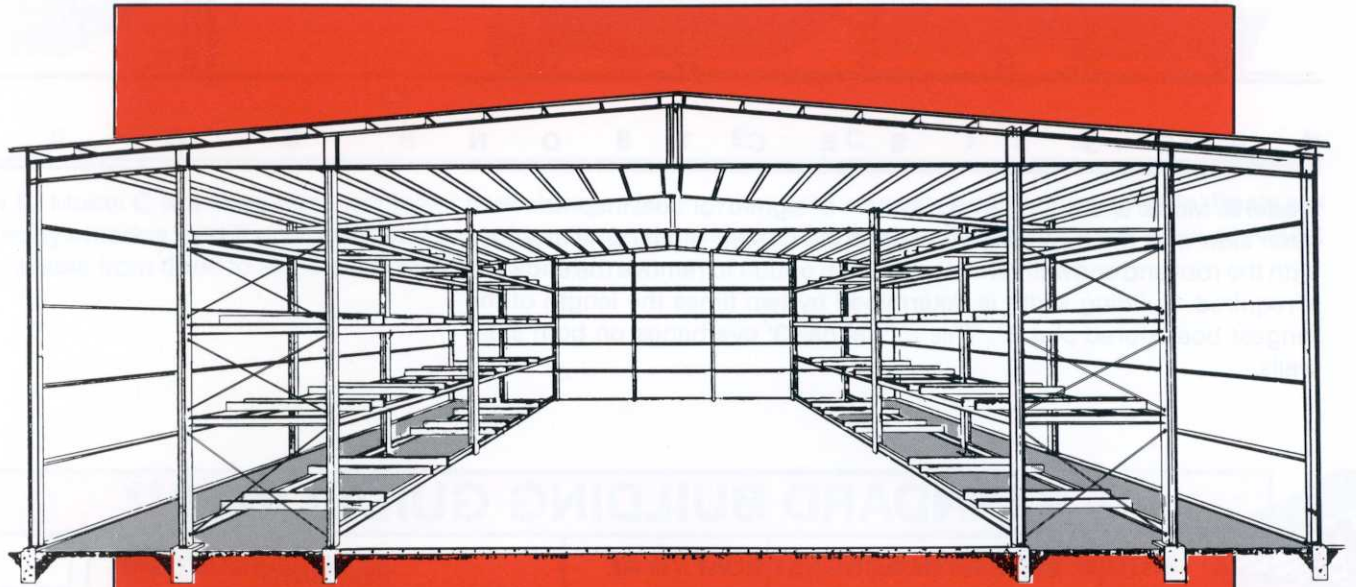


THE STAR STEELEX

RACK SUPPORTED BOAT STORAGE SYSTEMS



RACK SUPPORTED BOAT STORAGE Specifications

I. GENERAL

- A. The design of the structure shall be a single gabled, braced frame.
- B. Actual structure width shall be measured from outside-to-outside of sidewall framing and length from outside-to-outside of endwall framing.
- C. The roof slope shall have a 1" rise on a 12" run (other roof slopes available).
- D. All material shall be new and free from defects. Components will be clearly shown on erection drawings furnished by the manufacturer for the erection of the building.
- E. All primary frame connections will use ASTM A-325, zinc plated, high strength bolts. All secondary connections at purlins, girts, eave struts, and flange brace will use 1/2" diameter bolts.
- F. The lower flange of rafters will be braced by flange braces bolted to factory attached clips on the rafter. Flange braces may be required on one side of the rafter only.
- G. All standard drawings and designs will bear the stamp of a registered professional engineer. Complete design analysis of all structural components will be on file and furnished by the manufacturer upon request.
- H. There will be no field modification of rigid frame members unless authorized and specified on the manufacturer's drawings.
- I. Foundations will be designed locally by a qualified engineer. Anchor bolt diameter shall be as specified by the manufacturer. Anchor bolts and concrete reinforcing will be supplied by the concrete contractor.
- J. Erection must be performed in accordance with the erection drawings.

II. DESIGN LOAD CRITERIA

- A. Rack-supported boat storage systems shall be designed using the same design analysis and procedures as any other building manufactured by Star. This analysis can be modified to include any local code provision, as well as national codes, such as SBC, BOCA and UBC.
- B. Rack loads are designed for 50/50 percent fore and aft weight distribution.
- C. Boat racks are designed to place the heaviest boats on levels 1 and 2. These levels can support boats weighing from 2,000 to 13,000 pounds and over, depending on boat length (see chart on the inside). For levels above, design loads are lighter, due to limitations in the lifting capacity of marine forklifts.

III. BAY SPACING

- A. Bay spacing (the spacing between the primary frames) is usually found to be from 20' to 24' according to the requirements of the particular project. In most cases, two boats can be stored on the same level in the same bay at the same time; other spacings available.
- B. Due to the configuration of individual boats, the boat support beams are adjustable. The bottom boat support beam is adjustable 1' up. Intermediate boat support beams are adjustable 2' up and 2' down. The top boat support beam is adjustable 1' down. Fully adjustable is available but will require special design and special column orientation.

IV. WOOD STRINGER DATA

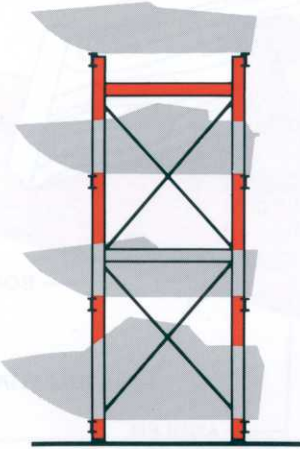
- A. As Star/Steelex does not provide nor inspect raw material for wood stringers, the following data is provided as a guide only. It is the responsibility of the purchaser to select, inspect and size wood stringers for his particular use.
 1. **Wood Types:** Types to be selected should be tough woods, such as oak, fir, etc.
 2. **Wood Grades:** As boat loads are applied directly to this member, only straight #1 grades should be used. Full cut (rough) dimensions are also advised.
 3. **Wood Sizes:** Wood sizes are determined by the weight of the boats and vary from 3" x 12"s to 2" x 10"s.

V. CRADLING/SUSPENSION

- A. Long wood stringers extending 1'-0 past boat beams is the Star/Steelex recommended method of cradling. This type of suspension uses four boat support brackets.
- B. Three-point and four-point support suspension using short wood stringers is possible. Special design is required if used. If three or four-point suspension is used, the owner must pay attention to the cradling system, particularly when racking shorter boats.
- C. Care should be taken that boat is not resting on two points along these long wood stringers (due to rounded hull shape). Excessive stress may be placed on the long wood stringers or on the boat hull. Some wood will conform to rounded hull shapes and some won't. Particular attention to these factors is required when using long wood stringers for the heavier or longer boats.



Star/Steel Rack Supported Boat Storage

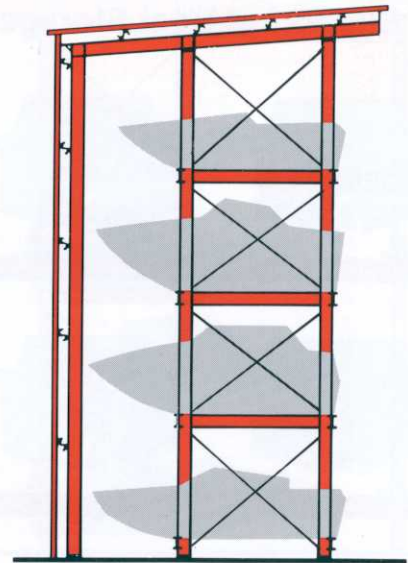


C R O S S S E C T I O N

Outside storage racks are available in configurations from two to five levels. They are used where shelter is not a consideration, either for temporary storage outside or inside an existing structure. Boat insertion is from one side.

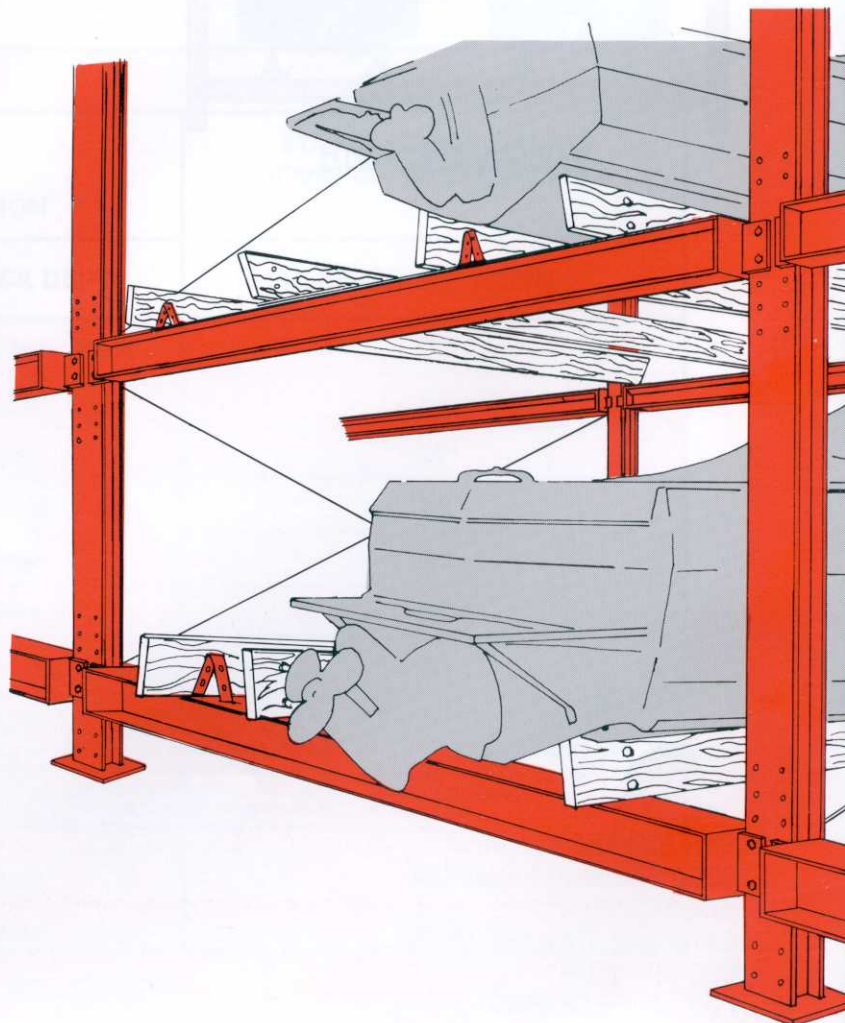
ADVANTAGES OF VERTICAL RACK STORAGE

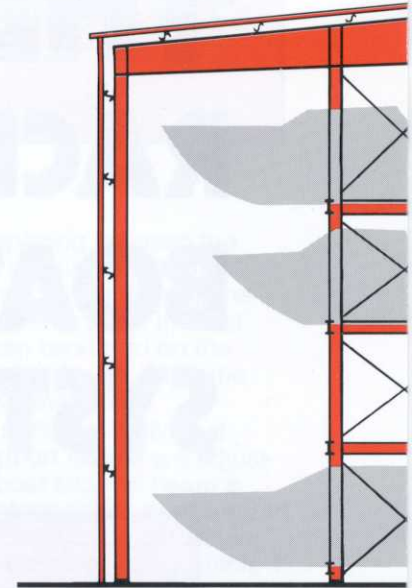
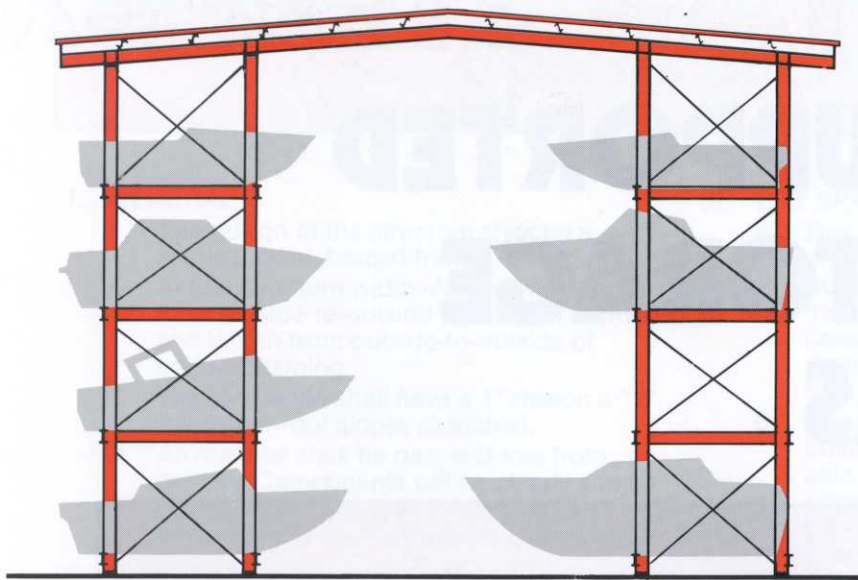
- Suitable shoreline boat storage property is expensive and diminishing. Vertical rack storage allows up to six times as many boats to be stored.
- Vertical rack boat storage may be used as an add-on profit center for existing marinas.
- The ability to tow boats with today's smaller cars is becoming less desirable.
- Rack supported buildings are less expensive than clear span buildings.
- Vertical rack storage structures offer convenient access to water.
- Star/Steel has 44,000 boats in storage; over 80 years experience and 750 builder/contractors located in all 50 states.
- Star/Steel has the capability to custom design to meet regional requirements, technological requirements and custom designed overhead bridge crane systems.
- Concrete floor slabs underneath the racks are not required.
- Depreciation on rack supported buildings can possibly be taken at 7 years in lieu of normal depreciation allowances.
- Star/Steel has professional engineers registered in 48 states.



C R O S S S E C T I O N

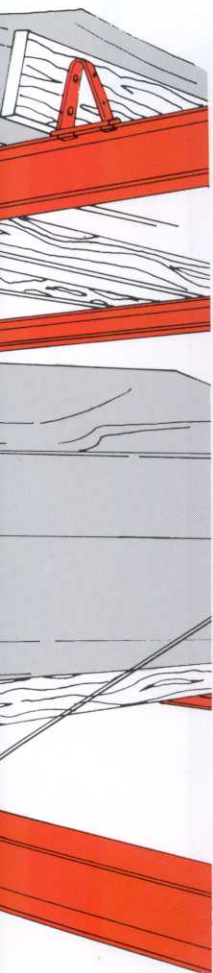
Model A. Model A is a single slope, rack supported structure with the roof, both endwalls, and the low sidewall sheeted. Boat insertion is from the high side. This model comes standard with a 3' overhang. Sidewall and endwall sheeting can be left off as an option. Building width is determined by length of longest boat stored plus 3'.





C R O S S S E C T I O N

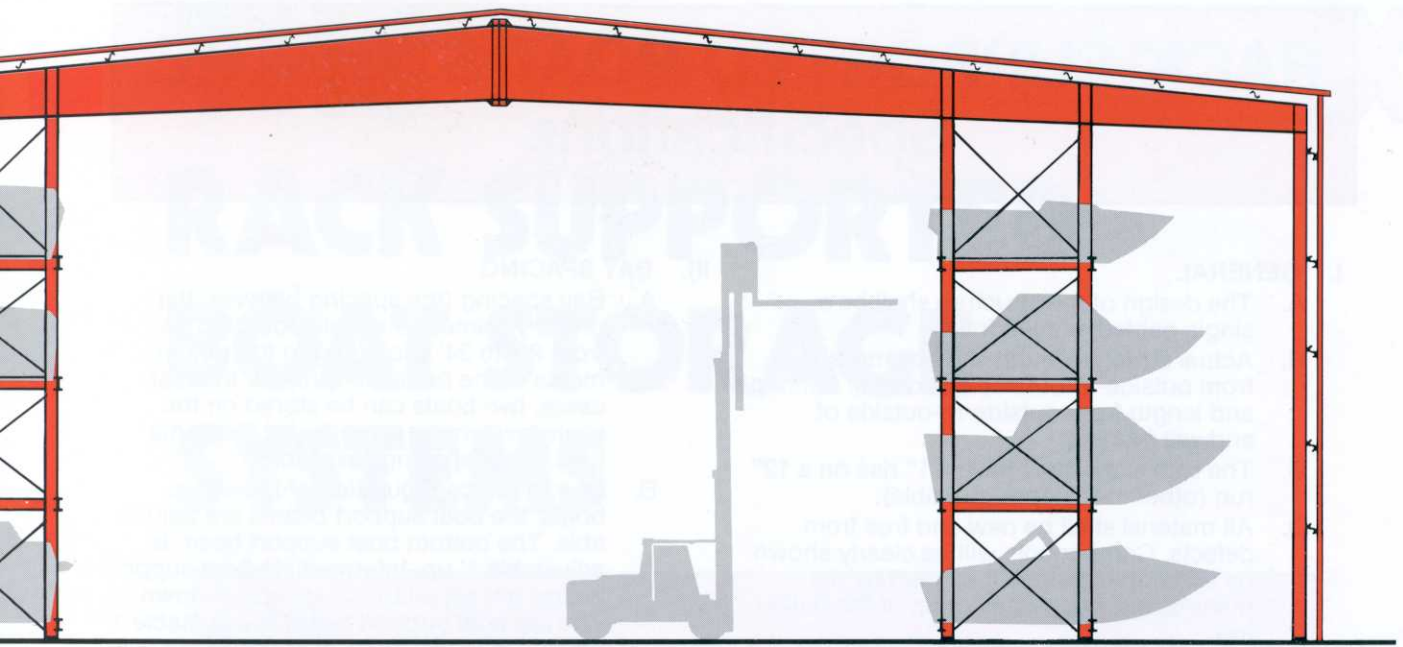
Model B. Model B is a double rack system designed for boat insertion from each side with the bow pointed toward the center. Model B is available with the roof and endwalls sheeted, with an option to remove the endwalls if required. Building width is determined by two times the length of the longest boat stored plus 6'. This model has 3' overhangs on both side-walls.



STANDARD BUILDING GUIDELINES**					
LENGTH OF LONGEST BOAT TO BE RACKED AND NUMBER OF STORAGE LEVELS		BUILDING (MODEL 'C' FULLY ENCLOSED)			BOAT LOAD (LEVELS 1 & 2)
		WIDTH	EAVE	AISLE WIDTH	
34' Boats	3 High	135'	33'0"	67'	13,000 lb.
	4 High	135'	39'0" *	67'	13,000 lb.
	5 High	135'	48'0" *	67'	13,000 lb.
30' Boats	3 High	120'	30'0"	60'	10,000 lb.
	4 High	120'	37'0"	60'	10,000 lb.
	5 High	120'	43'0" *	60'	10,000 lb.
26' Boats	3 High	110'	27'0"	58'	8,000 lb.
	4 High	110'	35'0"	58'	8,000 lb.
	5 High	110'	42'0" *	58'	8,000 lb.
22' Boats	3 High	96'	23'0"	52'	4,000 lb.
	4 High	96'	29'0"	52'	4,000 lb.
	5 High	96'	35'0"	52'	4,000 lb.

* REQUIRES FORKLIFT WITH POSITIVE LIFT OVER 30'

** DIMENSIONS SHOWN ARE MINIMUM REQUIREMENTS;



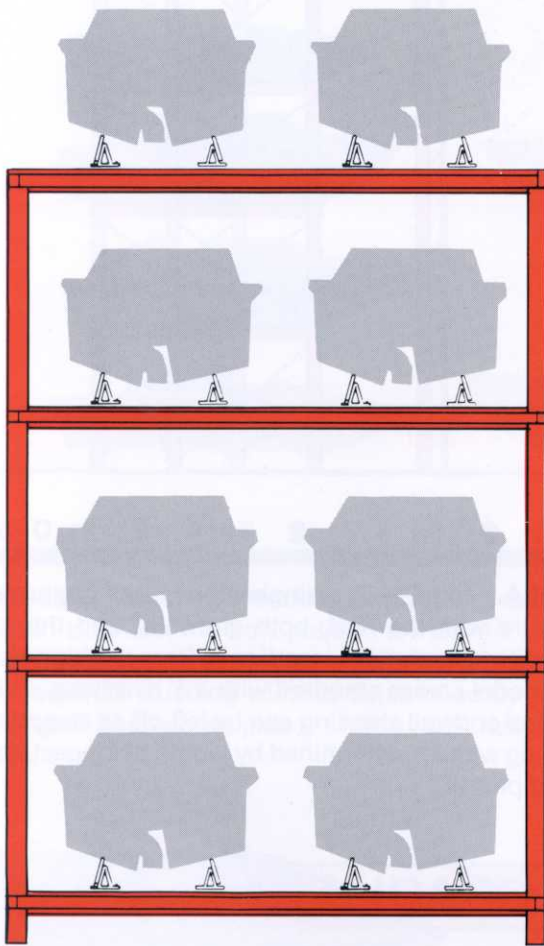
C R O S S S E C T I O N

Model C. Model C is a completely enclosed boat storage system with racks on each side of a center aisle. Boats are inserted by a marina forklift or an overhead crane from the center aisle with the bow pointed toward each sidewall. Model C is available from three to eight levels high.

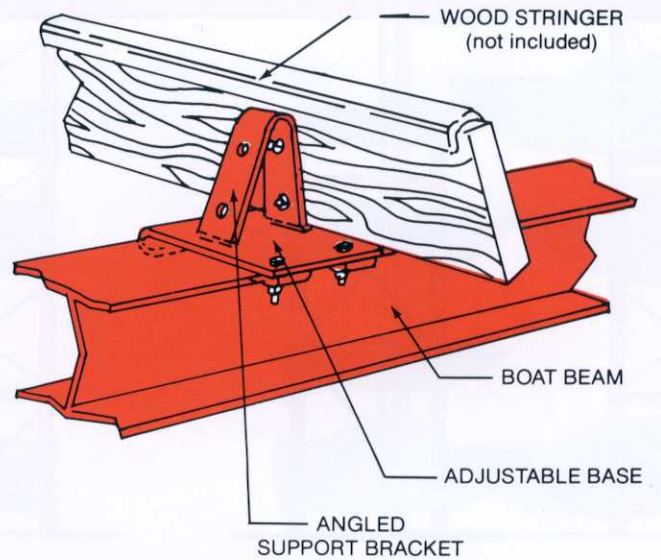
CAPACITIES	BOAT RACK LEVELS: - SUGGESTED STARTING LEVELS - PLUS DEPTH OF BOAT RACK SECTION		STANDARD BAY WIDTHS (Other bay widths available.)
	BOAT RACK LEVELS (Top of Beams)	BOAT RACK DEPTH	STANDARD WIDTH
6,000 lb.	1'6", 13', 24'	Boat Rack 14'0" Deep	20'
6,000 lb.	1'6", 13', 24', 32'	Same	20'
6,000 lb.	1'6", 13', 24', 32', 39'	Same	20'
5,000 lb.	1'4", 11', 20'	Boat Rack 13' Deep	20'
5,000 lb.	1'4", 11', 20', 29'	Same	20'
5,000 lb.	1'4", 11', 20', 29', 36'	Same	20'
4,000 lb.	1'2", 10', 19'	Boat Rack 12' Deep	20'
4,000 lb.	1'2", 10', 19', 28'	Same	20'
4,000 lb.	1'2", 10', 19', 28', 34'	Same	20'
4,000 lb.	1', 9', 16'	Boat Rack 11' Deep	18'6"
4,000 lb.	1', 9', 16', 23'	Same	18'6"
4,000 lb.	1', 9', 16', 23', 29'	Same	18'6"

ACTUAL NUMBER OF BOATS STORED IS DETERMINED BY OWNER REQUIREMENTS.

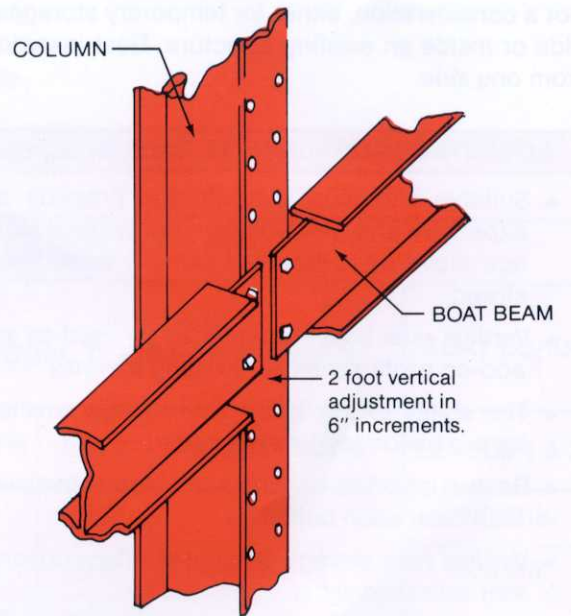
**Star/Steelex
Rack Supported Boat Storage**



TYPICAL BAY WIDTH



**ANGLED SUPPORT
BRACKET CONNECTION**



**BOAT BEAM TO
COLUMN CONNECTION**



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