



INSTALLATION MANUAL

COMMITTED TO
EXCELLENCE



IMPORTANT NOTE:

All details, recommendations and suggestions in this manual are for general guidelines only, and not meant to be all-inclusive. Industry accepted installation practices with regards to all areas not specifically discussed in this manual should be followed. Only experienced, Kirby Certified Builder and knowledgeable installation personnel familiar with accepted practices should be employed to ensure a quality job.

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QUALITY POLICY

We, at Kirby Building Systems., are committed to design, manufacture and supply quality products conforming to 'Global Standards', with the state of the art technology and equipments to ensure total customer satisfaction.

Our aim is to maintain leadership in this industry by continuously upgrading our Technology, Quality Management Systems and Skills of all our employees.

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GETTING STARTED

**READ AND UNDERSTAND THIS PAGE
BEFORE PROCEEDING WITH ANY
FURTHER WORK**

Safety First

Kirby has a commitment to manufacture quality-building components that are designed to meet the structural requirements of the building.

It is recommended that safe working conditions and accident prevention practices be the top priority on the job site, and the “local state’s” and national safety and health standards should always be followed to help insure worker safety.

Job site safety is a joint responsibility of all parties present on the job site, including owners, architects, engineers, contractors, subcontractors, delivery personnel, and employees of all the above, among others. All should be watchful to avoid hazards that might cause damage to property or injury to any person, including him or herself.

Always make certain that all employees know the safest and most productive way of erecting a building along with emergency telephone numbers, location of first aid stations and

emergency procedures. Avoid working during inclement weather periods when personnel are at increased risk due to high winds, lightning, precipitation, etc.

Kirby recommends daily meetings highlighting safety procedures, the use of hard hats, rubber sole shoes for roof work, proper equipment for handling material and appropriate safety gear, including nets where necessary.

This manual should be interpreted and administered with sound judgement consistent with good safety practices. Its information is to be disseminated to all workers on the job site. Where any doubt exists as to the language or directions of this manual do not take a risk “play it safe”.

Introduction

Kirby manufactures high quality, pre - engineered metal building packages. Quality installation is essential to complete the structure to the satisfaction of the customer.

This installation procedure is intended to provide Kirby Builders and or installation personnel with recommended procedures for erecting Kirby Buildings as safely and efficiently as possible. However, Kirby Building Systems is not liable for, and does not guarantee the quality of installation, nor does Kirby assume any responsibility for building defects that may be attributed to improper installation techniques, or the negligence of other parties.

It is emphasized that Kirby is only manufacturer of metal buildings and components and is not engaged in the installation of its products. Opinions expressed by Kirby about installation practices are intended to present only a guide as to how the components could be assembled to create a building. The experience, expertise and skills of the installation crews as well as the equipment available for handling the materials determines the quality and safety of installation and the ultimate customer satisfaction with the completed building.

The AISC's "CODE OF STANDARD PRACTICE" shall govern with respect to the fabrication tolerances, installation methods, and all field work associated with the project in question.

The installation personnel should familiarize himself with the contents of this document. Additional copies may be requested at a nominal cost.

Correction of minor errors:

- A. All installations work will be treated as outlined in the American Institute of Steel Construction's Code of Standard Practice for Steel Buildings and Bridges, Section 7,

which deals with the correction of errors in situations where the material is not being erected by the fabricator and which reads in substance as follows: "Corrections of minor misfits by the moderate use of drift pins, and a moderate amount of reaming, chipping or cutting are considered as part of installation.

- B. In cases where the Builder / Installation personnel believes there are errors in shop fabrication that prevent the proper assembling and fitting of parts by the use of drift pins, reaming, chipping or cutting, the Builder / Installation personnel shall immediately report such matters to the local Kirby Sales Office so that Kirby may either correct the error or approve the method and cost of the correction to be made, the Builder / Installation personnel shall furnish a clear description of the problem in his report to Kirby and shall also furnish a suggested solution and the cost thereof. Kirby shall have the option of :
 - 1. Replacing the defective material with freight allowed to jobsite by carrier of Kirby's selection.
 - or
 - 2. Authorizing field correction of the problem by a method and at a cost agreed to by Kirby.

Where field correction is authorized, the Builder / Installation personnel shall be allowed credit for the agreed cost, but in no event shall Kirby be liable for consequential damages.

Inspection by Kirby:

Kirby shall have the right to inspect from time to time all installation work being carried on by the builder or by others. It shall be the responsibility of the Builder / Installation personnel to furnish permits, if required, for entry to the job site for the inspection, and Builder / Installation personnel shall provide equipment (Ladders, Level etc,) for such inspection. If requested,

Builder / Installation personnel will receive a copy of the inspection report. In the event of installation, errors get detected at the time of the inspection, the Builder / Installation personnel will be notified of the errors in writing with a suggested method of correction.

In the event the errors are not corrected by the Builder / Installation personnel, the owner will be notified in writing by Kirby with a copy of the original report included with the owner notification. A copy of the notification to the owner will be forwarded to the Builder / Installation personnel. Kirby shall have no liability to the Builder / Installation personnel or to any customer for defective workmanship in the installation of building including by way of description, but not by way of limitations, defects arising from loose connections, missing parts, roof leaks, damaged sheets, omission of sealer, or closures, scratched surfaces, poor alignment, inadequate drainage or defects arising out of material furnished and or installed by the Builder / Installation personnel or others. The Builder / Installation personnel agrees to indemnify and hold harmless from any and all claims which may or might be made against Kirby by any customer or owner arising from or growing out of defects in the Installation of any Kirby building erected by or under the direction of, or for the account of the builder and or installation personnel.

Storage and protection:

- A. When aluminium, galvanized, or the galvanized prepainted coating or piled flat sheets or nested formed sheets becomes wet from rain, natural condensation, or other causes, white rust may result. This may occur either in transit or in storage at the jobsite.
- B. Formed prepainted sheets must be protected from moisture in the same manner as plain galvanized sheets until boldly exposed to the weather. The sheets must be

properly packaged and stored, otherwise, white rust may develop at minute cracks in the paint and at the cut edges.

- C. It is important on receipt of material, to examine packages for damage, Builders and / or Installation personnel, are advised to take prompt action where cuts, tears, or other damage is evident. If a small amount of moisture is present, the sheets should be dried before restacking or storage. Damp sheets should never be restacked until thoroughly dried.
- D. Roofing and wall sheets should be erected as soon as possible after their arrival at the job site. If temporary storage is absolutely necessary, they should be stored indoors. Where indoor storage is not possible, the procedure shown in this Manual must be followed to prevent the entry of moisture into the bundle and consequent storage stains.

Claims:

It is the responsibility of the Owner, Builder or Installation personnel to make an inspection upon arrival of all products shipped to the Customer, Builder or Installation personnel.

It is the responsibility of the Builder or Installation personnel to report such claims for shortage or defective material immediately to the owner, or customer to enable him to file a claim for the shortage or defective material.

Claims for shortage of defective material, if not packaged, must be made in writing to Kirby within five days after receipt of the shipment.

If packaged items are found to contain shortages or defective, material, these must be reported to Kirby, in writing, within 30 days after receipt of the shipment.

All claims must be reported to detail giving part numbers, description and length. This information may be obtained directly from the

Bill of Materials furnished with the building.

See Appendix "1" for Kirby's claims policy. Please read carefully and follow procedure outlined therein.

Installation:

- A. It is the Builder / Installation personnel's responsibility for mobilization, receiving, off loading and furnishing necessary tools for the proper Installation of a Kirby Building.
- B. The structure should be adequately braced at all times before raising the next component. The structure must be secured with temporary or permanent bracing before release of raising equipment and at the end of the day, week ends or other shutdowns. When commencing Installation of the building, the first braced bay must be erected with all the bracing, eave struts, purlins, girts and flange braces completely installed and all bolts properly tightened to make certain that the building is properly braced. (See appropriate pages that follow in this manual).
- C. All joints should be made up and all bolts in place before releasing raising equipment.
- D. Until the first run of roof sheets is secured, temporary scaffold should be used to start sheeting so that sheeters will have something to stand on. See proper method of walking on the roof described in the sheeting section of this Manual.
- E. All sheeters should be cautioned regarding roof openings & skylights, and any uncovered openings should be properly guarded.
- F. Workers should never slide down columns and other structural members. Ladders should be used to get on and off the building. Wall girts and diagonal braces should not be used as ladders.

Recommended Tools & Equipment

The following list of tools and equipment is considered adequate for installation of most Kirby Buildings. Actual equipment required may vary due to differences in building type and size, job site conditions and installation personnel. This list is intended to serve as a

recommendation only and should not be used as a limitation to your inventory of installation equipment. Use and maintenance of power equipment should be in accordance with the general guidelines set forth in this manual.

Screw Guns (HILTI ST 18 / BOSCH GSR-625TE)	2	With magnetic hex socket heads and replacement drives
Sheet Metal Nibbler (HITACHI)	1	Electric sheet cutting tool with replacement bits
Power Impact Wrench (BOSCH GDS 30)	2	With assortment of impact sockets - 12 mm to 24 mm
Electrical Drill Motors (BOSCH / KPT/ HITACHI)	2	12 mm (1/2") with twist drill
Skill Saw (HITACHI / BOSCH /DEWALT)	1	Electric or gas powered with metal & carbide tip blades
Electric Extension Cords		Sufficient for maximum number of tools used at once
Electric Arc Welder(ADWANI)	1	With leads and extra welding head
Generator	1	To supply job site electrical power
Gas Cutting Torch	1	With hose, gauges and replacement heads
Socket Wrenches (HAWS / TAPARIA) and ratchet drive handle.	2	Sets 12 mm (1/2") drive with assorted sockets
Spud Wrenches (TAPARIA/HAWS/EVEREST)	5	Each assorted sizes 12 mm to 24 mm
Box End Wrenches (TAPARIA/HAWS/EVEREST)	2	Sets assortment 12 mm to 24 mm
Open End Wrenches (TAPARIA/HAWS/EVEREST)	2	Sets assorted sizes 12 mm to 24 mm
Vice Grip Pliers	10	
Pop Rivet Tool (STAR)	2	Manual
Hammers	2	EA Shop, Sledge, Rubber

Sheet Metal Cutter (RIDGE)	1 EA left, Right, Straight
Wrecking Bars	2 Heavy Duty
Drift Pins	4 Heavy Duty
Hack Saws	4 With assorted blades
Chokers(HUK CHUK)	4 3/8"
Chokers (HUK CHUK)	4 1/2"
Cable Clamps	Assorted Sizes
Slings (MADRAS AUTO)	4 With Clevises
Spreader Bar	1 EA 3m, 5m
1/2",3/4" Wire Rope	100M with 8 turnbuckles
Work Platform	2 6M, Steel or Plywood reinforced
Chain Block (INDUS)	3T, 5T
Extension Ladders	2 6M
Safety Belts with tool pouches (KARAM/ISI TESTED BRAND)	Sufficient for Crew
Hard Hats (KARAM /METRO)	Sufficient for Crew
Goggles	2 for power cutting
Goggles	2 for boring equipment
Hand Gloves	Sufficient for Crew
Steel Measuring Tapes (FREE MAN)	4 EA 4 M
Steel Measuring Tapes(FREE MAN)	2 EA 15 M and 30 M

Magnetic Spirit Level	2 1' to 4"
Framing & Try Squares	1 EA
Transit & Level Rod	1 EA
Plumb Bob & Chalk String	2 1/2Kg, 1Kg
Nylon Line 3/8"	100 M
Manila Rope	100M EA 3/8', 1/2"
Caulking Guns	4 Cartridge Type
Brooms	2
Dust Pans	2
Water Can with Cup Holder	1
Paint Brush	4" 2
Rope Ladder	2 EA 8M, 10M
Tool Box	2
Stapler (KANGAROO HP 45)	6 Nos
Stapler Pins(KANGAROO 23/17)	As required

Elements of metal building system:



- | | |
|--------------------------------------|------------------------------------|
| 1. Kirby Roof Panel | 15. Single Walk Door |
| 2. Kirby Wall Panel | 16. Curved Eave |
| 3. Canopy | 17. Sandtrap Louver |
| 4. Roll Up Door (Manual/Electrical) | 18. Corner Trim |
| 5. Double Slide Door | 19. Eave Trim |
| 6. Rake Trim | 20. Flush Fascia |
| 7. Sky Light (Translucent Panel) | 21. Strip Skylight |
| 8. Ridge Ventilator (With Bird Mesh) | 22. Roof Monitor |
| 9. Power Ventilator | 23. Double Walk Door |
| 10. Eave Gutter | 24. Roof Extension |
| 11. Louver With Bird Mesh | 25. Return Downspout |
| 12. Masonry Trim | 26. Brick Wall |
| 13. Window With Insect Screen | 27. Wall Light (Translucent Panel) |
| 14. Downspout | 28. Curved Cantilever Fascia |

Metal Building Terminology

ACCESSORY: An extra building component added to a basic Kirby Building, such as a door, window, vent etc.

ALUMINIZED: Aluminium coated steel.

ANCHOR BOLTS: Bolts set in concrete, used to anchor structural members to concrete foundation.

BASE ANGLE: A continuous angle secured to foundation to support wall panels.

BASE PLATE: A shop-welded, pre-punched plate on that portion of a beam or column which rests on the supporting surface. usually secured with anchor bolts.

BASE CHANNEL: A light gauge cold formed channel which replaces the base angle when liner or double sheeted partitions are required.

BAY (END): The distance between the centerlines of the first interior frame to the inside of the endwall panel.

BAY - (INTERIOR): The distance from centerline to centerline of two interior columns.

BEAM: A structural member which is ordinarily subjected to bending and is usually a horizontal member carrying vertical loads.

BEARING FRAME ENDWALL: Frame composed of corner columns, wind columns, flush girts and rafter sections, which is designed to carry one-half bay loading also referred to as "light endwall".

BRACE ANGLES / RODS: Angles or rods primarily on roof and sidewalls of RF (Rigid Frame) or BC (Beam & Column) Buildings for transferring wind force to foundation and aiding in plumbing the structure.

BRIDGE CRANE: A material handling system usually within a building which moves longitudinally on a runway constructed of rails

and beams.

BRIDGING: Structural member used to give weak axis stability to joists or purlins.

BUILT-UP MEMBER OR SECTION: A structural member, usually an "I" Section, made of individual web, flange and base plates by welding them together.

BUILT-UP ROOFING: A covering made up of alternating layers of tar and asphaltic material (mostly used for flat roofs)

BUTTERFLY CANOPY : A free standing, single or double column roof structure having a valley gutter at the centerline of the building having the outer edge of the roof projecting upwards.

BUTT PLATE (OR SPLICE PLATE) : The pre-punched end plate of a structural member which usually rests against a matching plate of another member in forming a bolted connection.

BY-FRAMED GIRTS : Girts which overlap at outside column flange to form a continuous member.

"C" SECTION : A member cold-formed from steel coil in the shape of "C", used primarily in bearing frame endwalls and framed openings.

CAMBER : A pre-determined curvature designed into a structural member to offset the anticipated deflection when load is applied.

CANOPY : Any overhanging or projecting structure with extreme end usually unsupported.

CANTILEVER : A projecting beam that is supported and restrained at one end only.

CAULK : To seal and make weather tight joints, seams or voids by filling with a waterproofing compound or material.

CHANNEL : An open - ended "C" shape with no

return lips, which may be either cold-formed or hotrolled.

CLIP : A plate used for fastening several members together.

CLOSURE STRIP : Sealant material formed to match either inside or outside wall or roof panel configuration used at base, eave, rake or accessory locations to provide closure against the elements.

COLD - FORMED : Various shapes such as angles, channels, girts and purlins formed from steel at room temperature.

COLUMN : A vertical structural member.

CONTINUOUS GIRT OR PURLIN : Girt or purlin that overlaps at columns or frames to form a continuous member.

CONTINUOUS RIDGE VENT : Series of roof ventilators connected to each other located along roof peak line.

CORNER COLUMN : Corner column located at the corner of a bearing frame endwall.

CORNER TRIM : Preformed sheet metal trim used to close the junction of side and endwall sheets.

CRANE RAIL : Track upon which a top running crane moves (usually hot-rolled - A.S.C.E. rails).

CRANE RUNWAY BEAM : Support for bridge crane.

CURB : Raised flashing around a roof accessory to provide water tightness at the roof opening.

CURTAIN WALL : Perimeter wall panels which carry only their own weight.

DAMPER : A baffle used to open or close the throat of ventilators.

DEAD LOAD : The weight of the structure itself plus any permanent stationary loads.

DEFLECTION : The transverse displacement of a structural member in the direction of load and measured from its no-load position.

DIAPHRAGM ACTION : The action of Kirby wall panels on flush-framed wall to act as one unit to resist longitudinal wind force.

DOWNSPOUT : A hollow rectangular, square or round tubular section used to carry water from a gutter to the ground.

DRIFT PIN : A tapered pin used to align holes in steel members to be connected. Also called "spud wrench"

EAVE : The line along the top of the sidewall, formed by the intersection of roof and wall panels.

EAVE CANOPY : A roof extension beyond the sidewall of a building, may also be cantilevered below the eave.

EAVE HEIGHT : The vertical dimension from finished floor to top of eave strut.

EAVE STRUT : Structural member at the eave to support roof and wall panels : Also transmits forces due to wind on endwall from roof brace rods to wall brace rods.

EAVE STRUT GUSSET : A small gusset shop-welded to main frame on RF and BC buildings to support eave struts and afford alignment with by-framed girts.

EAVE TRIM : Trim used to close off top of sidewall panels in lieu of eave gutter.

INSTALLATION : The on-site assembly of pre-engineered components to form complete structure.

INSTALLATION DRAWINGS : Drawings prepared specifically for each buildings, showing piece mark, and location of all components.

EXPANSION JOINT : A break of space in construction to allow for thermal expansion and contraction.

FASCIA : Decorative trim or panel projecting from the face of a wall.

FIXED BASE : A column base that is designed to resist rotation as well as horizontal or vertical movements.

FLANGE : The projecting edge of a structural member.

FLANGE BRACE : A brace from flange of column or rafter to girt or purlin to provide lateral support and stability.

FLASHING : A sheet metal closure to ensure weather-tightness.

FOOTING : A pad or mat, usually concrete, located under a column, wall, or other structural member, used to distribute loads from the member into supporting soil.

FOUNDATION : The substructure on which a building rests.

FRAME : Primary structural members, made up of columns and rafters, which support the secondary framing.

FRAMED OPENING : Opening in wall, roof or floor that is framed with secondary members.

GABLE : A triangular portion of the endwall of building, directly under the sloping roof and at the bottom of the eave strut line.

GAUGE : Thickness range of steel (24, 26 etc). Distance between holes punched in flanges, base or splice plates.

GALVANIZED : Zinc - coated steel.

GIRDER : A main horizontal structural member that supports vertical loads.

GIRT : A secondary horizontal structural member attached to sidewall or endwall columns to which wall covering is attached and supported horizontally; usually a cold-formed “Z” shape.

GLAZE OR GLAZING : The process of installing glass in window and door openings.

GROUT : A mixture of cement, sand and water used to fill cracks and cavities. Often used under base plates or leveling plates to obtain uniform bearing surfaces.

GUSSET PLATE : A steel plate used to connect two or more structural members in the same plane.

GUTTER : The member used to collect and carry rain water off the roof.

HAIR - PIN : Reinforcing bar used to help transfer anchor bolt shear (due to column thrust) to concrete floor mass. The ‘U’ shaped hair pin wraps around the anchor bolts inside the slab.

HAUNCH : Also knee. The deepened portion of a column or rafter, designed to accommodate the high stress where column and rafter intersect and connect.

HAUNCH BRACE : A diagonal brace between eave strut and haunch.

HEADER : A horizontal member over a wall opening.

HEADER TRIM : Trim used above a wall opening.

HIGH STRENGTH BOLTS : Any bolt made from steel having a tensile strength in excess of 100,000 pounds per square inch (PSI). Some examples are ASTM A-325, JIS B 1186.

HIGH TENSILE STEEL : Structural steel having a yield stress in excess of 36,000 pounds per square inch.

HIP-ROOF : A roof which rises by inclined planes from all four sides.

HOT ROLLED SHAPES : Steel sections (angles, channels, I-beams, etc.) which are formed by rolling mills while the steel is in a semi-molten state.

IMPACT : Shock loads caused by dynamic application.

INNER LINER : Liner panelling on the inside of walls.

INSIDE CORNER TRIM : Trim which flashes inside corners.

INSULATION : Any material used in building construction to reduce heat transfer.

INTERMEDIATE BAY : The distance between two main frames within a building, other than end frames.

JACK BEAM : A beam used to support another beam or rafter to eliminate a column support.

JACK TRUSS : Truss used to support another beam, truss or rafter to eliminate a column support.

JAMB : A side column of a doorway or opening.

JIB CRANE : A cantilevered beam or horizontal beam with hoist and trolley. This lifting machine may pick up loads in all or part of a circle around the column to which it is attached.

JOIST : Beam for supporting the floor or roof.

KIP : Kilo-pound (1000#)

KIRBY DECK (KD): Standard panel used as a form (shuttering) on mezzanine floors or as a

deck panel over which concrete is poured.

KIRBY RIB (KR) : Standard panel used for roof, liner, soffits and partitions.

KIRBY WALL PANEL (KW) : Standard panel used on exterior wall and facades.

KNEE (OR HAUNCH) : The connecting area of a column and rafter of a structural frame.

KNEE BRACE : A diagonal brace designed to resist horizontal loads usually from wind or from moving material handling equipment. This brace member normally has the lower end connected to a column and the upper end connected to a rafter or eave strut.

LEAN - TO : A structure having only one slope or pitch and depending on another structure for partial support.

LINER PANEL : Sheeting on inside of building; may be either full or partial height.

LIP : A flange stiffener on cold formed sections.

LIVE LOAD : Any moving or variable load which the structure must support which is not permanently attached to the structure.

LOUVER : An opening provided with fixed or adjustable blades to allow air flow.

MANSARD : A tilted fascia system mounted to the roof, outside the steel line, and above the roof line to form a decorative fascia appearance and hide the roof line.

MAIN OR PRIMARY FRAMING : Steel frames which support secondary framing members such as girts, purlins or eave struts.

MASTIC : Caulking or sealant furnished in rolls, normally used in sealing roof panel laps.

MEZZANINE BEAM: Primary framing for mezzanines.

MEZZANINE JOIST : Secondary framing for mezzanines.

MOMENT : Force times distance (Torque)

MOMENT CONNECTION : A joint capable of transmitting moment to another member of the system.

MONITORS: Superstructure located above the ridge of the building used for ventilation or additional light.

MULLIONS : Vertical member connecting two windows located side by side.

(MS) MULTI-SPAN : More than one building tied together; multiple gable buildings.

NIBBLER: An electric hand tool used to cut steel roof or wall sheet openings.

PARAPET : That portion of the wall which extends vertically above the roof line to form a fascia-type appearance to hide roof slope.

PARTITION : An interior dividing wall.

PEAK BOX: A pre-fabricated trim piece that hides the rake trim connection at the apex of gable, and bears a metal plate with the Kirby Trade Mark.

PEAK PANEL : Kirby rib panel located along building ridge, conforms to roof slope and configuration.

PIER: A concrete structure designed to transfer vertical load from a base of a column to a footing.

PILASTER : A masonry column built into a wall and projecting from it.

POP RIVET : A small headed pin with expandable shank for joining light gauge metal, typically used for flashing trim etc.

PORTAL FRAME BRACE : Columns and horizontal beam substituted for standard bracing in areas where rod bracing is not allowed because of access requirements.

PRIMER PAINT : Initial coat of paint applied at factory to structural framing for protection against elements during shipping and installation only.

PURLIN : A secondary member, usually cold-formed horizontal structural member located in the roof to support roof panels, that is itself supported by the primary structural framing. Generally, purlins in Kirby Buildings overlap at frames to form a continuous design.

PURLIN EXTENSION CANOPY : Cantilevered continuation of roof at rake line.

PURLIN STRUT : Additional purlin added at or near intersection of wind bracing members at the rigid frame where a series of wind bracing is required in the roof panel. This strut may or may not be a continuous member throughout the length of the building.

RAFTER : A fabricated primary structural member with that extends from haunch to apex. Any beam used in a primary frame to support purlins.

RAKE : The intersection of roof and endwall.

RAKE ANGLE : Angle attached to purlins at rake for attachment of endwall sheets.

REACTIONS : Forces required to resist loads from a structure.

REINFORCING STEEL : Steel rods placed in concrete to take tension, compression and shear stresses.

RIDGE : Peak of a gabled buildings (Apex)

(RF) - RIGID FRAME : A clearspan structure,

characterized by tapered columns, tapered haunches and rafter beams.

ROOF SLOPE OR PITCH : Slope of a roof plane expressed as a ratio of vertical rise per unit of horizontal run.

SAG ROD OR SAG ANGLE : Tie rods or angles to support bottom purlin flanges against compression buckling due to special wind force.

SCREEDING : The process of striking off the excess concrete to bring the top surface to proper finish and elevation.

SEALANT : Any material which is used to close up cracks or joints to protect against leaks.

SECONDARY FRAMING : Framing consisting of minor load bearing members of a structure, such as purlins, girts, eave struts etc.

SEISMIC FORCES : Forces due to earth movement or earthquake.

SELF-DRILLING SCREW : A fastener which combines the functions of drilling and tapping. Used for attaching panels to purlins and girts (as an option).

SELF - TAPPING SCREW : A fastener which taps its own threads in a pre-drilled hole, used for attaching panels to purlins and girts, for panel laps, and for trim and flashing.

SHEETING ANGLE : An angle used for securing sheeting.

SHIMS : A piece of steel used to level or square base plates.

SHIPPING LIST : A list that enumerates each piece to be shipped.

SILL : The bottom horizontal framing member of a door or window opening.

SINGLE SLOPE : A sloping roof with one slope surface.

SKYLIGHT : Translucent fiberglass panel formed like Kirby Rib used on roof or like Kirby Wall used on walls in place of pre-determined panels to supply natural light to interior of building.

SLIDE DOOR : A single or double leaf door which opens horizontally by means of overhead trolleys.

SOFFIT : The underside covering of a canopy or purlins extensions; usually Kirby Rib.

SOIL PRESSURE : Allowable load per unit area a substructure slab may exert on a given soil.

SPACE- SAVER : Kirby's straight column, sloped-beam rafter building, where girts are flush-framed within the column.

SPAN : Width of building inside to inside of wall panels (side wall to side wall)

SPLICE : A connection in a structural member.

SPLICE PLATE : Plate used to connect two steel members.

SPUD WRENCH : See "Drift Pin".

STEEL LINE : The outside perimeter of structural steel or inside of wall panels.

STIFFENER : A member used to strengthen a plate against lateral or local buckling, usually a plate welded perpendicular to the longitudinal axis of the member. Large concentrated loads such as crane loads usually require stiffeners at the point of connection.

STITCH SCREW : Screw used to fasten panel to panel at side laps.

THRESHOLD : An aluminium extrusion kick plate that spans between jambs beneath a

personnel walk door leaf.

THRUST : Horizontal force developed as a result of a load being applied to a rigid frame.

TIE : A structural member that tends to lengthen under stress (ie; Wind brace rod)

TORQUE WRENCH : A wrench containing an adjustable mechanism for measuring and controlling the amount of torque or turning force to be exerted. Used to tighten nuts on high strength bolts.

TRIM : Light gauge sheet metal used around building opening and at intersections of roof, walls, etc, often referred to as flashing.

TRUSS : A structure composed of three or more members designed and connected so that the structure as a whole acts as a beam and the individual members are subjected primarily to longitudinal stress.

TURN OF NUT METHOD : A method of tightening bolts in a connection. A rotation of the nut through 1/2 to 3/4 turn beyond a “snug” position will produce at least the desired minimum tension of the bolt. (“Snug” is defined as the point at which the material between the bolt head and the nut is rigid, if power tools are used., “Snug” would be the point at which the wrench begins to impact).

UNIT STRESS : Stress per unit area.

UNSUPPORTED COLUMN : The condition that exists when a column has no lateral support, a column is unsupported when there are no braces attached to the flanges.

UPLIFT STRAP : Light gauge metal straps running continuously across the purlins from the base of the building at one side to the other. These straps are normally used on buildings

with a 3/10 Roof Slope, buildings with asbestos sheeting, unsheeted buildings and in buildings with longer bays.

VALLEY GUTTER : Oversized gutter located at the junction of the eaves where buildings are joined in multiple, sidewall to sidewall, junction of parapet wall and roof, junction of sidewall and end wall of buildings forming a T or L Shape and at the intersection of roof planes in a butterfly roof.

WAINSCOT : A liner starting at floor but less than ceiling height.

WALL, BEARING : Wall capable of supporting a structural system.

WALL, NON-BEARING : Wall not capable of supporting a structural system.

WEB : The part of a channel, purlin, girt, column or rafter between the flanges.

WEB MEMBERS : The system of members connecting the chords of a truss.

WIND BENT : A wind bracing system used in sidewalls, where brace rods cannot be used.

WIND COLUMN : A column located in endwalls of building designed to carry required wind loads.

YIELD STRESS : The stress at which the strain ceases to be directly proportional to the stress.

“Z” SECTION : A girt or purlin; A member cold formed from steel sheet coil in shape of a block “Z” with stiffener lips.

FOUNDATION & BUILDINGS ANCHORAGE

General Foundation Information

Kirby recommends that all building foundations, including RCC Column / pedestal sizes, grade beams and floor slabs, be designed by an experienced local foundation engineer. This engineer can also recommend excavation procedures, drainage practices, formwork, reinforcing steel requirements and concrete proportioning. This will assure proper designs, expedite the work and reduce costs.

NOTE:

Never start installation until the concrete is cured sufficiently. Normal M 20 Grade Concrete has to be cured for minimum of 7 Days. Consult the concerned Civil Engineer when in doubt.

Anchor bolt settings:

It is extremely important that anchor bolts be placed accurately in accordance with the anchor bolt setting plan. All anchor bolts should be held in place with a template or similar means, so that they will remain plumb and in the correct location during placing of the concrete. Check the concrete forms and anchor bolt locations prior to the pouring of the concrete. A final check should be made after the completion of the concrete work and prior to the steel installation. This will allow any necessary corrections to be made before the costly installation labor and equipment arrives.

NOTE:

Strict adherence to your specific Anchor Bolt Plan is required. Foundation must be square and on plane. Make certain the Anchor Bolt plan released by Kirby, being used is marked

“FOR CONSTRUCTION” and not marked

“ FOR APPROVAL”.



Caution : Check the squareness of the grid marking on the reference pillars before proceeding with any further foundation / anchor bolt work.

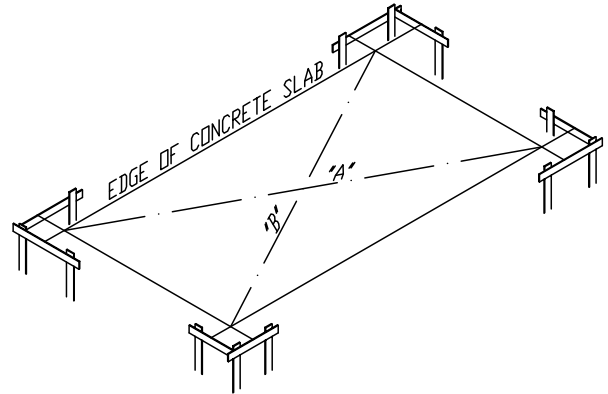
Anchor Bolt Setting Procedure

- “ Anchor bolts shall be set in accordance with Kirby “Issued for Construction Anchor bolt Plan”
- “ Finalise the FFL with the client or consultant and concreting has to be done finally to FFL level as shown in anchor bolt drawing.
- “ Establish the reference pillars at all corners and intersection of axis and grid lines of periphery. The reference pillars should not be more than 20 meters apart.
- “ Mark the grid lines as indicated in AB setting plan on the level pillars.
- “ Tie the piano wire/threads on the marking, check the squareness of the building. In case of building more than 30 M wide, the squareness of the reference pillars marking should be checked with theodolite / total work station.
- “ Ensure the top of final lift pedestal shuttering is equal to the top of desired concrete pedestal top.
- “ Ensure the rigidity of pedestal reinforcement, shuttering & template. (May be improved by welding of stirrups with main rods or additional rods welded diagonally with main rods) It shouldn't be disturbed during concreting.
- “ Last lift of pedestal concreting should be depth of anchor bolt plus 100 mm to ensure verticality and uniform height of anchor bolts.
- “ Place the anchor bolts & respective templates.
- “ Template should be locked to pedestal shuttering by using MS Angle or Wooden reepers to avoid centerlines getting disturbed during concreting.
- “ Check the projection of anchor bolts above the pedestal top. It should be as shown in anchor bolt drawings.
- “ Check the verticality of anchor bolts and then tack weld with the reinforcement before concreting.
- “ Pedestal top surface should be level and smooth under template and around the anchor bolts.
- “ Ensure anchor bolts are cast within main reinforcement cage.
- “ Before pouring concrete, re-check the elevations of anchor bolts at all main frames and endwall posts using level instrument or theodolite.
- “ Protect the anchor bolt projected threaded parts by applying grease before concreting.
- “ Remove the templates after setting of concreting & clean the anchor.
- “ Erector shall be responsible for grouting. Levelling plates, loose base and bearing plates shall be grouted after they are set. Columns with attached base plates that are temporarily supported on levelling nuts and washers and shims shall be grouted after the steel frame has been plumbed.

Squaring the Foundations

1. Diagonal Method:

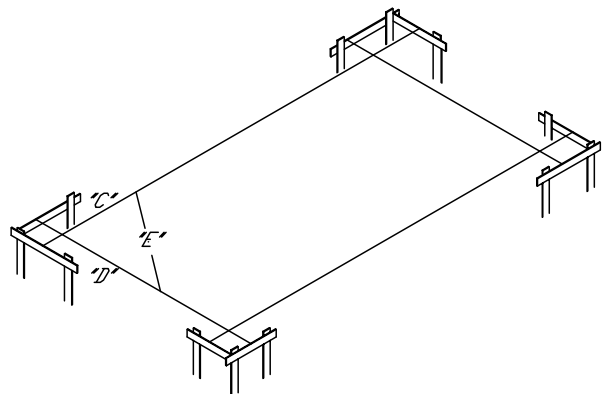
- The greatest accuracy in squaring the foundation is obtained by the diagonal method. Through adjusting the lines until the two diagonal dimensions "A" and "B" are equal.
- Adjust the foundation layout lines until dimensions "A" and "B" are equal in length.
- Check again for correct building length and width, as per drawings issued for construction.
- To be used for buildings smaller than 21 m wide or 21 m long.



2. Right Angle Method:

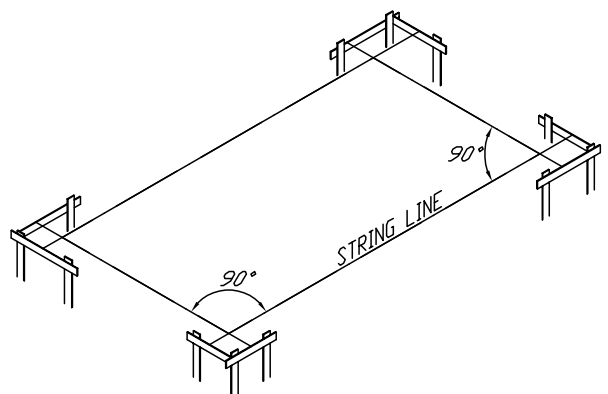
- On larger buildings, where the length of the diagonals exceed the commonly used tape, the right angle method may be used. Establish the dimension of the two sides "C" & "D" of the right triangle as shown in the chart and adjust the lines to obtain dimension "E". Repeat for the other three corners.
- To be used for buildings up to 30 m wide or 60 m long.

C	D	E
9,000	12,000	15,000
10,000	14,000	17,500
12,000	16,000	20,000
13,500	18,000	22,500
15,000	20,000	25,000
16,000	22,000	27,500

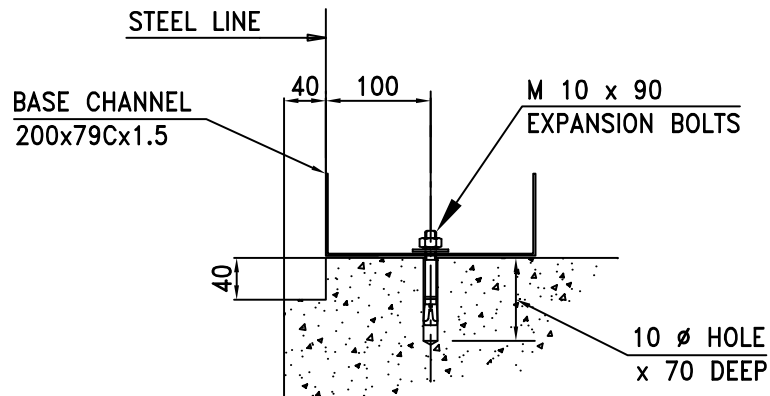
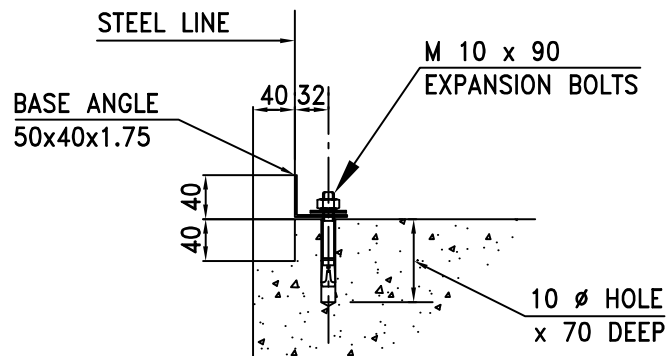


3. Transit Method:

- Buildings larger than 30 m wide or 60 m long should be squared with a transit. Be sure transit is in good condition, accurately located over the intersection point and absolutely level.
- Locate transit exactly over corner intersection point of string line. Sight along one building line, swing transit through 90° to establish adjacent building line.
- For accurate results, transit must be exactly level and in perfect working condition.
- Check diagonal dimensions as shown in "Diagonal Method".



Base Angle / Base Channel



Base Channel is substituted for Base Angle when liner is furnished with a building. The sheet notch size (40 x 40 mm) should be straight and uniform in size for proper seating of wall panels.

TYPICAL FRAMING DRAWINGS

Rigid frame cross section:

The typical section shows the column and rafter arrangement, purlin, girt and frame brace locations, bolt sizes and numbers, inside clearances. The following illustrates a typical frame cross-section and a description of its contents.

1. Building width; Dimension out to out of girt line.
 2. Dimension from out of girt line to centerline of ridge. This dimension will be centerline dimension on symmetrical gable building.
 3. Girt depth.
 4. Depth of column at column base.
 5. Depth of column and girt at frame knee.
 6. Horizontal clear dimension of frame at knee connection.
 7. Building eave height finished floor to top flange of eave strut.
 8. Girt spacing.
 9. Vertical clear dimension at knee connection.
 10. Vertical clear dimension at ridge connection.
 11. Roof slope or bevel.
 12. Slope dimension from centerline of ridge to out of eave strut measured along slope of roof.
 13. Purlin spacing.
 14. Flange brace location with numbers.
 15. Bolted frame splice designation.
- depth and is measured from out of purlin to centerline of end frame.
 4. Sidewall bay spacing measured centerline to centerline of frames.
 5. End wall exterior bay spacing shown on anchor bolt plan.
 6. End wall interior bay spacing measured centerline to centerline of endwall columns.
 7. Purlin piece marks.
 8. Roof wind bracing piece marks.
 9. Eave strut piece mark.
 10. Purlin lapping dimensions.

Sidewall framing elevation:

The sidewall framing elevation shows the girts, eave struts and sidewall bracing layouts and piece marks numbers. The contents of typical sidewall elevation drawing are given below.

1. Sequence number of sidewall framing elevation shown used to identify multiple sidewall framing plans associated with job.
2. Building length measured out to out end wall girts.
3. Sidewall bay spacing measured centerline to centerline of frames.
4. Sidewall girt spacing.
5. Sidewall column piece mark.
6. Sidewall girt piece mark.
7. Sidewall bracing piece mark.
8. Sidewall column line designation.
9. Sag rod piece mark.

Roof framing plan:

The roof-framing plan shows the layout and part number of purlins, eave struts, building clips and bracing. A description of the contents on a typical roof-framing plan follows.

1. Building length shown out to out of purlins.
2. Building width shown out to out of eave struts
3. End frame inset dimension; this dimension varies with end frame type and end wall girt

Endwall framing elevation:

The end wall framing elevation shows the end framing column, rafter and girt arrangements and piece marks. Typical column and beam and rigid frame end wall framing elevations are explained below.

1. End wall framing elevation designation by frame line number.
2. Width of building measured out to out of sidewall girts.
3. Sidewall girt depth.
4. End wall exterior bay spacing on anchor bolt plan less sidewall girt depth.
5. End wall interior bay spacing measured centerline to centerline of end wall columns.
6. Building eave height measured from top of finished floor to top flange of eave strut.
7. Vertical height of top of roofline at ridge above eave height.
8. End wall girt spacing.
9. Corner column piece mark.
10. End wall rafter piece mark.
11. End wall interior column piece mark.
12. End wall girt piece mark.
13. End wall column line designation.

SAFETY

Safety is..

- .. Performing your daily tasks in a safe manner.
- .. Protecting people, equipment and environment.
- .. Most frequently achieved by dropping the right word to the right person at the right time and by doing so often enough.

PPE:

The main purpose of personal protection equipment is to protect us from being injured by hazards of our job.

Major types of PPE, depending upon the job are:

- .. Hard hat with chin strap.
- .. Safety glasses/side shields.
- .. Hand gloves.
- .. Safety shoes with steel toe.
- .. Safety belts/safety harness.

Scaffolding:

- .. No wooden scaffolding should be allowed.
- .. Metallic scaffolding with wheels arrangement at the bottom with out riggers should be used, which run on steel channel runners.
- .. Hand rails, toe boards and decking should be in place.
- .. Scaffolding should be level and plumb on a firm base.
- .. All wheels should be locked when working on the scaffold (if it is a movable scaffold).
- .. Built-in ladder should be provided in the metal scaffolding.

Ladders:

- .. Inspect every ladder before using it. Remove from service any ladder found defective.
- .. Painted ladders should not be used.
- .. Do not allow more than one person on the ladder.
- .. Wooden ladders should not be used, metal ladders to be used.
- .. Every ladder shall be adequately tied or held.

Cranes and Lifting Equipments:

- .. Wire rope slings, D-shackles and pullies to be test certified.
- .. Proof of inspection and or written certification that material-handling equipment is safe and appropriate for intended work.
- .. Operation of equipment shall be restricted to licensed operators with proper training.
- .. A load should never be raised or swung over people or an occupied building.
- .. Condition of lifting slings/belts should be checked and if found defective, should be replaced with new ones.
- .. Experienced rigger should give directions to crane operators while Installation.
- .. SWL (Safe working loads charts to exhibited inside the crane cabins.

Sky Lights and Ridge Panels:

- .. Do not step on skylights.
- .. Barricading should be done around ridge area, prior to fixing of ridge panels with warning ribbon.
- .. Ridge panel should be installed simultaneously as far as possible to avoid workers falling through ridge.

Essential Measures:

- .. Builders should ensure their Installation personnel are under workmen's compensation policy.
- .. Conduct daily safety meetings at site.
- .. Insist compliance of safety procedures in daily meetings.
- .. First aid box should be available at site.
- .. Loose sheets should be properly secured and tied.
- .. Maintain proper house keeping at site.
- .. Night work should be avoided.
- .. Life lines on roof at every 3 meters interval and safety belts have to be hooked to these

- life lines.
- “ Electrical switch boards with plugs should be used and no loose wires to be used.
- “ All electrical wire joints should be properly taped.
- “ All cylinders (LPG, Oxygen and Acetylene) should be kept in a specified storage area.
- “ All operating deficiencies should be addressed and rectified to ensure safe working environment at site.

PRE - INSTALLATION ACTIVITIES

Access to Site

The vehicle transporting your building parts must gain access to the building site from the adjacent highway or road. Such access should be studied and prepared in advance of arrival. All obstructions, overhead and otherwise, must be removed and the access route graveled or planked if the soil will not sustain the heavy wheel loads.

Inspect to ensure that there is enough room to physically perform the tasks required to erect the building. Application of sheeting and trim can be expensive when there is no sufficient working space because of proximity of adjacent buildings or other obstructions.

The availability of any required utilities should also be considered in advance. Take careful note of any overhead electric lines or other utilities to avoid hazards and damage (Notify your utility company(s) when necessary).

Develop a comprehensive safety awareness program in advance to familiarize the work force with the unique conditions of the site, and the building materials, along with the appropriate "Safe Work" practices that will be utilized.

NOTE:

Complete sets of Installation drawings are furnished with every Kirby building. Each plan is specially prepared for each individual building and should be strictly adhered to. Familiarize yourself and crew with these drawings prior to start - up.

Unloading Operations:

Pre-planning of the unloading operations is an important part of the Installation procedures. This involves careful, safe and orderly storage of all material. Detailed planning is required at the job site where storage space is restricted. Here,

a planned separation of materials in the order of the installation process is necessary to minimize the costly double handling of materials. While set procedures are not possible in all cases, special attention should be given to the following items.

NOTE:

Kirby trucks are loaded to maximize efficiency, maximize trailer weight, and ensure safety. Unfortunately, Kirby cannot load truck per customer request.

Think Safety At All Times:

1. Location of carrier vehicle during unloading

: Unload material near their usage points to minimize lifting, travel and rehandling during building assembly.

2. Prepare necessary ramp for truck : The edges of the concrete floor should be protected to minimize the danger of chipping or cracking from truck traffic if the materials are to be laid out on the floor. One important safety consideration is the fact that material stored on the floor may subject the workers to possible injury from falling objects.

3. Schedule lifting equipment (Not by Kirby):

The type and size of lifting equipment is determined by the size of the building and the site conditions. Length of boom, capacity and maneuverability of lifting equipment will determine its location for both unloading and installation. Use the same lifting equipment to unload and erect structural parts. Lifting equipment costs are usually minimized by combining the unloading process with building installation. As soon as the truck is unloaded, the lifting equipment should start erecting the columns and raising the assembled rafters into position.

4. Consideration of overhead electric wires :

Overhead power lines are a continuing source of danger. Extreme care must be used in locating and using lifting equipment to avoid contact with power lines.

5. Schedule crew : Depending on the crew size, valuable time can generally be gained if the supervisor plans and watches ahead instead of getting tied up with a particular unloading chore.

6. Check shipment! : When shipments are received in the field, two inspections are necessary:

- A. When items, boxes, crates, bundles or other large components are received and unloaded from the carrier, they should be checked with the packing list. If during the inspection, damages, and shortages of items are found, a report should be filed with the transporter immediately at the site. When damages are evident from the exterior of trailers, they should be opened and inspected thoroughly at the time of receiving shipments.
- B. When bundles, crates, cartons, boxes, etc are opened following delivery, another check must be performed to determine the quantity received and their condition.

If during this inspection damages or shortages of items are found upon opening the crates or cartons, a written claim should be sent to Kirby

no later than thirty (30) days after delivery.

If a shortage is discovered within a bundle box, then a written notice should be mailed to Kirby. Unless these two important inspections are made and any reports or claims are filed immediately, settlements become very difficult and usually all parties suffer the loss. When filing claims either with the transporter, or with Kirby, the claim should indicate the item(s) in question, the bundle or truck load in question (if any), the actual quantity received, the quantity which should have been received, or that which was damaged. This is important for quickly retrieving the necessary information. Also, other information such as job number, names and addresses of consignees and consignor should be indicated on claims, as well as invoice numbers. These procedures are primarily for your protection. A shortage discovered later, can be caused by theft, misplacement, or other causes, and neither the carrier nor Kirby are responsible in such events.

NOTE:

Galvanized and galvalume materials are susceptible to damage from prolonged periods of contact with moisture while stacked together. If there is evidence of moisture during unloading, the panels should be separated, dried and stored out of the weather to prevent permanent discoloration.

Un-loading, Handling & Storing Material

Structural:

Inspect all shipments prior to releasing the tie-downs for loads that may have shifted during transit! REMEMBER, SAFETY FIRST!

Blocking by wooden packing under the columns and rafters protects the splice plates and the slab from damage during the unloading process. It also facilitates the placing of slings or cables around the members for later lifting and allows members to be bolted together into sub-assemblies while on the ground. Extra care should always be exercised in the unloading operation to prevent injuries from handling the steel and to prevent damage to materials and concrete slab.

If water is allowed to remain for extended periods in bundles of primed parts such as girts, purlins, etc., the pigment will fade and the paint will gradually soften, reducing its bond to the steel. Therefore, upon receipt of a job, all bundles of primed parts should be stored at an angle to allow any trapped water to drain away and permit air circulation for drying. Puddles of water should not be allowed to collect and remain on columns or rafters for the same reason.

All primer should be touched up as required before Installation!



CAUTION: Retain stenciled part mark numbers on the members for easy identification & assembly.

Wall And Roof Panels:

Kirby wall and roof panels including color coated, galvalume and galvanized, provide excellent service under widely varied conditions. All unloading and installation personnel should fully understand that these panels are quality products which merits cautious care in handling.

Under no circumstances should panels be handled roughly. Packages of sheets should be

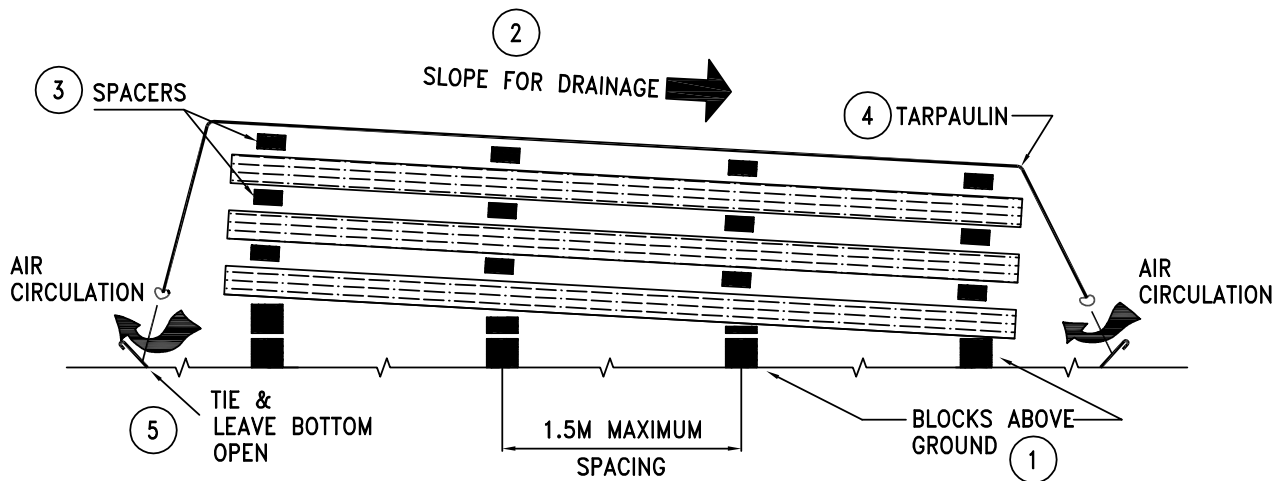
lifted off the truck with extreme care taken to ensure that no damage occurs to ends of the sheets or to side ribs. The packages should be stored off the ground sufficiently high to allow air circulation underneath the packages. This avoids ground moisture and deters people from walking on the packages. One end of the package should always be elevated to encourage drainage in case of rain.



CAUTION: Care should always be taken when walking on panels. Use safety lines and nets when necessary! Panels are slippery. Oil or wax applied to the roof and wall panels for protection against weather damage will make them a very slippery surface. Wipe dry any oil that has puddled from bundles stored on a slope. Dew, frost, or other forms of moisture greatly increase the slipperiness of panels. Always assume panel surface is slippery and act accordingly. Think Safety. Use wood blocking to elevate and slope the panels in a manner that will allow moisture to drain. Wood blocking placed between bundles will provide additional air circulation. Cover the stacked bundles with a tarpaulin leaving enough opening at the bottom for air to circulate.

Storage for Panels:

1. Block above ground to keep water out.
2. Slope bundles for drainage.
3. Stack sheeting with spacers between bundles.
4. Cover with canvas tarpaulin to protect from rain.
5. Tie down cover ends away from stack to permit air circulation, do not wrap under or restrict air



When handling or uncarting the panels, lift rather than slide them apart. Burred edges may scratch the coated surfaces when sheets are slid over one another. Never allow panels to be walked on while on the ground. Rough and improper handling of a panel is inexcusable and a prime example of poor job supervision.

NOTE:

Use gloves when handling metal panels to prevent hand injuries. Be aware of the dangers of handling panels on a windy day. A large panel can catch enough wind to knock a worker off his feet, even at ground level! Safety first!

IMPORTANT

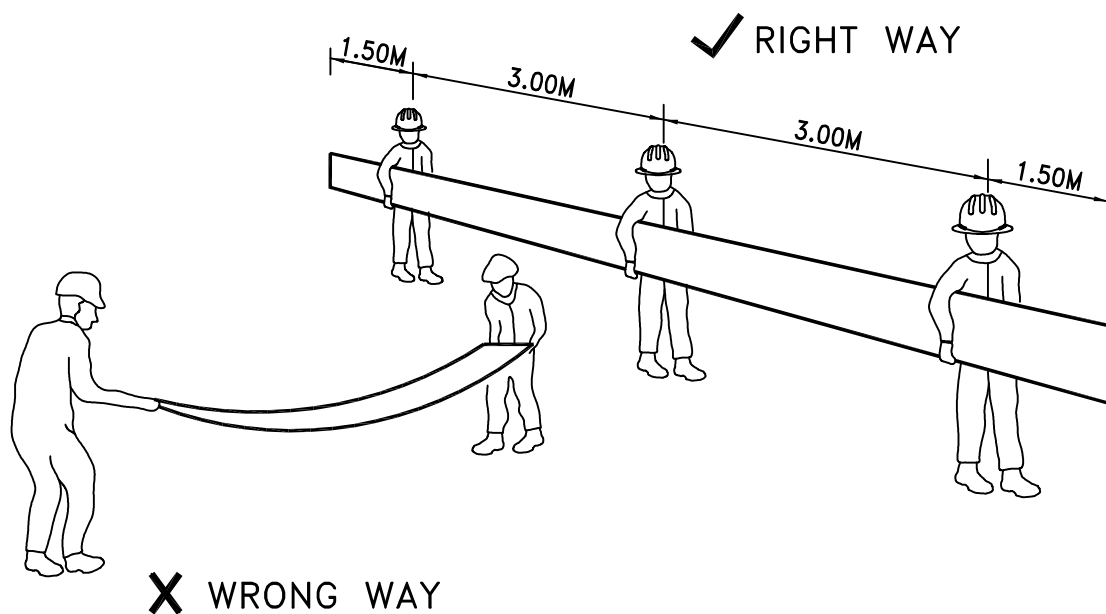
DO NOT USE PLASTIC SHEETING AS A COVER BECAUSE IT WILL PROMOTE MOISTURE.

Unloading:

A Crane and / or forklift is necessary for unloading the components of a metal building. Care should always be taken to avoid damaging material.

Lifting Panels By Hand:

Standing on one side of the panel, lift it by the seam. If the panel is over 3.00 Metres long lift it with two or more people on one side of the panel to prevent buckling. Do not pick up by the ends.



Material Layout

Component unloading procedure:

As the building material is unloaded, it should be placed in and around the building site near the place where it will be used. While each job will vary according to size or site conditions, the layout below typifies an arrangement which offers convenience and accessibility during assembly and Installation.

Rigid frame columns are laid in position for raising.

Rafters are stacked for sub-assembly and easily accessible for setting.

Girts, purlins, eave struts and bracing are divided according to the requirements of each bay.

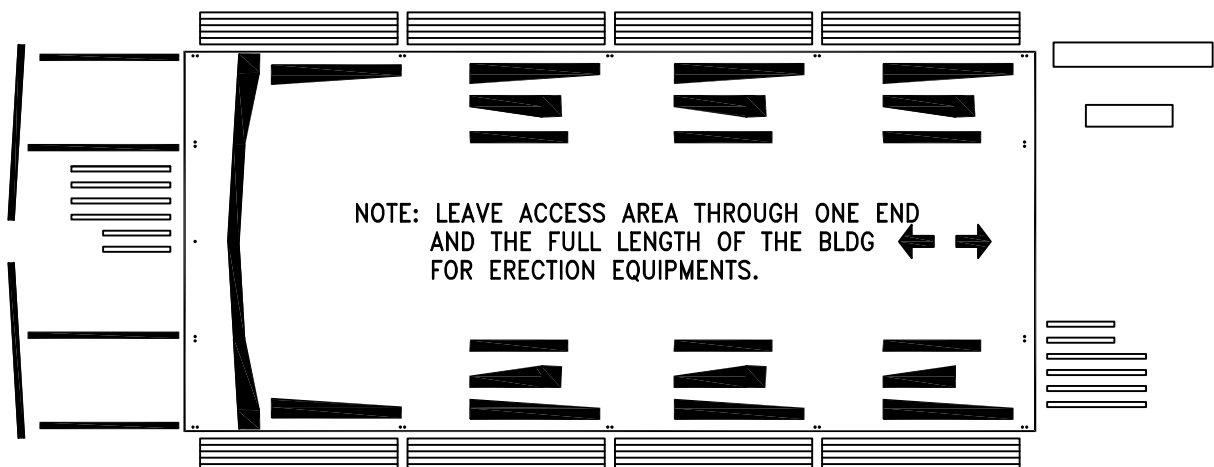
NESTED PARTS (PURLINS, GIRTS ETC.) SHOULD BE SEPARATED AND BLOCKED TO ALLOW DRAINAGE OF COLLECTED MOISTURE TO PREVENT RUSTING, PRIOR TO INSTALLATION.

Endwall material is laid out for each end.

Small components (nuts, bolts, clips, fasteners etc.) are stored in a given area convenient to all parts of the building.

Wall and roof paneling and other components which will not be used in the initial stage of erecting the steel, are placed to the outside of the work area and properly stored and protected from the weather.

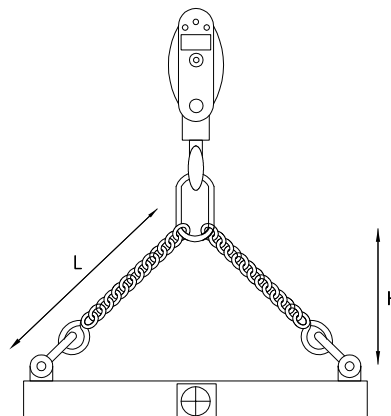
Insulation should not be stored on the edge of the roll as this will damage the edges.



Cable Tension & Hook Height

Tension and hook height for the diagrams below show lifting weights at various angles.

Notice how the cable tension increases as the lifting angle is decreased. It is of interest to note that if this angle is reduced to 15°, the cable tension is 3.9 times the vertical lift; at 10°, it is 5.7 and at 5° it is 11.5. When tension in cable increases, the compressive or buckling load on the peak rafter section also increases. Slings with low lifting angles should therefore be avoided both to protect the cable and to prevent buckling of the rafter.



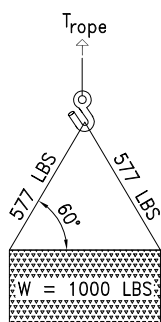
Structural Framing Precautions:

Responsible personnel, experienced in rigging and handling light steel members in a safe manner, should complete the layout, assembly and installation of steel. Improper handling can easily result in injury, delays and unexpected added costs. This is particularly true when raising assembled rafters for wide buildings.

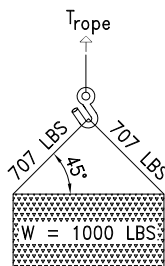
MEASURE THE HORIZONTAL SLING
ANGLE BY USE OF L/H FACTOR

L/H = LOAD MULTIPLIER

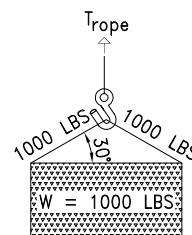
L/H	ANGLE
1.15	60 DEGREES
1.41	45 DEGREES
2.00	30 DEGRESS



LIFTING SLING AT 60°
TENSION IN ROPE IS 1.15W



LIFTING SLING AT 45°
TENSION IN ROPE IS 1.41W



LIFTING SLING AT 30°
TENSION IN ROPE IS 2W

SAFETY NOTE:

Check wire rope for broken strands, broken wires and kinking. Replace damaged, unsafe

rope immediately. Always use equipment with an adequate safety margin over the lifted load! Safety first!

Plan in advance!

Reduce avoidable costs!

Minimum costs should be obtained when the following conditions are met during the installation of Kirby buildings:

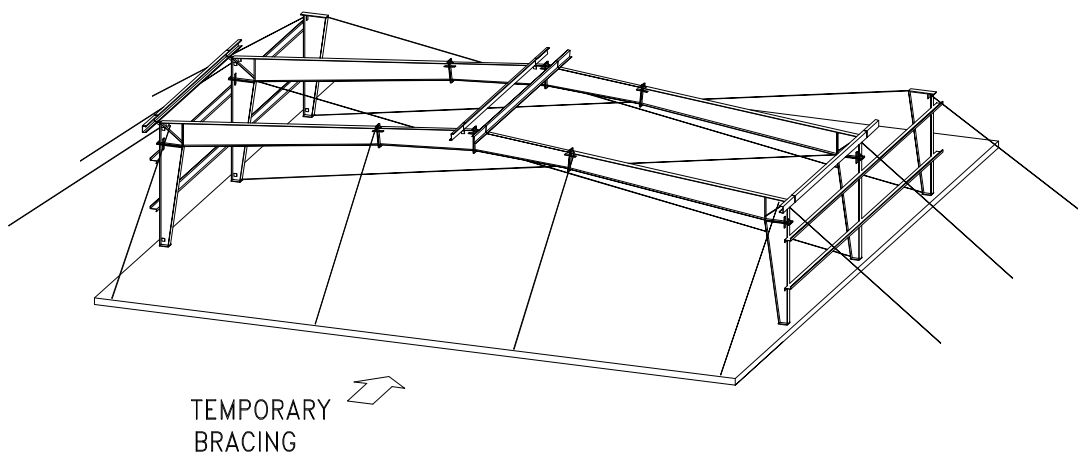
1. When safety practices are discussed and initiated in advance of any work procedure.
2. When the overall work of erecting the building is divided into individual jobs, and when each job is assigned (in proper sequence) to teams of workers consisting of two to seven workers each, with three to five workers teams preferred.
3. When individual workers are properly trained and instructed in advance as to what they are to do and the safe way to do it. This eliminates time wasted while waiting to be told what to do next.
4. When building parts are properly laid out according to advanced planning so as to avoid lost time in repetitive handling or in searching for specific items.
5. When as many parts as can be safely raised in a single lift are bolted together in sub-assemblies on the ground where assembly work is faster and safer, thereby, requiring

fewer lifts and fewer connections to be made in the air.

6. When Installation of the steel framework starts at one end and continues bay by bay to the other end of the building.
7. When the first bay is completed, the individual frames are erected and tied together by skeleton purlins, and the fill-in purlins are installed after the costly lifting equipment has been released.
8. When tools and equipment of the proper kind, in good, safe condition, are available in sufficient quantity.

Lifting Cables And Spreaders Bars:

In all instances the length of the lifting cables should be such that the angle between the rafter and the lifting cables is no less than 45 degrees. To reduce the severe compression stresses at the ridge of the rafters that are created by the angle of lifting cables, a spreader bar is recommended, which allows the lifting cables to be parallel to each other.



NOTE:

Stay well in the clear of loads being moved by any lifting device. Hands and feet should be kept

clear of moving loads and never stand under a load being lifted. Remember, SAFETY FIRST

Installation of Primary and Secondary Structural:

Many methods and procedures are in use for erecting the structural portion of metal buildings. The techniques of raising frames vary from erecting small clear spans and endwall frames in units to erecting the large clear spans and modular frames in sections. The installation methods used depend strictly on the type of buildings, the available equipment, the experience level of the crews, and the individual job conditions.

The variation in these factors precludes the establishment of a firm or specific set of installation rules and procedures. Consequently, the installation operation must be tailored by the installation personnel to fit individual conditions and requirements. However, there are certain installation practices, pertaining to structural members, which are in general use and have proven sound over the years. Descriptions of these follow.

Installation personnel are cautioned not to cut primary members (rigid frames columns, rafters,

end bearing frame rafters, interior columns). These are the primary support members for the frame and are designed as such. Any cutting of these members may affect the structural stability. A written approval from Kirby should be taken prior to attempting alterations of these members.

NOTE:

In no case should building installation be started on green concrete / honey combed concrete. Anchor bolts may pull loose, concrete spall (chip out along edges) may occur and equipment may crush or crack slab. Normal Portland cement concrete should cure at least seven days and high-early strength concrete at least three days before the structural columns are erected. Special circumstances may require even longer curing periods; consult the project engineer, not Kirby, on foundation questions.

INSTALLATION

Installation of Rigid Frames

The intermediate or interior frames nearest the bearing endwall are usually erected first. This bay usually contains the optional diagonal bracing. The proper completion and plumbing of this first bay, as will be discussed later, is extremely important to the successful completion of the building.

Although several methods are used to erect rigid frames, it has been found most satisfactory to erect the columns first, tie them together with the girts and tighten the anchor bolts. The anchor bolt tension may need to be adjusted to seat the rafter. Temporary bracing should always be installed as soon as sections are lifted in place.

When the rafter consists of several roof beams, as in the case of wide buildings, a safe procedure of raising by sections and supporting the free end must be followed, regardless of the type of equipment available. In most instances the work proceeds from outside columns inward toward the peak until the entire frame is bolted into place.

The same general procedures of installation apply to either clear span or multiple span frames. In the case of the latter, the support for rafter sections during installation is generally supplied by the interior columns, themselves, making temporary supports unnecessary. Two words of caution concerning the installation of rigid frames are in order. The first is the rigid frames, especially free ends or cantilevered sections should never be left “for the day” in an unsupported, unbraced or unguyed condition. Such practice has resulted in the total loss of considerable amounts of erected steel because of wind.

The second word of caution pertains to the additional care required in the installation of multiple span frames compared to clear span frames. Frames with interior columns, because of closer supports, have much lighter sections. They are much more apt to buckle during installation than clear span frames, and consequently require greater care in rigging and handling.

Method of statement for highly complex or very wide / tall buildings must be prepared and/or approved by Kirby Engineering before commencing work.

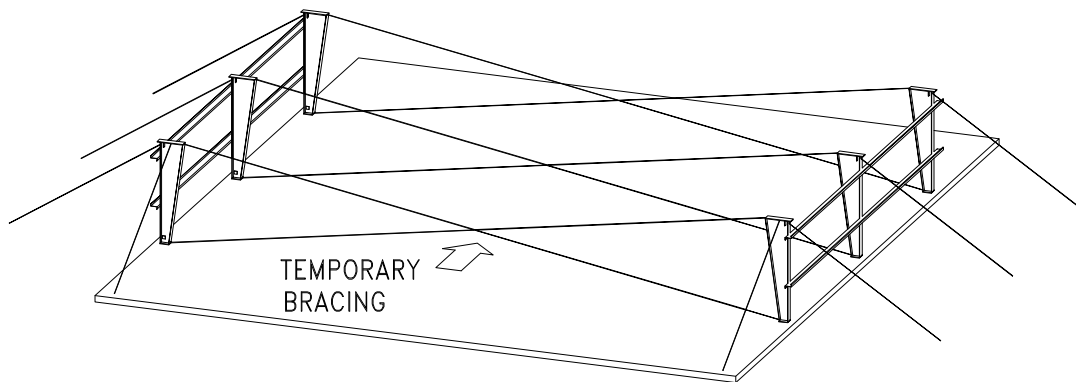


CAUTION: 50% of Purlins including peak purlins with flange braces and eave struts to be installed before releasing the crane from holding the rafter for further installation.

Structural Framing (Installation)

Installation Procedure:

STEP 1



IMPORTANT:

Before erecting column shim plates to be kept level to FFL

Columns should be erected just prior to roof rafter and secondary framing Installation.

SEQUENCE:

1. Check anchor bolt plan and Installation drawings for special conditions.
2. Erect columns in place and tighten anchor bolt nuts.
3. Attach girts and install temporary bracing.

NOTES:

1. Plan to erect a braced bay first, usually this is the first interior bay from either end of the building.
2. It is the responsibility of the installation personnel to provide temporary Installation bracing until structure is complete.

STEP 2

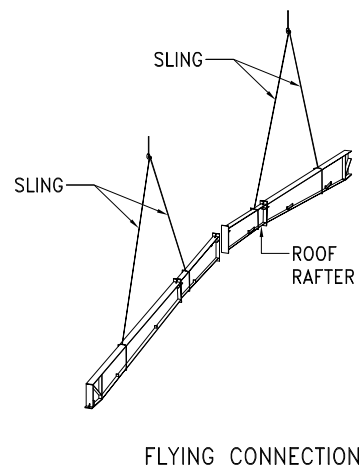
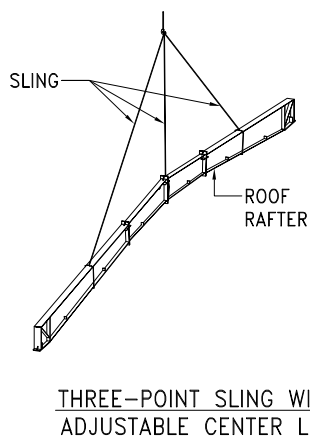
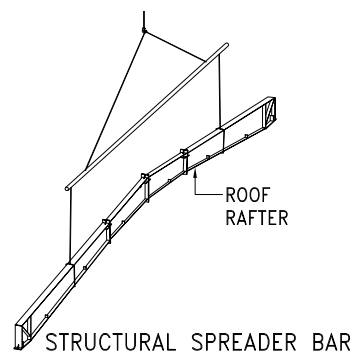
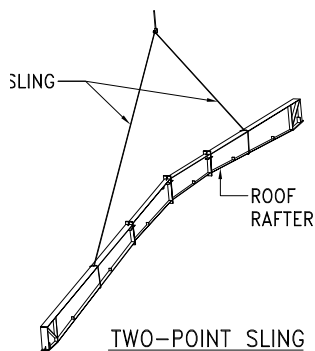
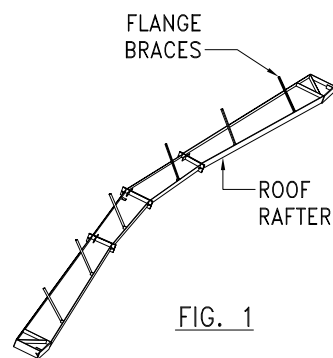
A. Installation of Flange Braces:

Attachment of flange braces on the ground.

Check your primary framing drawings for flange brace locations. Attach flange braces to the roof rafter assembly while on the ground to one side, attach flange braces to opposite side when roof rafter assembly is raised into vertical position.

B. Lifting Rafter Assembly:

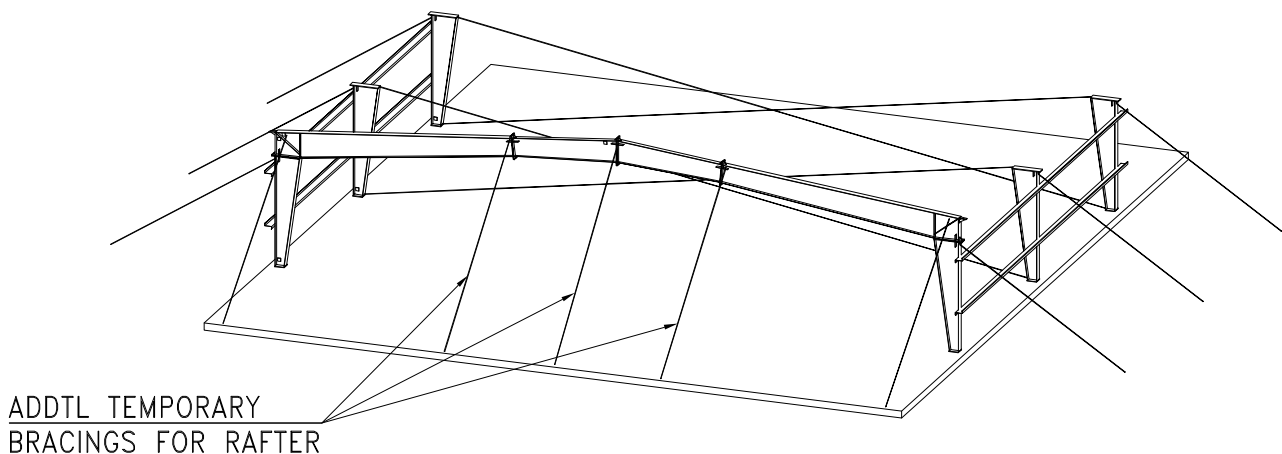
Shown are four methods which may be used for rigging slings for lifting roof rafter assemblies. Regardless of the method you use, make sure, it is suitable and adequate for the job when considering size of the roof rafter and hoisting equipment available.



C. Installation Rafter Assembly:

1. Raise rafter beam into place.
2. Hold rafter beam in place until it is securely bolted to the column and temporary bracing

is installed to hold assembled rigid frame in place.



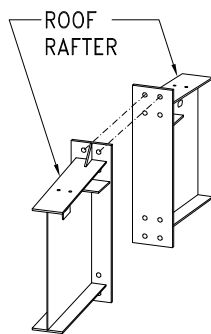
NOTES:

1. Assemble roof rafter components on the ground.
2. Make sure roof rater is level and straight before structural bolts are fully tightened
3. Bolt in place as many clips and flange braces as possible before raising roof rafters to reduce Installation time as it is easier to assemble these pieces on the ground than it is to do it in the air.
4. For suggested methods of hoisting roof rafters, see page 36 of this manual.

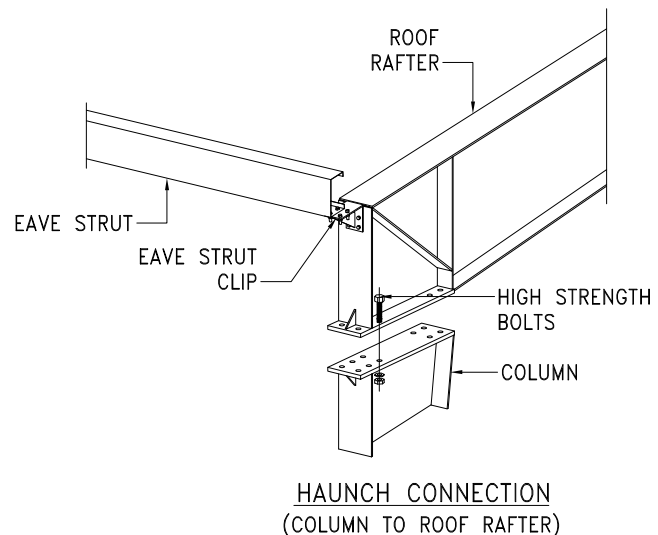
D. Rigid Frame Connection Details:

NOTES:

1. All connections are field bolted.
2. Refer to your installation drawings for quantity and bolt size.
3. All bolts are high strength.
4. All bolts are to be installed using Turn-of-Nut method or by using Calibrated Torque Wrench.
5. Install and tighten all frame connection bolts as each rigid frame is assembled.
6. All high strength bolts shall be tightened as per the tables shown on page 42 and 43.



ROOF RAFTER SPLICE
CONNECTION

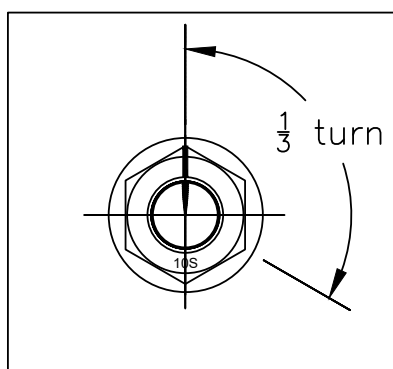


Turn-of-the-Nut Pretensioning Method:

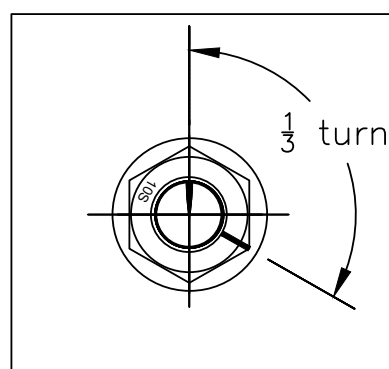
1. Check all connections to be sure that all bolts have been installed.
2. All the bolts shall be brought to snug-tight position before tensioning.
3. Position the bolt to snug tight by manual operation using an ordinary spud wrench. A full effort of a man using an ordinary spud wrench would bring the bolt to snug tight position. No wrench extension or long wrenches should be used to bring the bolt to a snug tight position to avoid tensioning.
4. Once the snug tight position is achieved, the outer face of the nut shall be match-marked with the protruding bolt before final tightening. Matchmarking shall be by waterproof marking pen.
5. After matchmarking, the tightening shall proceed until the desired nut rotation meets the requirements as shown in Table 8.2.
6. A visual check on the match-marks will indicate when the correct rotation has been achieved.
7. Tightening shall be carried out by manual wrench, or electric impact wrench.

RCSC Specification (Nut Rotation from Snug Tight Condition for Turn-of-Nut Pretensioning)

BOLT Length	Amount of nut rotation
Up to 4 times diameter	1/3 turn
More than 4 times up to 8 times diameter	1/2 turn
More than 8 times up to 12 times diameter	2/3 turn
For all required nut rotations, the tolerance is plus 60° (1/6 turn) and minus 30° (1/12 turn).	



Match - Mark nut & bolt



Position of nut after tightening

ASTM-A325M High Strength Bolts

Bolt Dia mm	Min Bolt Pre-Tension	
	kN	M.Ton
12	49	5
16	91	9
20	142	15
24	205	21
27	267	27
30	326	33
32	376	38
36	475	48
39	567	58

ASTM-A490M High Strength Bolts

Bolt Dia mm	Min Bolt Pre-Tension	
	kN	M.Ton
12	61	6
16	114	12
20	178	18
24	257	26
27	334	34
30	408	42
32	471	48
36	595	61
39	710	72

Using Calibrated Torque Wrench:

A wrench containing an adjustable mechanism for measuring and controlling the amount of torque or turning force to be exerted used to tighten nuts of high strength bolts.

ASTM-A325M High Strength Bolts

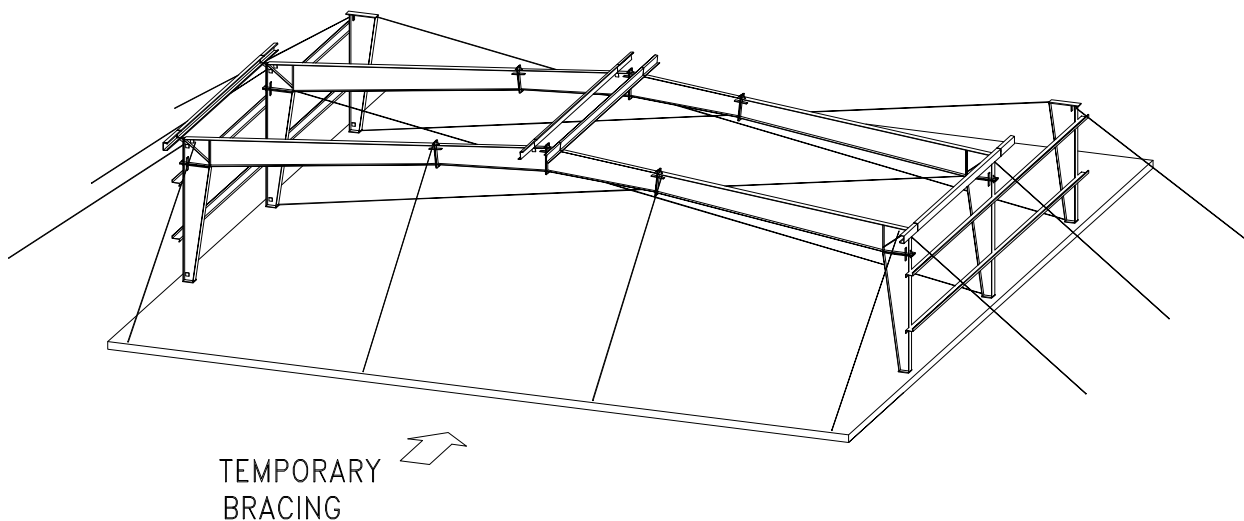
Bolt Dia mm	Induced Load kN	Recommended Tightening Torques	
		Black/HDG (k=0.20)	Lubricated (k=0.15)
12	38.93	93	70
16	72.38	232	174
20	113.10	452	339
24	162.86	782	586
27	212.25	1146	860
30	258.99	1554	1165
32	299.22	1915	1436
36	377.33	2717	2038
39	450.80	3516	2637

ASTM-A490M High Strength Bolts

Bolt Dia mm	Induced Load kN	Recommended Tightening Torques	
		Black/HDG (k=0.20)	Lubricated (k=0.15)
12	55.45	133	100
16	103.09	330	247
20	161.07	644	483
24	231.95	1113	835
27	302.29	1632	1224
30	368.87	2213	1660
32	426.16	2727	2046
36	537.40	3869	2902
39	642.05	5008	3756

STEP 3

1. Repeat Step 2 for the second rigid frame of the braced bay.



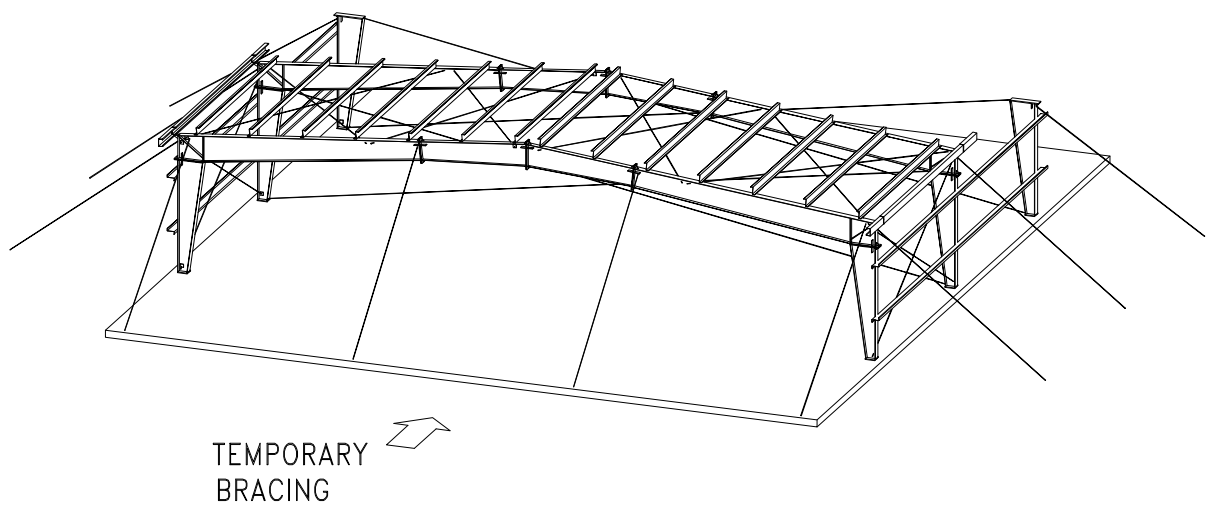
NOTE:

If the roof rafter consists of more than two segments, additional purlins are to be installed while roof rafter is held in place so that there are

at least two purlins spanning between roof rafter segments.

STEP 4

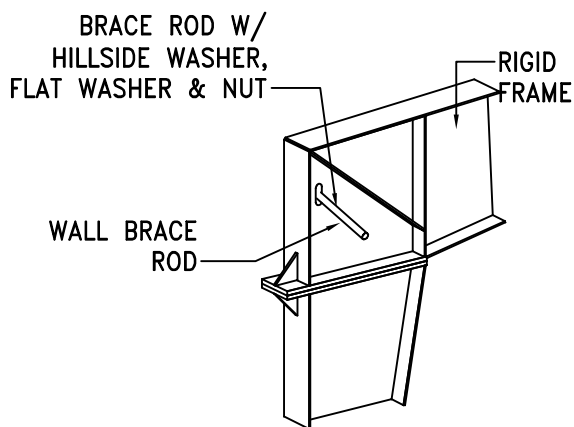
1. Bolt all remaining girts and purlins in place in the braced bay.
2. Install bracing and flange braces.
3. Proceed to plumb and square the braced bay.



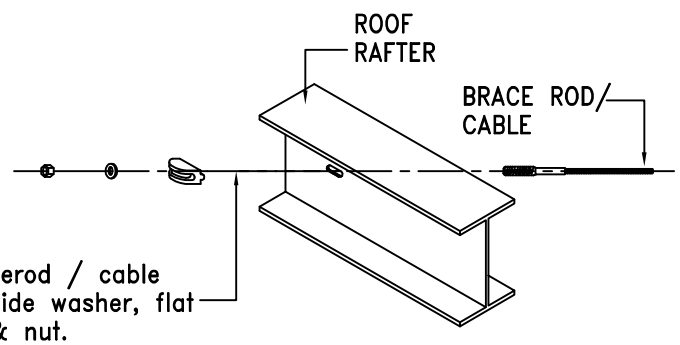
NOTES:

1. See the pages 49-51 for methods of plumbing and squaring the braced bay.
2. No further installation is to proceed until item 3 of step 4 has been fully completed.

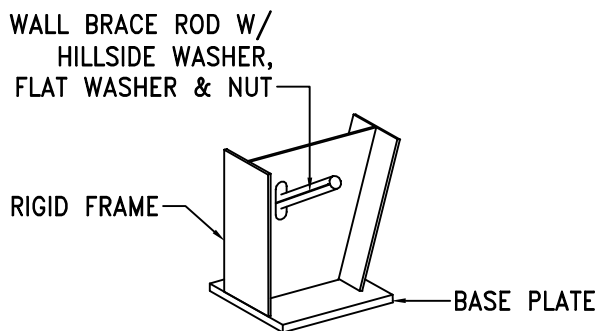
Rod Bracing:



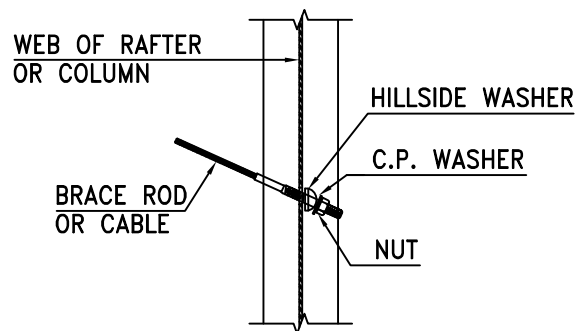
WALL BRACE DETAIL
AT HAUNCH



ROOF BRACE DETAIL AT ROOF RAFTER



WALL BRACE DETAIL
AT COLUMN BASE



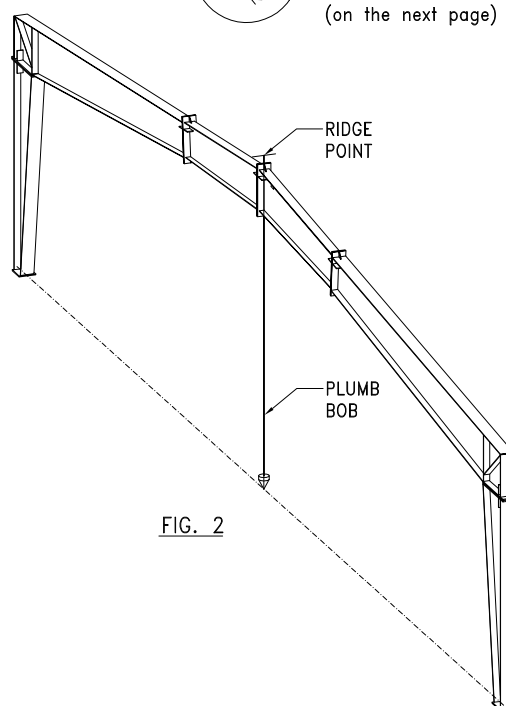
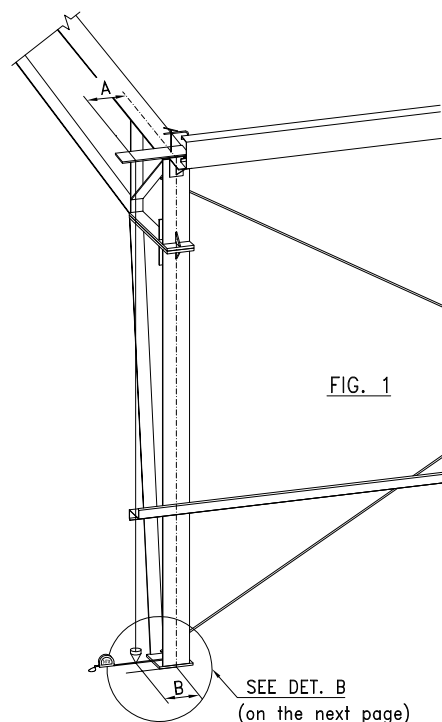
The protruding lug on the hillside washer is always located in the slotted hole to restraining its movement when brace rod/cable is tightened.

Plumbing & Squaring

STEP 5

As soon as all the purlins, girts and eave struts have been installed in the braced bay, it should be accurately plumbed and squared to ensure correct alignment of the succeeding bays. This is accomplished by adjusting the diagonal bracing and temporary bracing in the roof and wall planes.

1. With all the rods loosely installed, plumb the column of the rigid frame by tightening or loosening the nuts of the brace rods. Remember: when one brace rod is tightened, the other rod must be loosened. When columns are plumb, sidewall brace rods should be finally tightened to a "Taut" condition. Dimension "B" must be the same as dimension "A" for column to be plumb, See Fig 1
2. The Roof Beams should be aligned in progression from the eave to the ridge. Plumb the roof rafter at each connection point and the ridge by tightening or loosening the rod at those points. Stretch a line across the flanges at the base of the column. Drop a plumb bob from the ridge point of the roof rafter, adjust as necessary so that the plumb bob is in line with line at base of columns. When this occurs the ridge is plumb, See Fig 2



NOTE:

Before step 2 is started, check to make sure column and roof rafter flanges are the same width. If flanges are not the same width, allow

for measurement adjustments to compensate for the width difference before proceeding with step 2.

3. Check to be sure that ridge point of the rigid frame is over the center line of the building. See fig 3 Measure to establish bim "A", dimension "B" is 1/2 bim. "A", Establish center line of buildings from dimensions "A" & "B" and mark center line of floor slab., Drop a plumb bob from ridge point of building. Adjust ridge point if necessary so that plumb bob aligns with centerline of the building.

NOTE:

The plumbing and squaring operation is one of the most important function of the installation sequence. Spend sufficient time on this sequence to ensure the braced bay is level, plumb and square to avoid problems when continuing the Installation sequence.

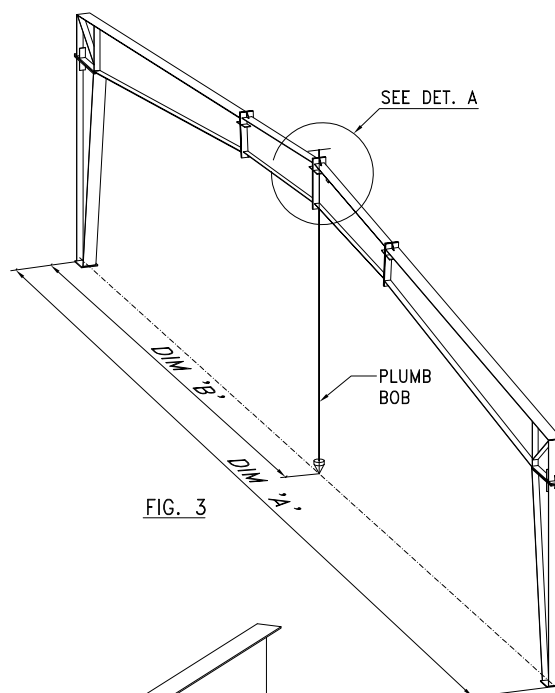
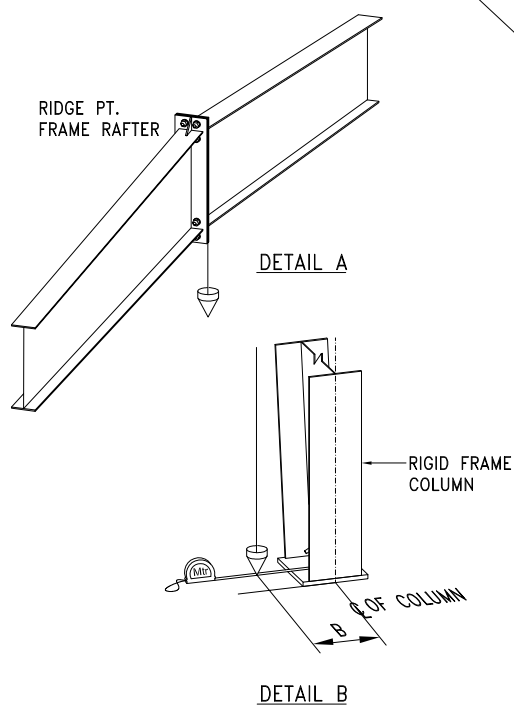


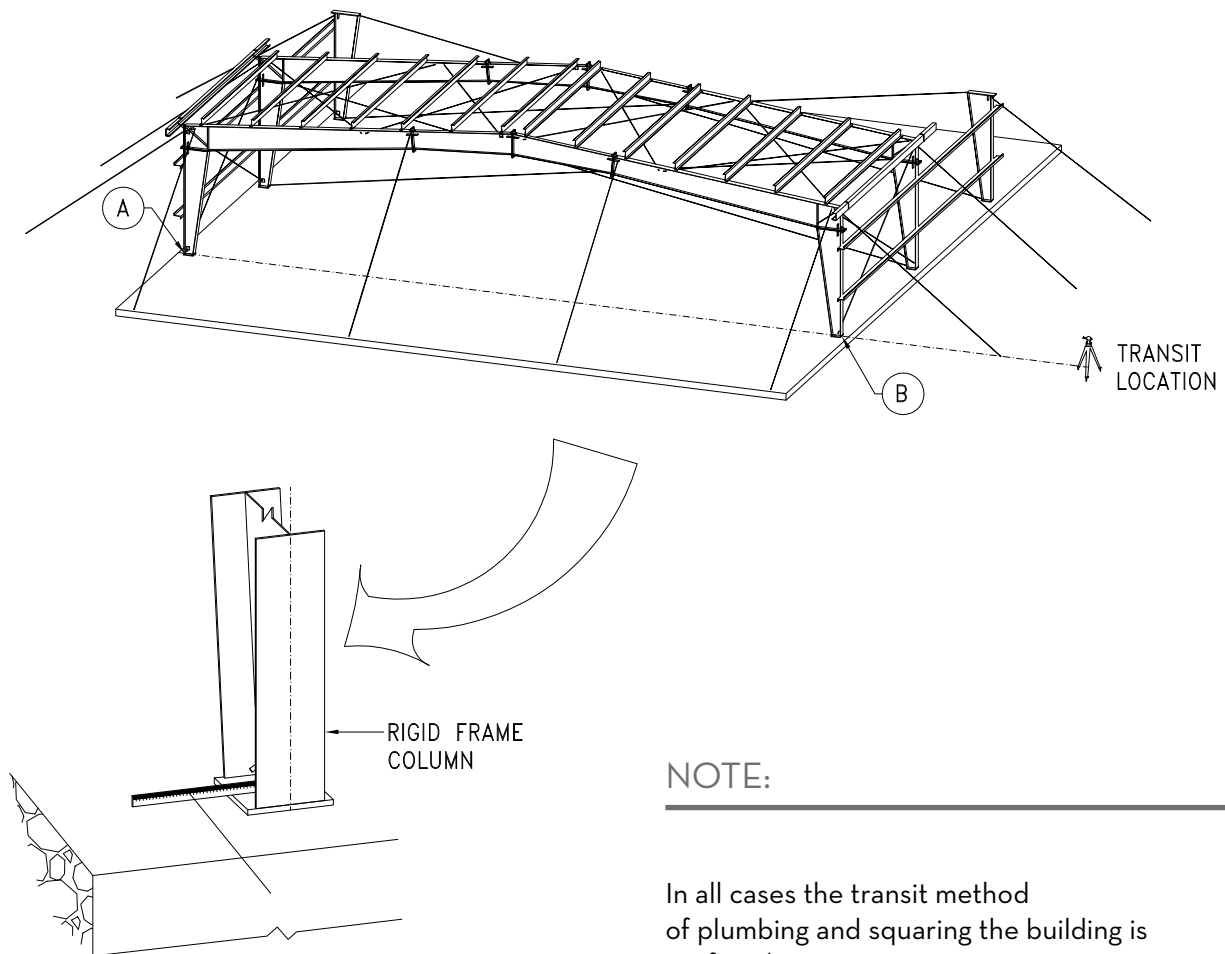
FIG. 3



CAUTION: This method is not recommended under conditions that would be affected by wind.

STEP 5 CONTD.

1. Locate Transit as shown above, (In this example it is located slightly to the left of the first rigid frame).
2. Make sure transit is perfectly level.
3. Rotate transit until you get the same exact tape reading at points A & B, (Base of
- column, outside flange - See Details).
4. Lock Horizontal rotation of transit.
5. Adjust rod bracing until the tape reading at point A & B is obtained at all points indicated on above sketch - take all reading from the same surface as "A" & "B".

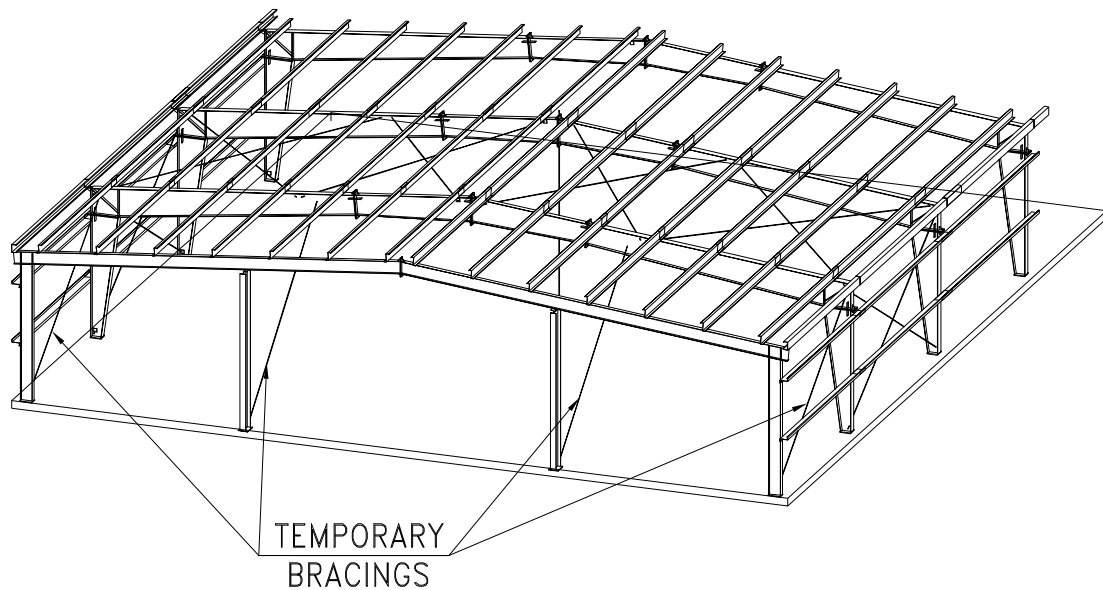


NOTE:

In all cases the transit method of plumbing and squaring the building is preferred.

Structural Framing Continued...

STEP 6



Proceed with the installation of the remaining frames and bearing end frames. In each braced bay shown on the installation drawings, repeat step 4 before proceeding with the installation of additional bays.

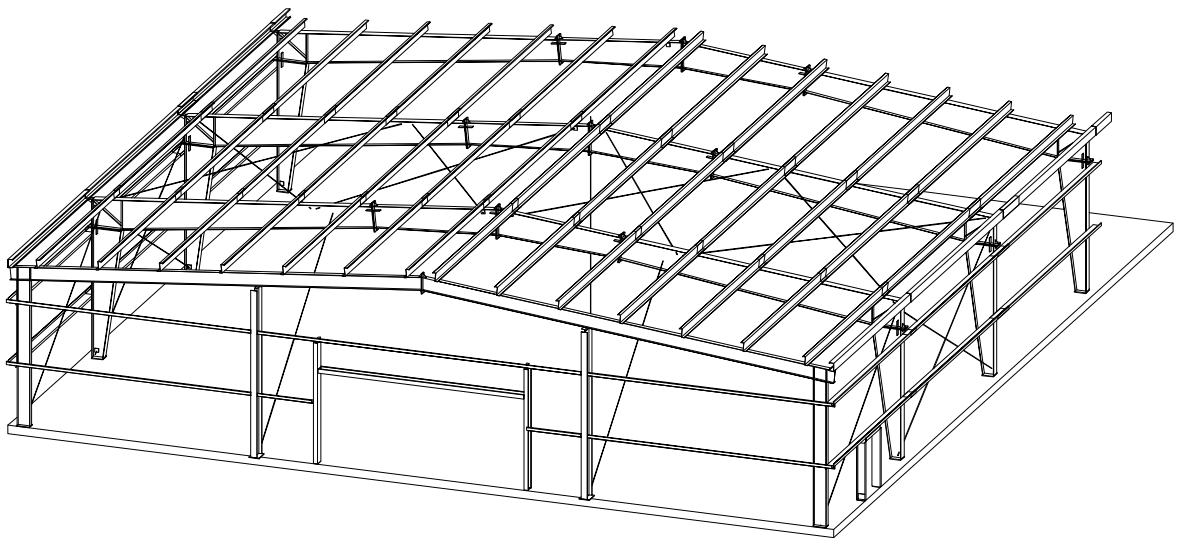
Eave struts and peak purlins may be installed in intermediate bays between braced bays to stabilise frames. However, do not start more

work than can be completed in a work day to ensure all structural framing is completed in those days before leaving the site at the end of the day,

IMPORTANT NOTES:

1. As installation progresses, each braced bay must be fully completed as outlined in step 4 before proceeding with the installation of additional bays.
2. Install portal brace, jack beams (Where ever applicable) first before proceeding with rafter and purlin installation of subsequent bays.
3. Where ever there is fascia column, it is to be attached to the main column / rafter on ground to save time.

STEP 7



Complete installation of all red steel components. Align the purlins by stretching the piano wire between rafter and along the flanges of the purlins, adjust the sag rod nuts to match the purlin to the piano wire.

Upon completion of all secondary framing in the braced bay, plumbing and squaring the braced

bay, installing secondary framing in the end bay, paneling may commence and be worked in conjunction with the completion of the balance of the red steel. This could save time on larger buildings if separate sheeting crews are used.

NOTE:

When the building reaches this stage of installation, sheeting should proceed immediately. The structure without sheeting should not be left standing for prolonged periods of time without taking proper precautions

(Temporary bracing, blocking etc), to prevent wind damage especially to purlins and girts due to excessive vibration they are exposed to in the un-sheeted conditions.

Installation of Wind Bracing

The diagonal bracing is usually a round rod. It should always be installed as shown on the installation drawing and should be tensioned so that the building will not sway or rock when the wind blows. Care should be taken, however, not to over tighten and bend the structural members. The workman should watch the structural members carefully as he tightens the bracing.

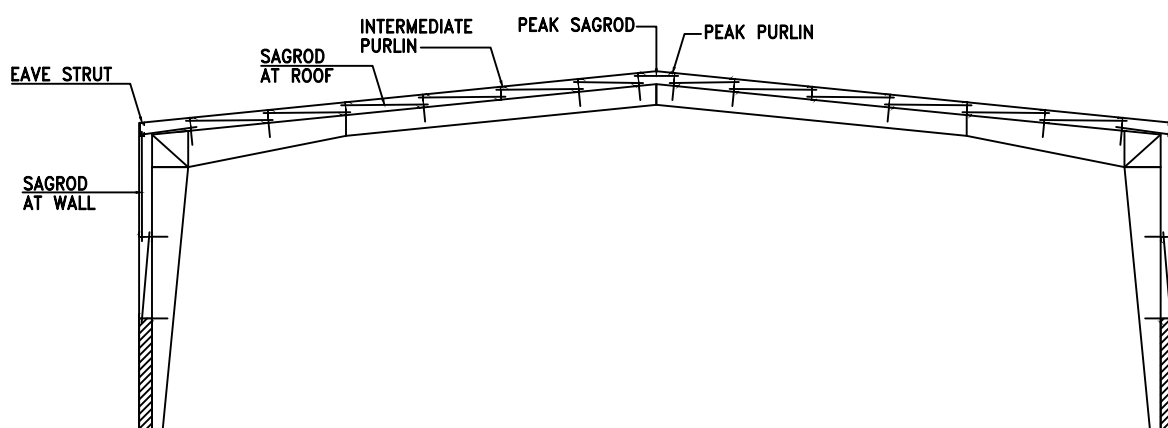
Occasionally the bracing in the wall of a building cannot be installed in the specified bay because of doors or other complications. Usually these can be moved to other bays without affecting the structural integrity of the building. However, before moving any wind bracing check with Kirby. Never modify a Kirby building without first notifying Kirby and getting back a written confirmation

Installation of Sagrods

Sagrod on the wall is a tension member used to limit the deflection of a girt in its weak axis direction. On the other hand, sagrod on the roof is used to limit the lateral displacement of the bottom flange or purlins caused by the horizontal component of the gravity load. Generally, both are used to keep the purlin / girt from sagging. For erection purposes, it is used to properly align purlins / girts.

Sagrods are shown in the roof framing plan, sidewall and endwall framing elevations (wherever required). All Sagrods are supplied with 2 nuts at each end.

Refer to schematic diagram below for sag rod fixing at roof and sidewalls.



SCHEMATIC DIAGRAM – FRAME CROSS SECTION @ SAGROD LOCATION

Alignment of Crane Beams

Crane beam alignment is very important for smooth, trouble free performance of Cranes. It is important that the centerline of crane beam web and crane rail is aligned to the acceptable tolerances as mentioned in the table to avoid torsional forces on the beam and to improve performance of structure for long life. The following procedure shall be followed:

1. Check straightness of crane beams on ground before Installation.
2. Check the level of top of crane brackets and level the columns base plates accordingly.
3. Mark the center of web on the top flange / channel of crane beam and mark the same by using punch marks for easy identification.
4. Check the straightness, level of crane beams both the length and width of the building as per the tolerance mentioned in the table.

NOTE:

- a. Use piano wire / Theodolite for checking the straight line of crane run way beams.
- b. Ensure uniform (measurable) pull is given while measuring the span and diagonal

dimensions. (Please ensure proper taping method is followed)

5. Stretch a piano wire (without any bends) to match punch marks already made on the crane beams and adjust the crane beams till all the beams are to a straight line and as per the tolerances mentioned in the table and complete alignment of run away beams along one side first.
6. Follow the same procedure on another side and adjust the crane beams to a straight line. While aligning the beams to the straight line, ensure the span and diagonal dimensions for each bay is within the acceptable tolerance.
7. Install the bracing angles / surge girders members. Ensure the span and diagonal dimensions are not disturbed while installing these members.
8. Ensure the rail is laid as per the straight lines marked on the beams top flange and the maximum direction between rail and web of crane beams not exceeding more than 3/4" of web of crane beams.
9. Record all the readings in a chart and accept the alignment of crane beams and crane subject to within the acceptable tolerances mentioned in the table.

Crane runway beam installation:

Item	Description	Tolerance	Maximum Rate of Change
Span	<p> $L = L + A$ (Max) $L = L - A$ (Min) Support point (Typical) Theoretical span </p>	$A = 8/3 "$ $(A = 10\text{cm})$	$20"/4/1'$ $(6.3\text{mm} / 6\text{m})$
Straightness	<p> $B = 8/3 "$ $(B = 10\text{cm})$ </p>	$B = 8/3 "$ $(B = 10\text{cm})$	$20"/4/1'$ $(6.3\text{mm} / 6\text{m})$
Elevation	<p> Top beam for top running crane Bottom of beam for under hung crane Support point (Typical) Theoretical Height </p>	$C = 8/3 "$ $(C = 10\text{cm})$	$20"/4/1'$ $(6.3\text{mm} / 6\text{m})$
Beam to Beam Top Running	<p> Top running </p>	$D = 8/3 "$ $(D = 10\text{cm})$	$20"/4/1'$ $(6.3\text{mm} / 6\text{m})$
Beam to Beam Under hung		$E = 3/8 "$ $(E = 10\text{cm})$	$20"/4/1'$ $(6.3\text{mm} / 6\text{m})$
Adjacent Beams	<p> Top running Under Hung </p>	$F = 8/1 "$ $(F = 10\text{cm})$	NA

Erection Tolerances

The following normal tolerance limits relate to steel structure in the unloaded stage where the structure is only loaded under self-weight.

Deviation for Installation of Anchor Rods and Foundation Bolts

The variation in location of these items from the dimensions shown in the approved embedment drawings shall be as follows:

1. The vertical variation in location from the

specified top of anchor rod location shall be equal to or less than plus or minus 1/2 in. (13 mm).

2. The horizontal variation in location from the specified position of each anchor rod centre line at any location along its projection above the concrete shall be equal to or less than the dimensions given for the anchor rod diameters listed as follows:

Anchor Rod Diameter, in. (mm)	Horizontal Variation, in. (mm)
3/4 and 7/8 (19 and 22)	1/4 (6)
1, 1 1/4, 1 1/2 (25, 31, 38)	3/8 (10)
1 3/4, 2, 2 1/2 (44, 50, 63)	1/2 (13)

Deviation for Beam and/or connections

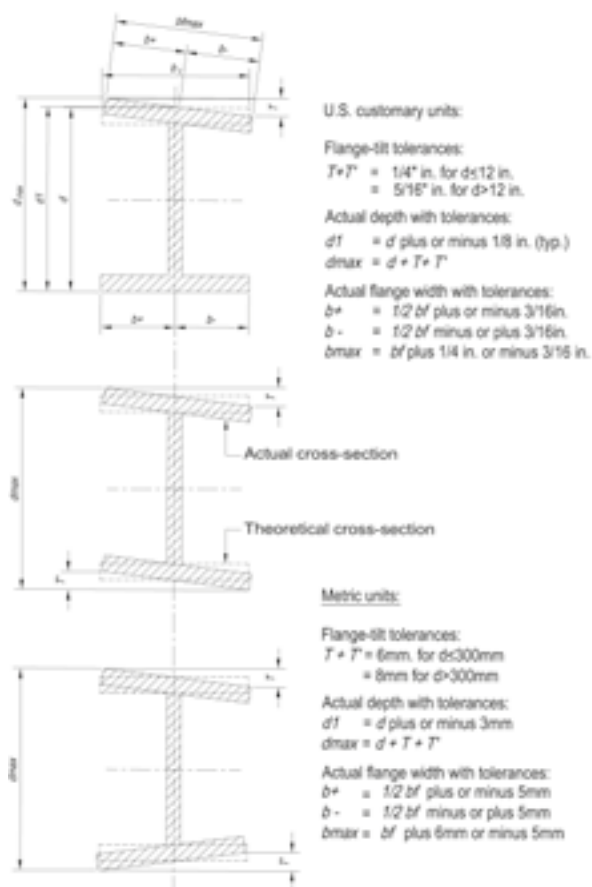
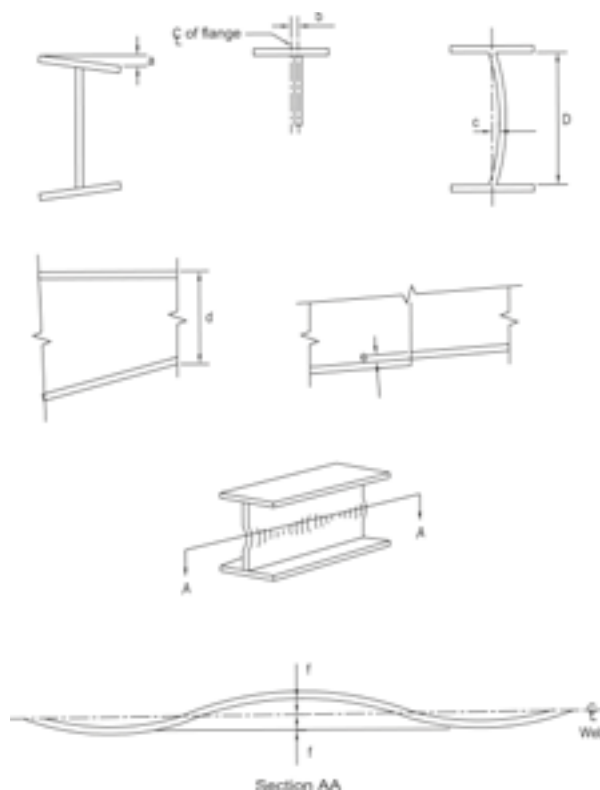
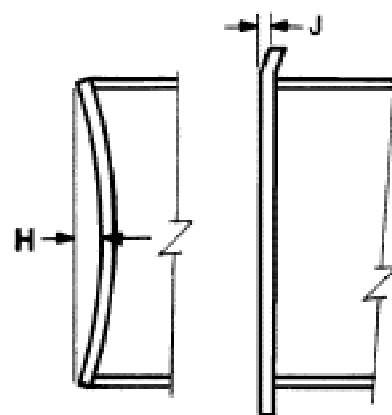
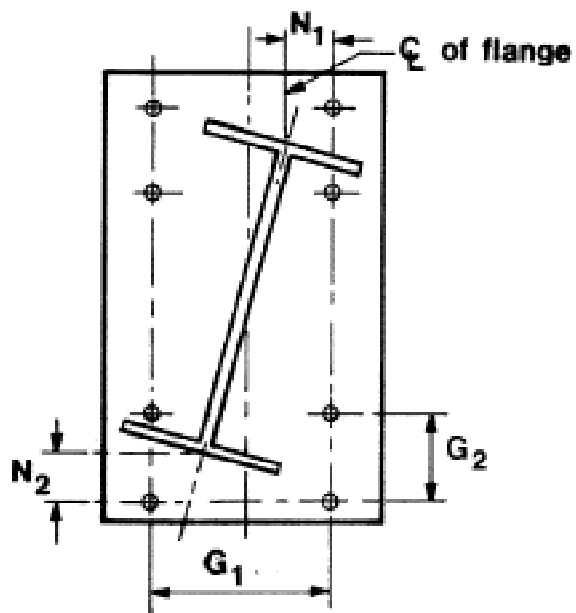
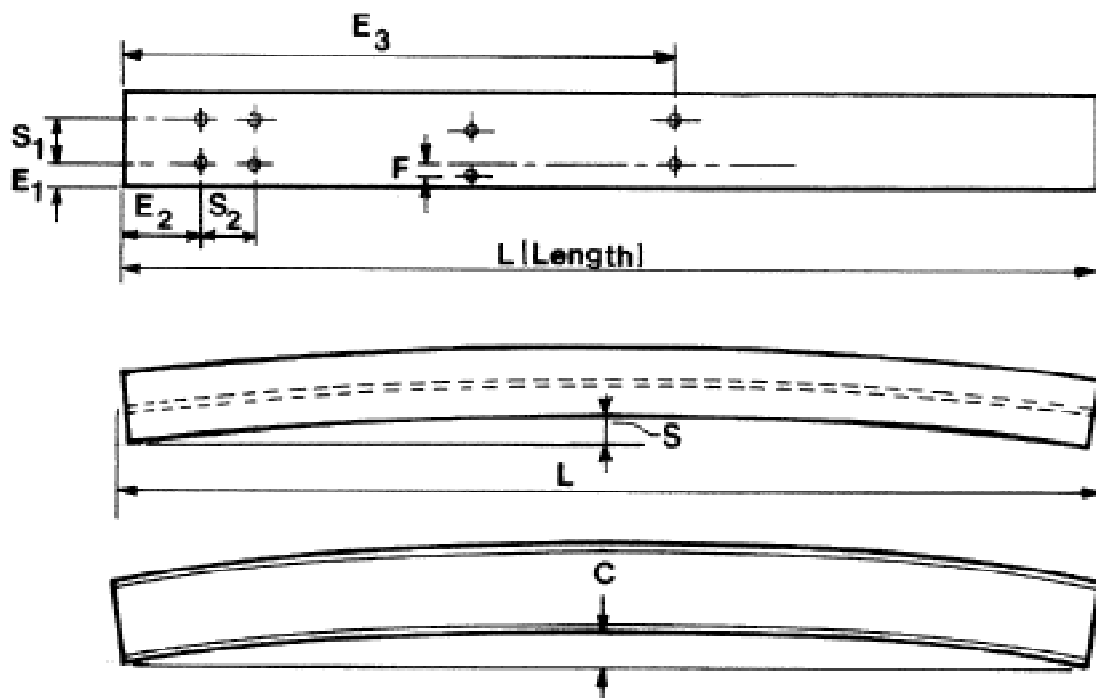


Figure C-5.1. Mill tolerances on the cross-section of a W-shape.



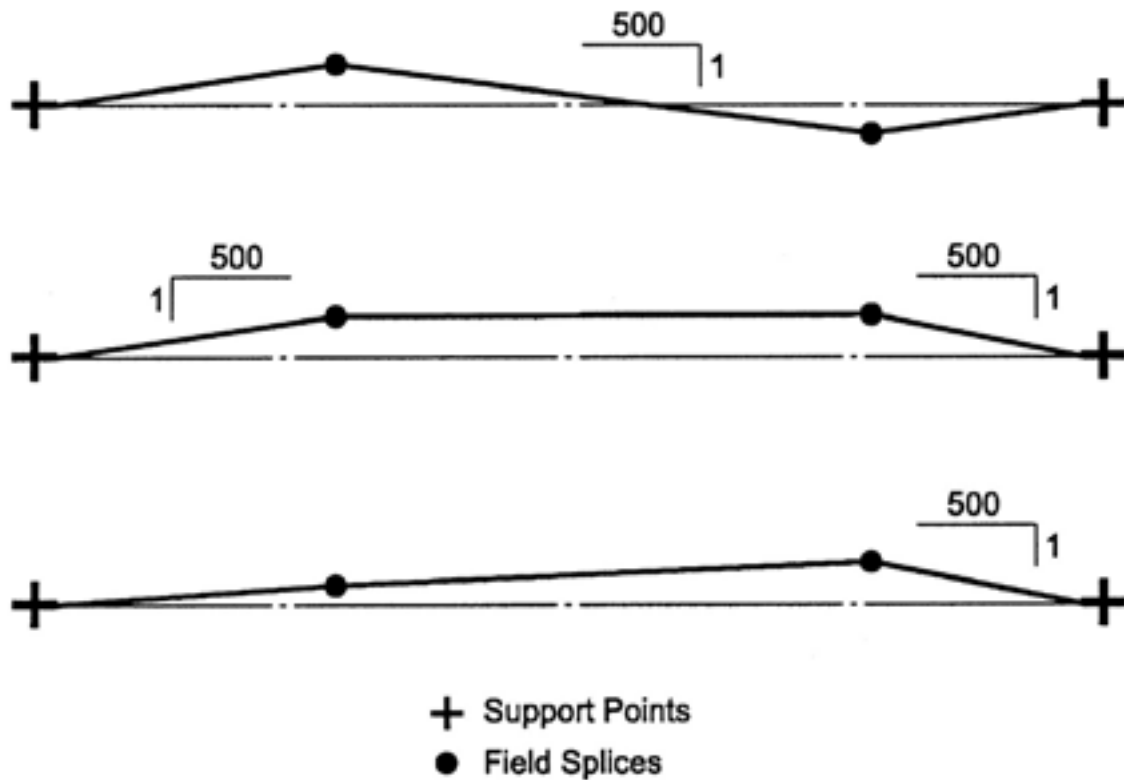


Built - Up Structural Members

	Dimension	Tolerance	
		+	-
Geometry	a	3°-1/4" Max	3°-1/4" Max
	b	1/4"	1/4"
	d	3/16"	3/16"
	e	1/8"	1/8"
	c	D/72"	
	f	D/72"	
Hole Location	E1	1/8"	1/8"
	E2	1/8"	1/8"
	E3	1/8"	1/8"
	S1	1/16"	1/16"
	S2	1/16"	1/16"
	F	1/8"	1/8"
Length (L)		1/4"	1/4"
Sweep (S)		Runway Beams 1/8" x L(ft)/10 All other members 1/4" cL(ft)/10	
Camber (C)		1/4" x L(ft)/10	
Splice Plates	N1	1/8"	1/8"
	N2	3/16"	3/16"
	G1	1/16"	1/16"
	G2	1/16"	1/16"
	H	UP TO 24"	1/8"
		24" TO 48"	3/16"
		OVER 48"	1/4"
	J	1/4"	1/4"

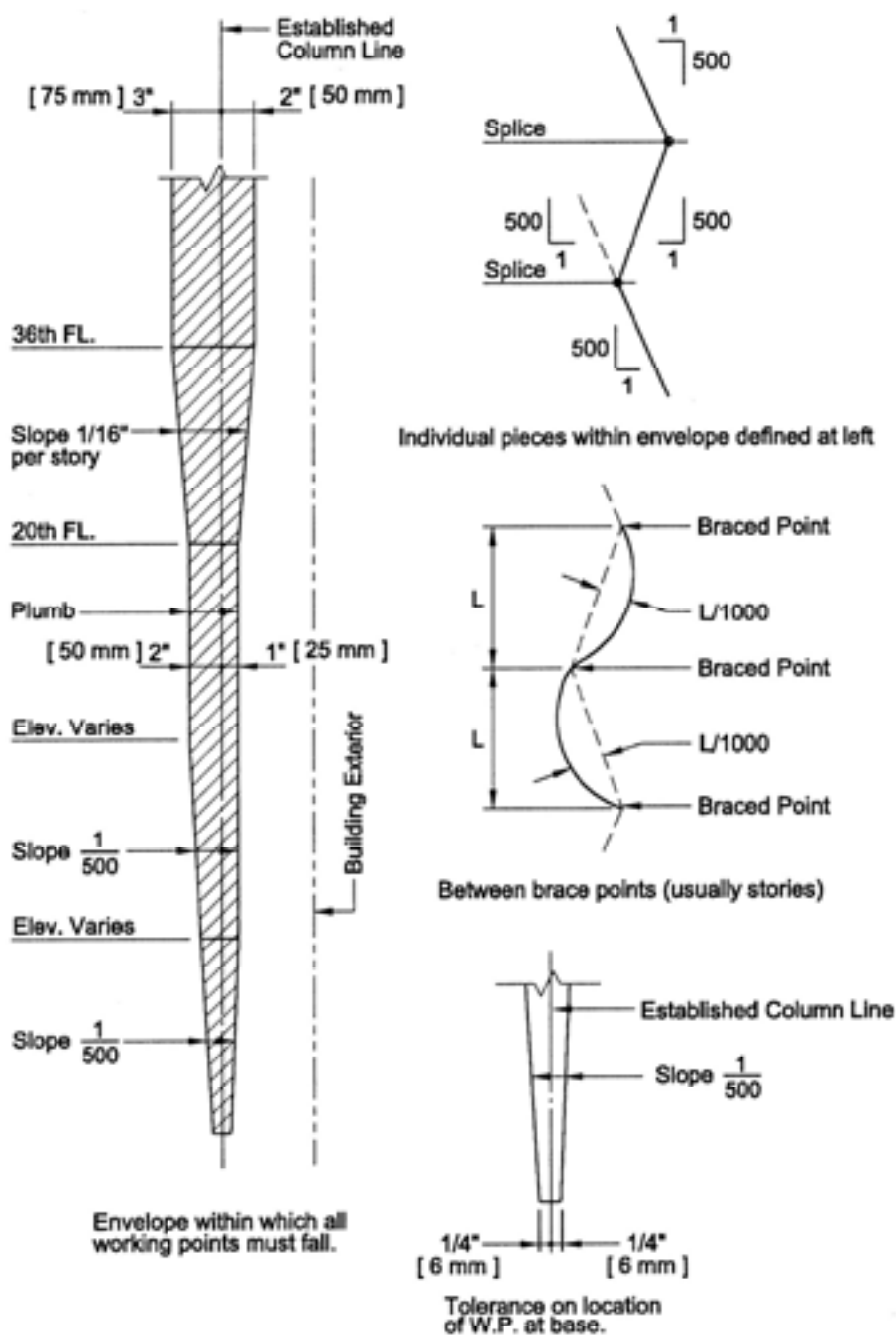
For a cantilevered member that consists of an individual, straight shipping piece, the plumbness, elevation and alignment shall be acceptable if the angular variation of the working line from a straight line that is extended in the

plan direction from the working point at its supported end is equal to or less than $1/500$ of the distance from the working point at the free end



Structural Steel Frame Tolerance

For an individual column shipping piece, the angular variation of the working line from a plumb line shall be equal to or less than $1/500$ of the distance between working points



Erection Camber

Main Girder or truss above 15m in length construction shall be provided with such camber under effect of dead load and half of life load. Rolled beams with 15m need not to be cambered. Cambered values shall be followed as

per project drawings and fabrications details

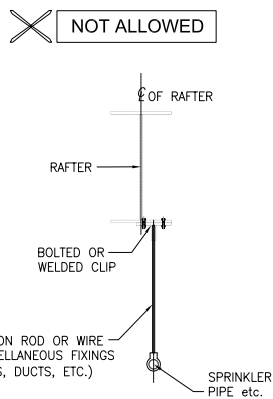
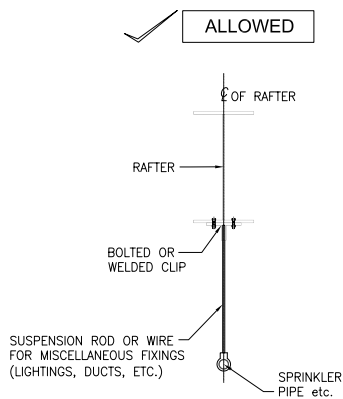
Suspension Of Loads From Main And Secondary Members

NOTE:

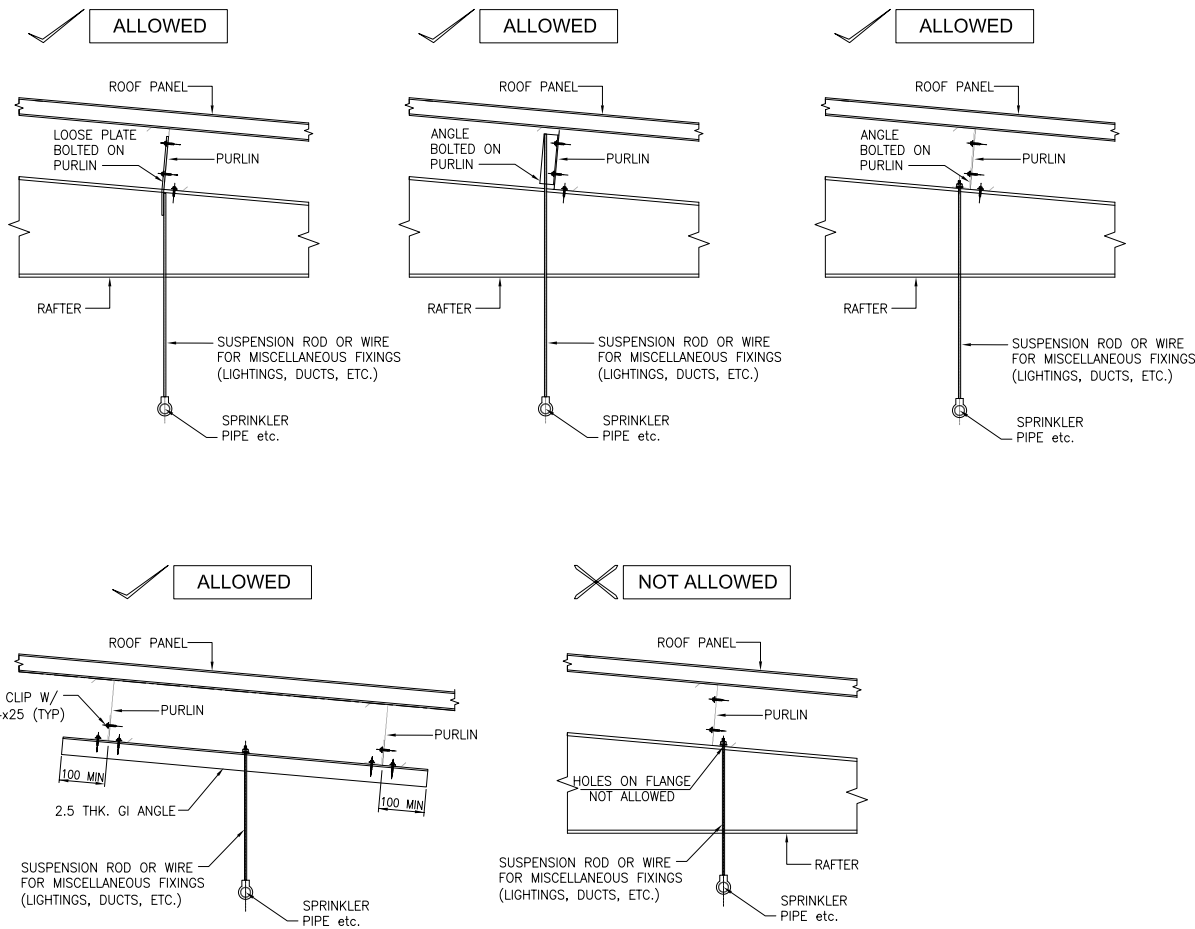
1. Drawing details shows the proper methods of suspending loads from purlins and rafters.

2. The total load suspended from purlin and rafter shall not exceed the value of collateral load indicated on the drawings. If in doubt, please contact Kirby's nearest Representative for confirmation.

FROM RAFTER:



FROM PURLIN:



SHEETING

General Note

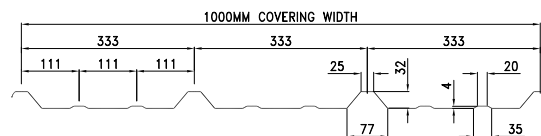
All the primary and secondary framing should be erected plumbed and the bolts properly tightened before the sheeting of the building is started. Framed openings should also be

installed, plumbed, squared and tightened before sheeting begins.

Kirby Roof Panel (KR):

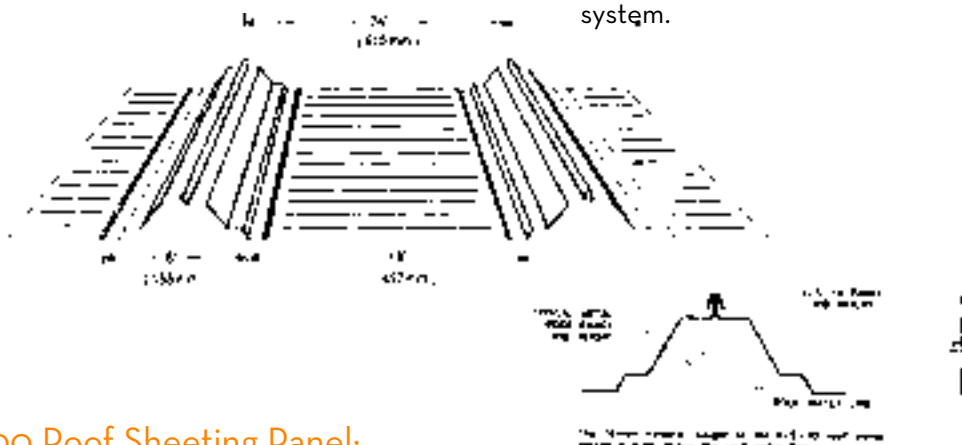
The KR panels are designed for both roof and wall applications. Its symmetric profile allows for installation without regard to sheeting direction. Sheeting can be started from either end of the building; however, by applying the sheets toward

the direction of the prevailing wind, the overlap line on the side of the every third rib will be less visible. Where heavy prevailing winds occur; place the edge to be lapped into the wind!

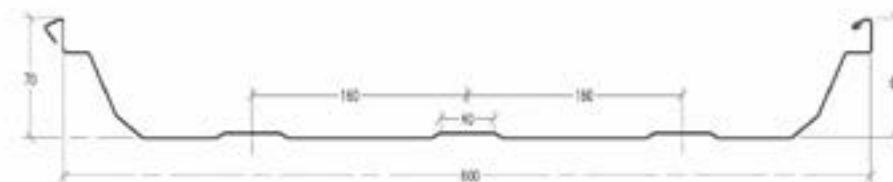


KLS- 10 Panels:

These panels are designed as standing seam roof system.



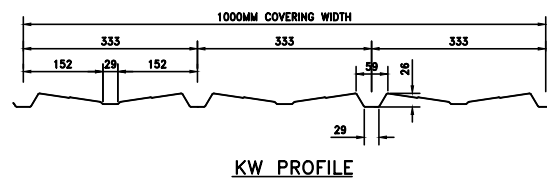
KSS-600 Roof Sheeting Panel:



Kirby Wall Panel (KW):

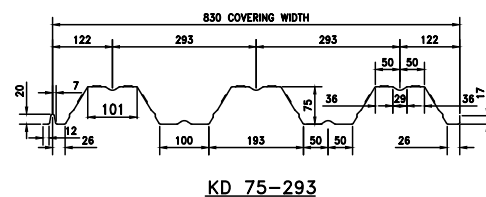
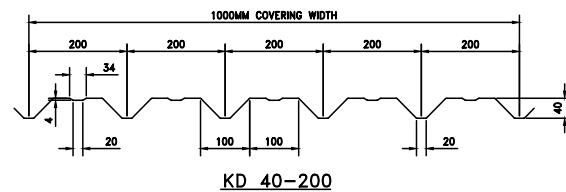
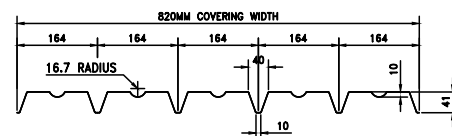
The KW panels are designed for wall applications only. The inverted ribs incorporated into its design produce smooth shadow lines and semi-concealed fasteners. Sheeting can begin

from either end of the building, and application of the architectural panel is not directional. Properly installed, the lap edges of the “KW” panel will have minimum visibility.



Kirby Deck Panels (KD):

Form deck can be any floor used as a concrete form. Connections to the frame are by the same methods used to attach floor and roof deck. Fastened at every corrugation at every joist using self-drilling screw. Kirby deck are available as galvanized and Aluzinc. Galvanized deck must be used for those roof deck systems where form deck is used to carry a lightweight insulating concrete fill.



NOTE:

The “KW” panels are adversely affected by an uneven girt line, and /or insulation that cause an uneven girt line. Either situation could cause oilcanning in the panels.

The design of the panel lap allows for the panel edge to be visible when installed. Equipment limitations and manufacturing tolerances, as well

as other factors can contribute to waviness at the visible edge.

Do not apply pressure to the pan of the panels during installation, when the pressure is released “oil canning” will occur. Safety first!



DANGER! Do not step on the major ribs, the side edge or end edge of the KR panel. Safety first!

Fastener Installation for KD

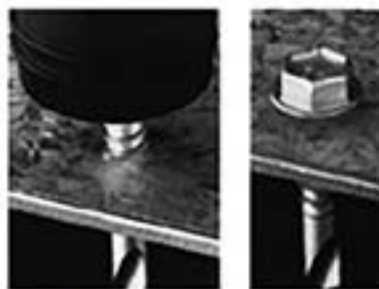
Special electric screw guns are used to drive self-drilling screws to attach deck to the structural frame. These screw guns are equipped with a clutch and depth limiting nosepiece to prevent over torquing. Screws are typically #12's or 1/4 inch diameter with a special drill point selected according to the total thickness of metal (deck plus frame) being joined. The fasteners have a flat head at the drive end and a ballistic point at the penetrating end. A variety of sizes are available to meet the penetration requirements of the steel substrate

Deck Installation:

As per International codes, the deck sheets are placed, one edge of deck will always be "open" or leading. This leading edge should only be approached in order to place the next sheet. Workers should also maintain a safe distance (6 feet if possible) from the end of the deck unit. When aligning the edge (side) lap, the worker should kneel. Kneeling lowers his center of gravity and decreases the chance of falling. Refer to OSHA Regulation 29 CFR Section 1926.759 (a)(1)(2003) which states that under special circumstances a Controlled Deck Zone (CDZ) may be established which permits flexibility to the methods of deck installation.

Side Lap Connections:

Sheet to sheet connections may be required at the side laps of deck. These are frequently referred to as stitch connections. Self-drilling screws are the usual stitch connections. Stitch screws are usually self-drilling type; 4.8mm diameter can be used. The installer must be sure that the underlying sheet is drawn tightly against the top sheet. Again, as when screws are used as the frame attachment, the special screw driving guns are used to prevent over torquing.



Self Tapping/Drilling



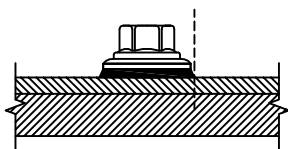
Fastener Installation

Correct fastener installation is one of the most critical steps when installing roof panels. Drive the fastener in until it is right and the washer is firmly seated. Do not overdrive fasteners. A slight extrusion of neoprene around the washer is a good visual tightness check.

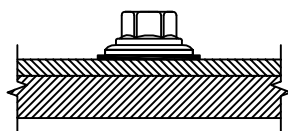
Always use the proper tool to install fasteners. A fasteners drive (screw gun) with an RPM of 1700-

2000 should be used for self-drilling screws. A 500-600 RPM fastener drive should be used for self tapping screws. Discard worn sockets, these can cause the fastener to wobble during installation.

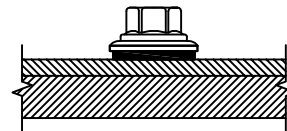
The correct degree of tightness can be achieved by using screw gun with depth gauge.



CORRECT DEGREE OF TIGHTNESS
NOTE SLIGHT CIRCLE
OF WASHER



TOO TIGHT
WASHERS SQUEEZED TOO THIN
EXTRUDES FAR BEYOND
FASTENER HEAD



TOO LOOSE
WASHER IS NOT COMPRESSED
TO FORM A SEAL

NOTE:

Always remove metal filing from surface of panels at the end of each work period. Rusting filings can destroy the paint finish and void any warranty.

Mastic Sealant:

Proper mastic applications are critical to the weather tightness of a building. Mastic should not be stretched when installed. Apply only to clean, dry surfaces. Keep only enough mastic on the roof that can be installed in a day. During

warm weather, store mastic in a cool dry place. During cold weather mastic must be kept warm until application. After mastic has been applied, keep protective paper in place until panel is ready to be installed.

Fastener Application

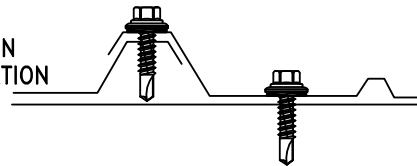
FASTENER

#12 SDTS
20MM LONG
#14 SDS
25MM LONG



APPLICATION

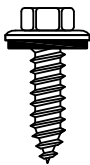
PANEL TO PANEL
PANEL TO FRAMING
WITHOUT INSULATION
WITH 60MM INSULATION



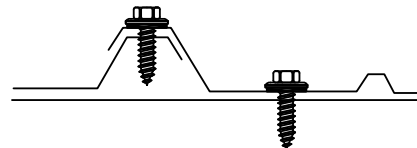
NOTE:

For Self-drilling Screws (SDS) pilot hole is not required.

#17 STS
20MM LONG



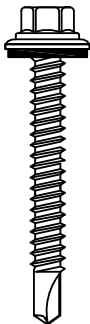
FOR REPLACING
STRIPPED SCREWS



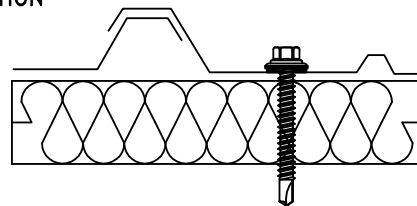
NOTE:

Maximum pilot hole for panel to frame is 5.00mm dia.

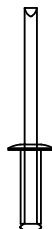
#14 SDS
50MM LONG



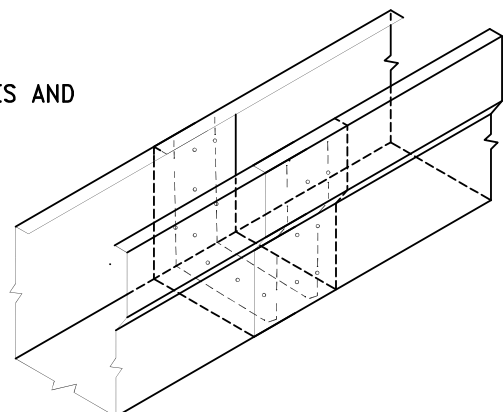
PANEL TO STRUCTURAL
ONLY WITH INSULATION
75MM TO 100MM



POP RIVET
WHITE OR
CAD PLATED



ALL TRIMS, SPLICES AND
DOWNSPOUTS

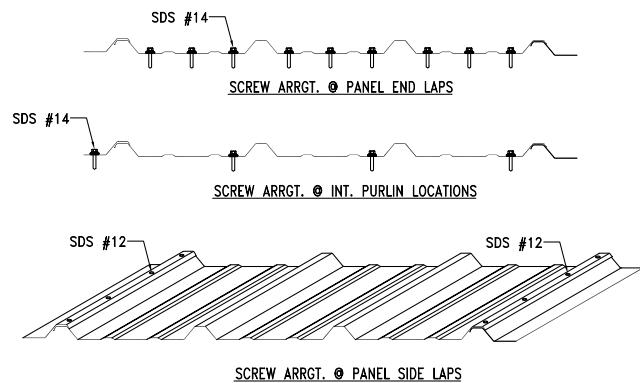


NOTE:

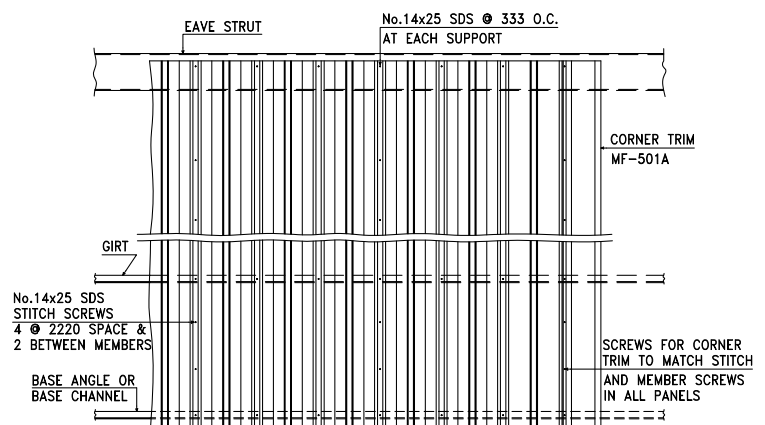
The pilot hole and pop rivet dia. should be equal for water tightness.

Fastener Layout

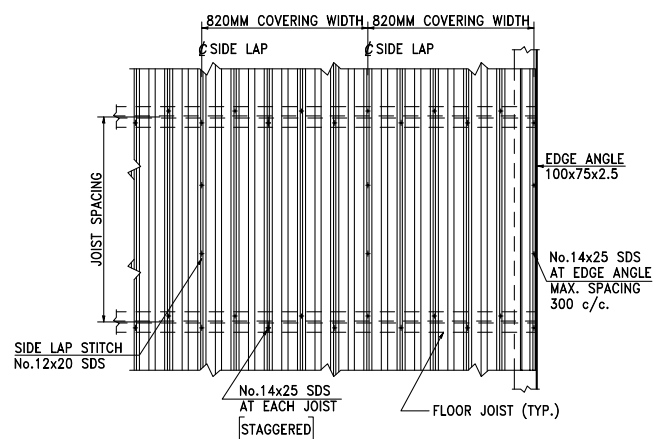
Kirby rib (KR):



Kirby wall (KW):



Kirby deck (KD):

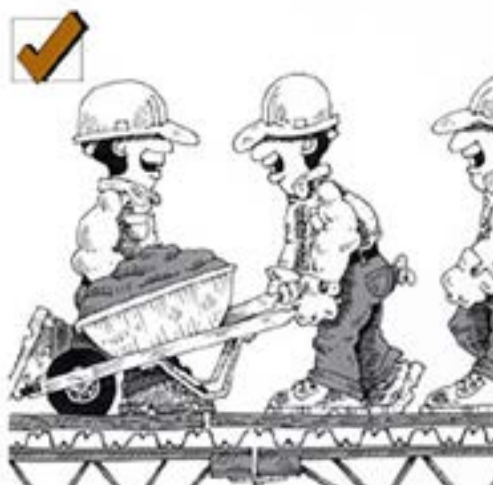
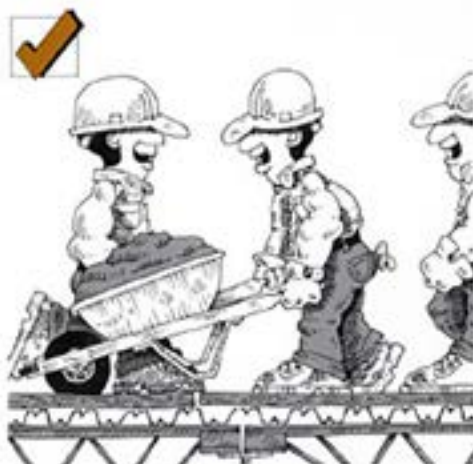
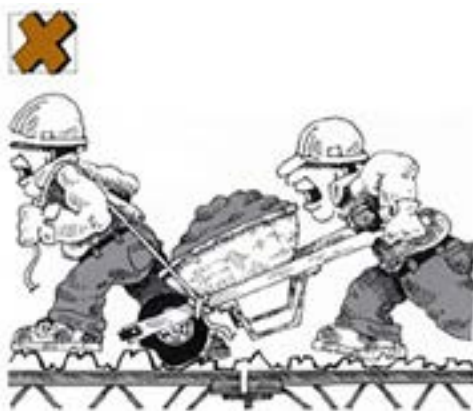


Pouring Concrete

Before concrete is poured, the contractor should inspect the deck to find any areas that may be damaged or crushed which may require shoring for the concrete pour. Areas that buckle during the pour are usually caused by previous damage, over spanning the deck, or allowing concrete to pile up. Buckled areas do not adversely affect the live load capacity. Damaged areas must be repaired or accepted. The contractor should make sure that the deck is properly and completely fastened in accordance with approved deck erection drawings and the deck has adequate bearing on all supports.

Concrete should be poured from a low level to avoid impacting the deck. It should be placed uniformly over the supporting structure and

spread towards the centre of the deck span. Concrete should be placed in a direction so that the weight is first applied to the top sheet at the side lap, reducing the possibility of the side opening during the pour. Workers should not congregate around the concrete placement zone. If buggies are used to place the concrete, runways should be planked and the buggies should only operate on the planking. The planks should be stiff enough to transfer the buggy loads without damaging the deck. Deck damage caused by roll bars or careless placement must be avoided. The deck panel will act as a diaphragm when all the deck units are in place and fully connected, therefore, if deck erection is interrupted before completion, temporary bracing may be required.



Composite Steel Deck

This part is applied to steel beams supporting concrete slabs that are interconnected such that they act together to resist bending. Composite beams must be provided with shear connectors or completely encased in concrete.

Shear Studs

Shear studs, welded in place with special equipment (in accordance with AWS D1.1) can serve to hold the deck to the frame. These studs are usually installed after the deck has

been spread to act as a working platform.

Therefore, it is necessary that the platform be adequately attached to the structure before the studs are installed. Shear studs, like all other fasteners, must be installed in accordance with the design drawings. Since most construction work is done in open air, ventilation for welding is usually adequate. However, for enclosed areas, ventilation must be provided. Adequate ventilation is extremely important when welding galvanized deck. All workers involved in the welding operation must wear eye protection to avoid weld flash.



Screw Alignment

Good alignment of the screws, especially on the wall panels, will give a professional appearance to the wall panel installation. One way this can be accomplished is by pre-drilling holes in the panels at identical locations. Up to 15 panels can be stacked together and drilled using a template panel. Use 4.7 mm diameter drill bit for panel to structural fasteners and a 3 mm diameter bit for the side lap clearance holes. It is important to clean metal filings off panel surfaces after drilling to avoid rust stains.

The template panel should be laid out for the proper screw locations in accordance with the building Installation drawings. Since re-drilling will “hand” the panels, it will also be necessary to select the end of the building from which the paneling is to begin. Before drilling the template panel, it should be checked for proper hole locations against the building framework. Be sure there is no excessive deflection in the purlins and girts.

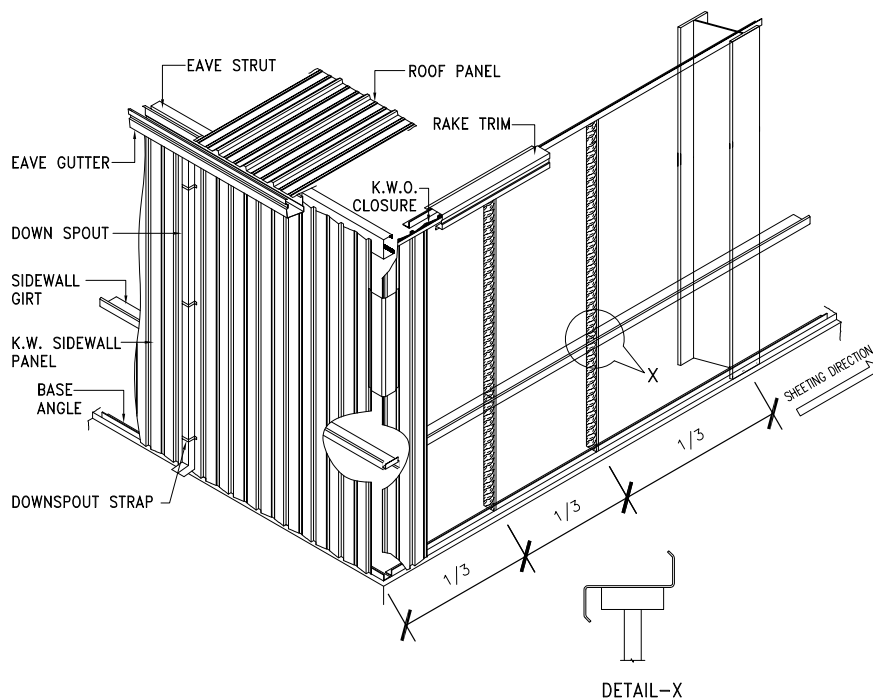
Aligning The Girts:

Installation of the building walls is generally done before the roof. Before starting the wall installation, check to be sure that the eave strut and girts are straight and plumb. One method of aligning the girts is to cut temporary wood blocking to the proper length and install between the lines of girts. This blocking can be moved from bay to bay, which will reduce the number of pieces required. Normally, two line of vertical blocking per bay will be sufficient.

NOTE:

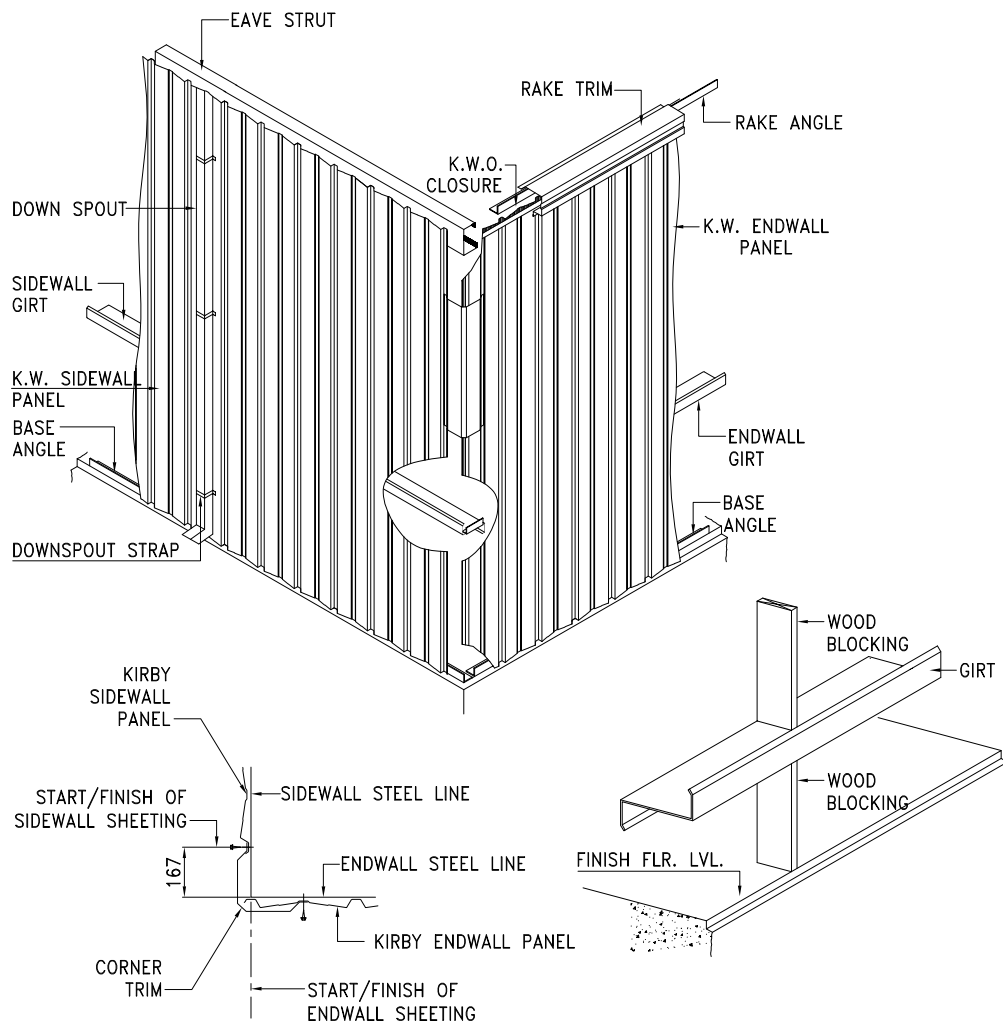
Do not allow blocking to become a falling hazard. Workers should wear hard-hats. Girts should never be used as a climbing ladder. Damage to girt clips, as well as injury to worker may result. Safety first!

Use approved eye protection when operating a drill. Electrical tool must be properly grounded. Do not use electrical tools or equipment while standing on wet surfaces. Safety first!



Wall Panel Installation

Sidewall and endwall panel installation:



NOTE:

1. Block girts to "level" position before starting panel installation. Maintain blocking until panel to structural fasteners are installed.
2. Align and plumb first wall panel.
3. To prevent "Oil - Canning" all panel fasteners should start from base angle and secured to each structural girt towards the eave.
4. Foundation must be square, level and correct to the out to out of steel dimensions.
5. Installation crew is to clean all wall panels before leaving job site.

Roof Panel Installation

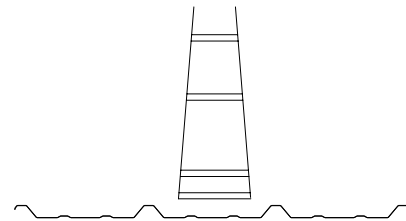
Kirby Rib Roof Panels may be damaged by installation traffic. Traffic damage can be avoided by the use of walk boards.

Two sets are suggested; one for the workmen laying or fastening panels, the other for traffic up and down the roof.

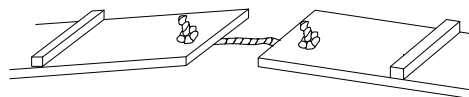
The walk boards are also an excellent safety precaution on steep roofs.

If you must step on the roof panel, always walk on the flat of the panel, on or close to the purlins.

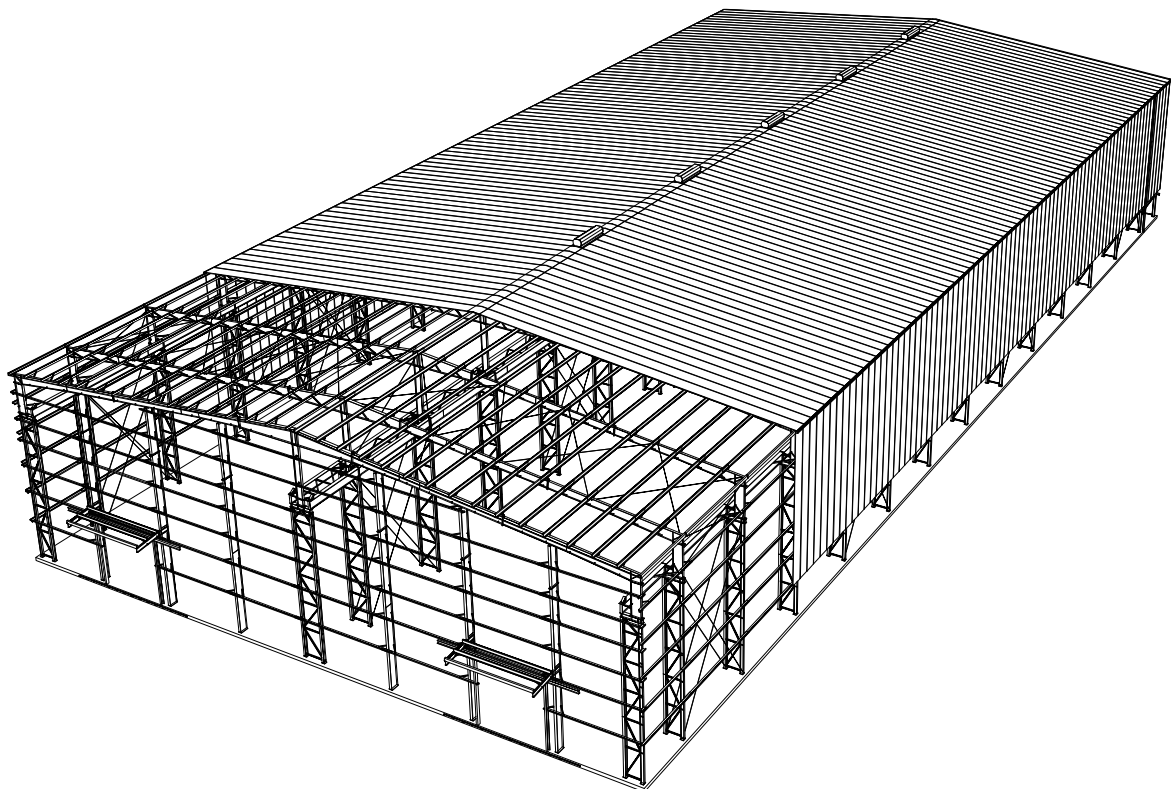
“NEVER WALK ON THE MAJOR CORRUGATIONS”



WALKBOARD PLACEMENT
ON KIRBY ROOF PANEL



DETAIL OF WALK
BOARDS AT RIDGE



CAUTION :

Before starting to panel, re-check the building structure to be sure it is still plumb and square

Installation of Kirby Rib Roof Panels:

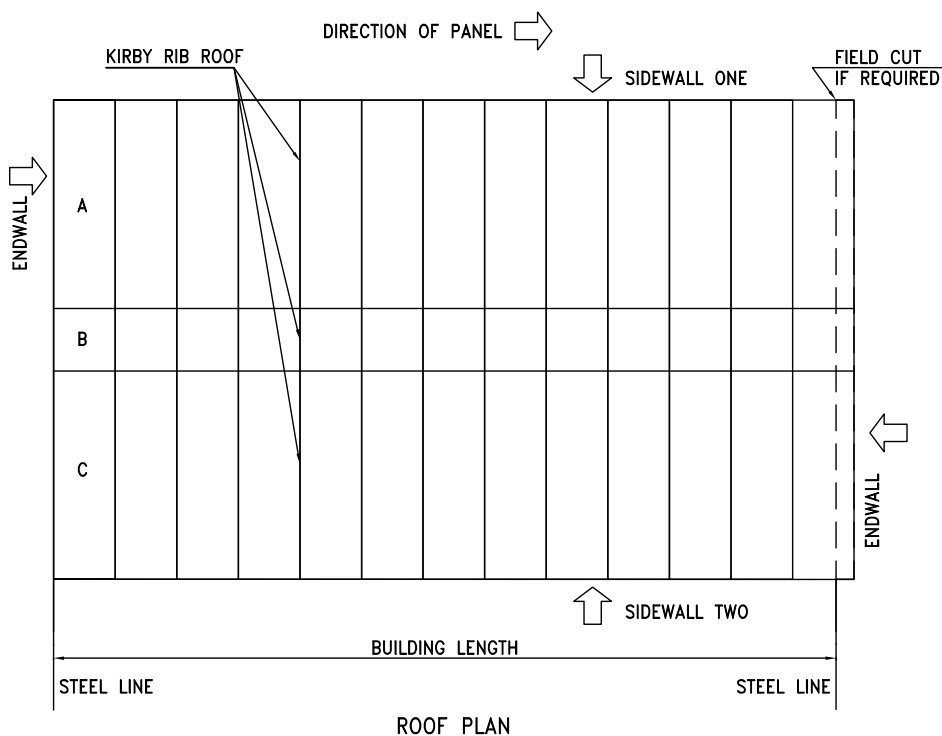
1. (A) & (C) Denote Kirby Rib Roof Sheet, (B) Denotes Kirby Rib Peak Panel.
2. Locate the center of the first major Rib exactly over steel line attach panels (A) & (C) then attach peak panel (B).
3. Each side of Kirby Rib Panel and the Kirby Rib Peak Panel must be run in conjunction with each other to ensure correct alignment.
4. Refer to other sections of this manual for details relating to eave alignment of roof panels, sealer application and fastener types.
5. All damages paint finishes are to be retouched to prevent rusting.
6. In the event a screw is installed in the wrong location or should a screw break during the driving process, remove the screw and install one of a large diameter to prevent leaking.
7. Concentrated heavy loads (Personnel or material) occurring on the roof during construction shall be distributed uniformly

over a large area in such a manner as to prevent damage to building components.

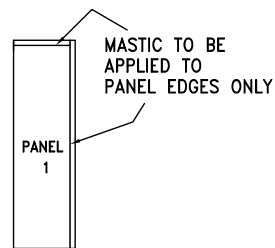
8. All metals shavings occurring as a result of drilling operations on the roof are to be removed in such a manner as to prevent damage or staining of roof finish. (The roof should be swept clean at the end of each day).

NOTE:

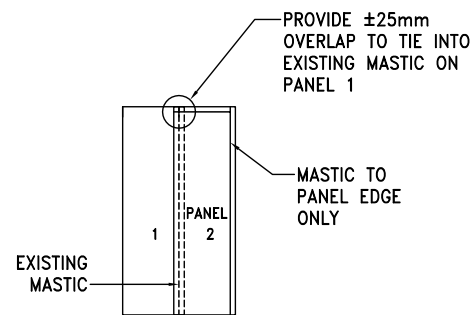
1. For buildings having roof extension, canopies, lean-to's etc. Wall paneling must be installed before roof sheets to allow for working clearance.
2. The last panel of roof should not be back lapped. If has to be cut to the requirements, the plain portion at cut end should be bent upwards.



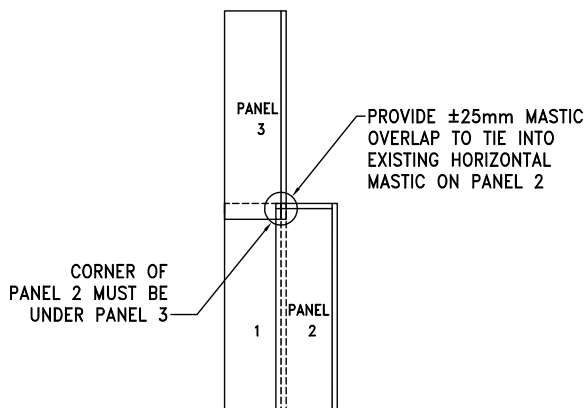
Roof Sheeting Sequence and Mastic Application:



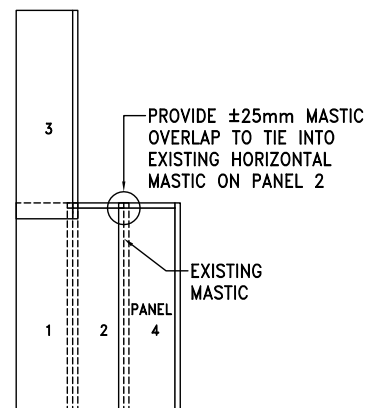
STEP 'A'



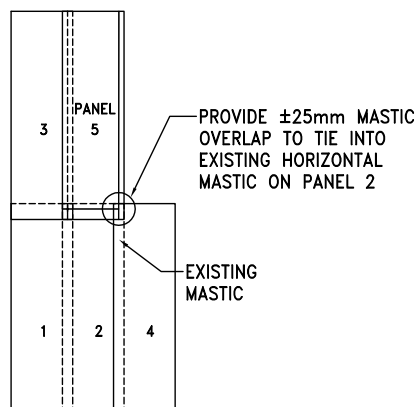
STEP 'B'



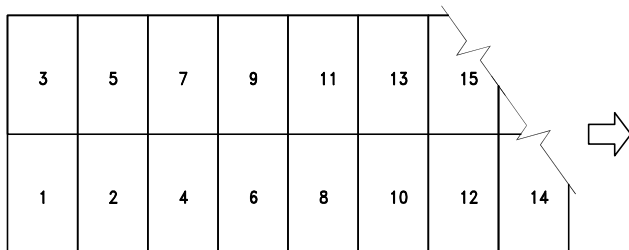
STEP 'C'



STEP 'D'



STEP 'E'



TYPICAL SHEETING SEQUENCE

Sheeting Sequence Note:

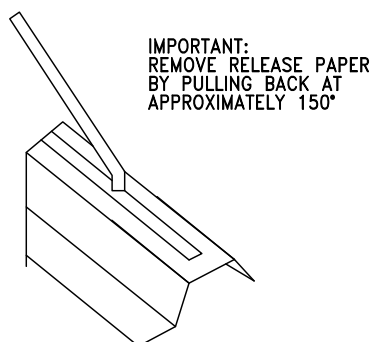
This procedure and mastic application saves time in picking up sheet corners and ensures a sealed four lap connection.

General Sheeting Notes:

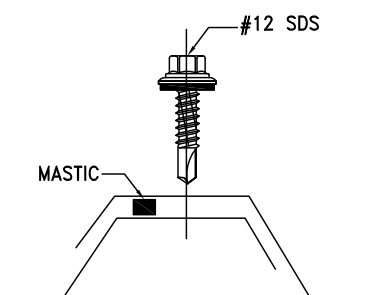
1. It is recommended where possible, sidewall and endwall sheeting should precede roof sheeting.
2. The building is to be plumb, square and tight before sheeting is begun.
3. Sheeting is shown in a left to right pattern as an illustration only. Actual sheeting is to begin at the leeward end of the building so that all panel laps will be away from the prevailing wind.
4. Check location of center line of high rib 5 M from steel line at end of building so adjustment of gain or loss can be made if necessary.
5. Installation crew is to sweep roof panels clear of all metal shavings daily until roofing is completed.
6. Roof and wall liner panels to be laid prior to roof and wall sheeting.

Installation Procedure:

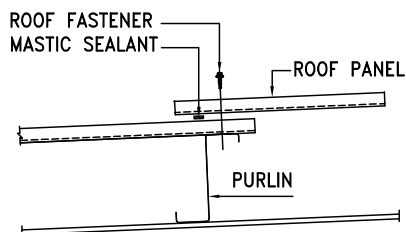
TAPE MASTIC (ROPE SEALING):



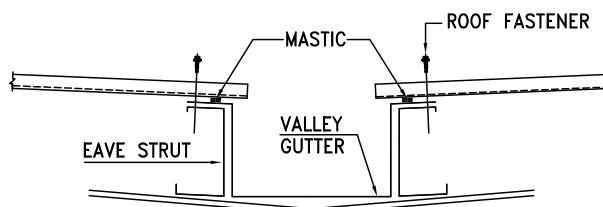
REMOVING RELEASE PAPER



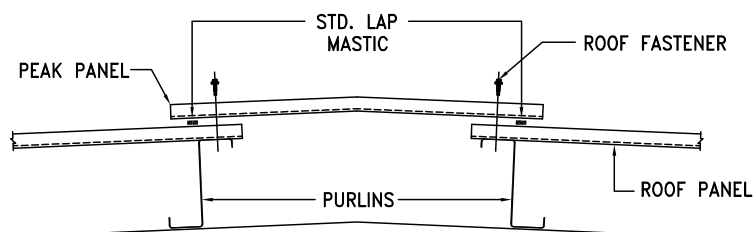
LAP/RIB DETAIL
(SINGLE LAP CONDITION)



TYPICAL SECTION THRU
ROOF PANEL LAP



TYPICAL SECTION THRU
VALLEY GUTTER



TYPICAL SECTION
THRU RIDGE

NOTE:

1. Rope seal to be fixed in front of the screw line.
2. Do not apply rope seal in the anticapillary flute.

Safety Precautions for Roofing

Kirby strongly recommends that Installation employees be continuously trained and re-trained in safe and productive work practices. Working on the roof area in the installation of roof structural, insulation or roof panels requires proper training, correct equipment and constant alertness to minimize the danger of falls. Hard hats should be worn on job sites to prevent injury from falling objects. Safe work practices on all Installation duties should be carefully reviewed with Installation crews prior to beginning each job.

NEVER STEP ON SKYLIGHTS OR TRANSLUCENT PANELS !

PANELS MAY COLLAPSE IF NOT PROPERLY SECURED !

Roof panels must be completely attached to

the purlins and to panels on either side before they can be a safe walking surface. Skylights or translucent panels can never be considered as a walking surface.

Partially attached or unattached panels should never be walked on !

DO NOT

1. Step on rib at edge of panel.
2. Step near crease in rib at edge of panel.
3. Step within 5 feet of edge on unsecured panel.

A single roof panel must never be used as a work platform.

NOTE

1. Always wear rubber sole work boots! When on the roof, use approved protection devices such as safety lines, safety nets or catch platforms.

2. Install all the structural screws before proceeding to fix the next panel.



SAFETY NOTE! CAUTION! PANELS MAY BE SLICK

Because of the demands of the manufacturing process, oil has been applied to the coil stock to protect the coil, as well as the finished panel during manufacturing shipping and storage! Metal panels must be wiped clean prior to panel installation.

INSULATION

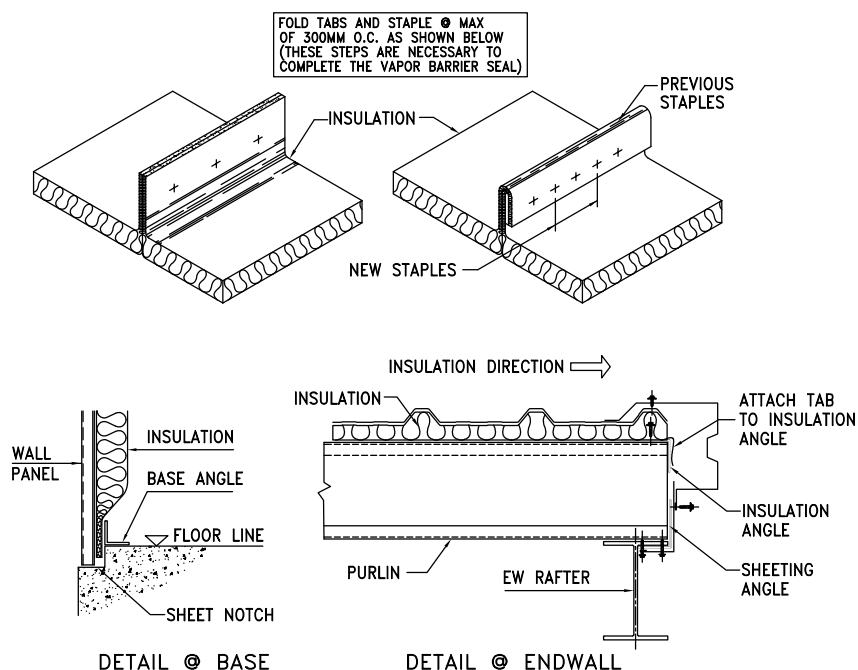
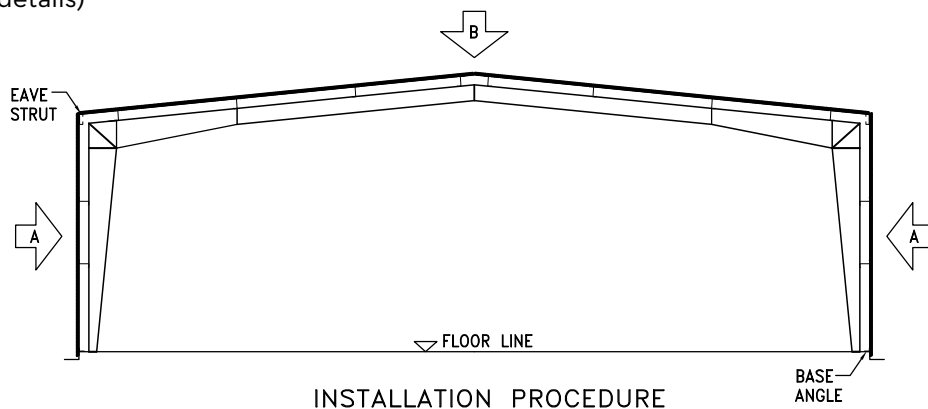
Insulation Installation Procedures

1. Wall insulation "A" is shipped in maximum length rolls and are to be field cut to exact length before installing. Refer to Installation drawings for specific details for your buildings.
2. Wall insulation should extend from top of eave strut to 40 mm below finished floor. Clamp insulation to eave strut as shown in Fig 1, page 71, pull facing tight and hold in place until wall panel is attached.
3. Roof insulation "B" depending on buildings width , may be shipped in one roll or a series of rolls (Refer to your Installation drawings for specific details)

Pull insulation simultaneously from each side of building until facing is tight (see fig. 2 page 72 for method of holding insulation right). Secure to top of eave strut, fold down and secure to outside face of eave strut.

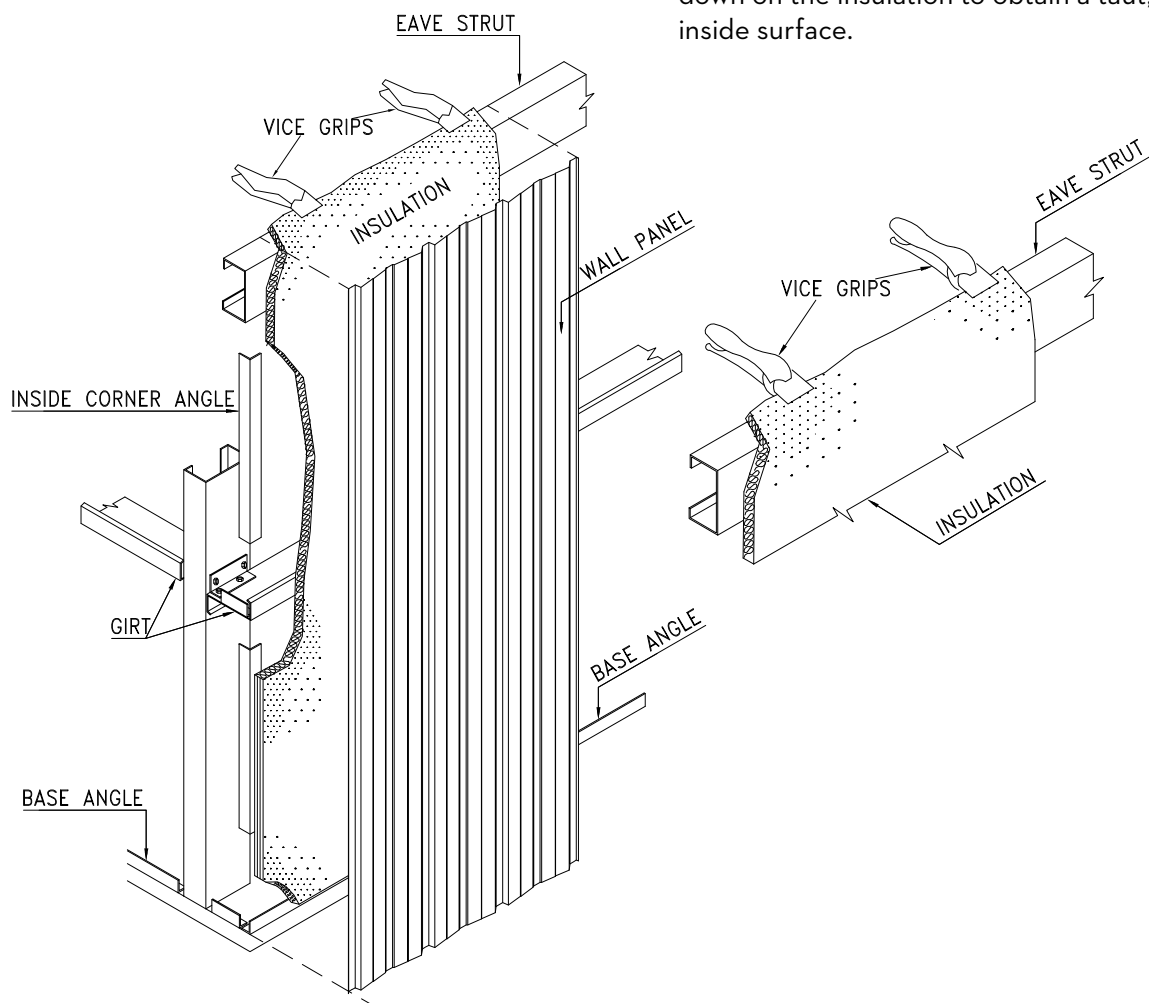
NOTE:

Fold the Insulation back at ends to avoid wicking.



Side wall and end wall insulation:

Temporarily attach the insulation to the top of the eave strut or rake angle,. Use two vice grips or other clamping arrangements as shown, Pull down on the insulation to obtain a taut, smooth inside surface.



NOTE:

Take care that the insulation strip is properly placed and plumb.

Attach insulation to base angle temporarily. Apply the first panel over the insulation and install panel to structural fasteners working from bottom to top of panel. Remove clamps and trim insulation at top and bottom. Insulation has

no load bearing strength. Do not lean or prop material against wall insulation. Do not step on roof insulation. Observe all proper safety procedures. When handling fibreglass, wear long sleeved shirts to minimise contact with the insulation fibers : "Safety first"

Insulation installation procedures:

Roll out the second insulation strip overlapping the first (See your Installation drawings for splice location) and temporarily hold in place by applying a vice grip tool to the two tabs at the purlin.

NOTE:

At the place of roof skylight / wall skylight, framed opening , the insulation has to be trimmed neatly and the foil folded back to give a neat appearance.

Do not allow the insulation to become wet.

Do not install more insulation on the roof than can be covered by roof panels. Before the work period ends.

Stretch the insulation over the eave strut by means of a clamp as shown below, Staple side tabs. Apply roof panel from the eave up in the normal manner. Remove the vice grips after panels have been applied.

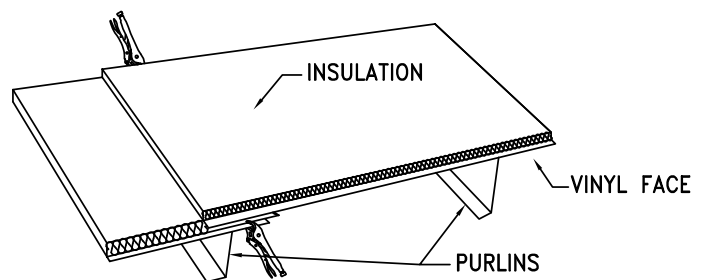


FIG. 1
INTERMEDIATE ROOF INSULATION SPLICE

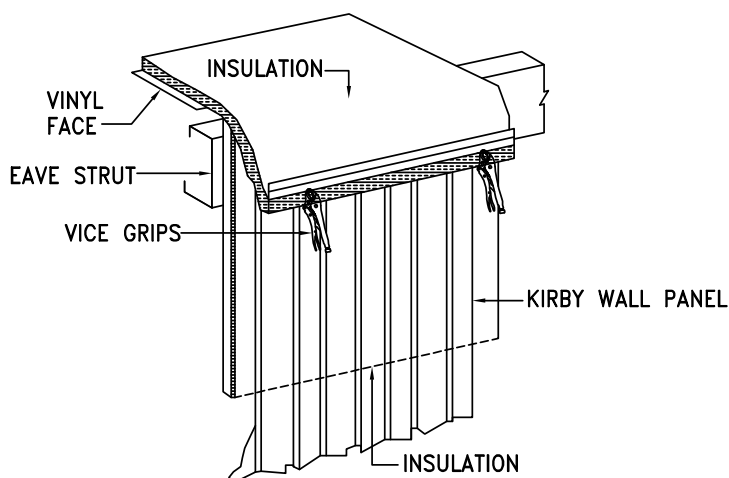
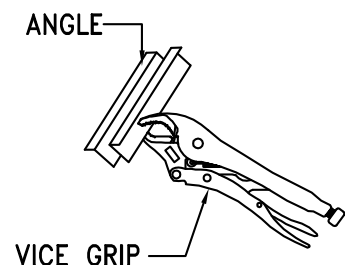
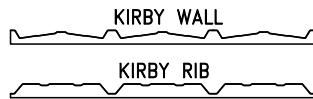


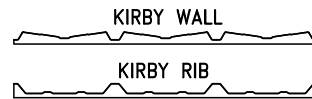
FIG. 2
SUGGESTED METHOD OF KEEPING ROOF INSULATION
WHILE ROOF PANELS ARE BEING INSTALLED



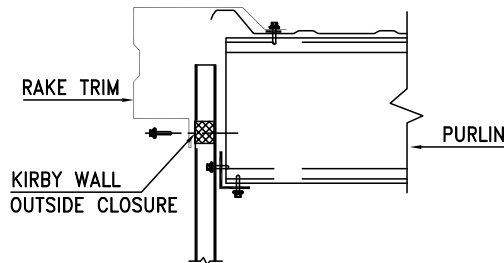
Closure Strips & Applications



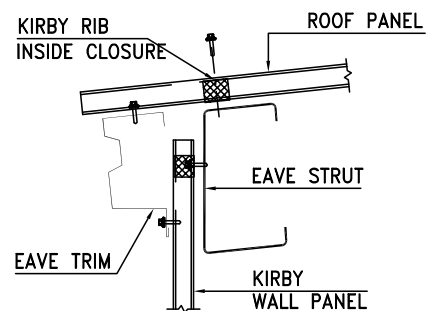
OUTSIDE CLOSURES



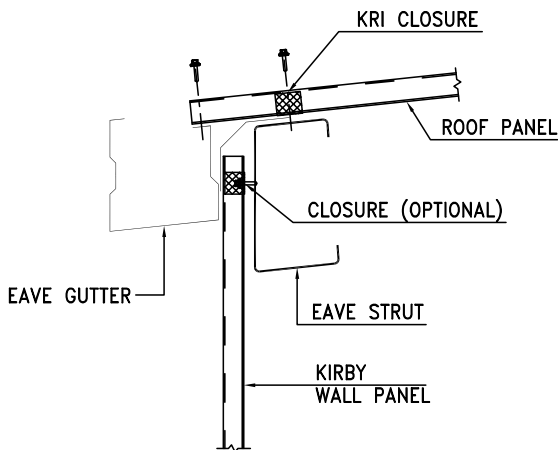
INSIDE CLOSURES



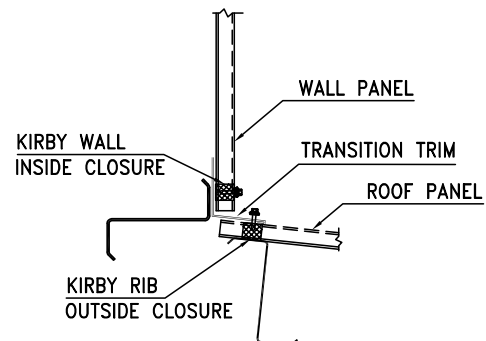
RAKE



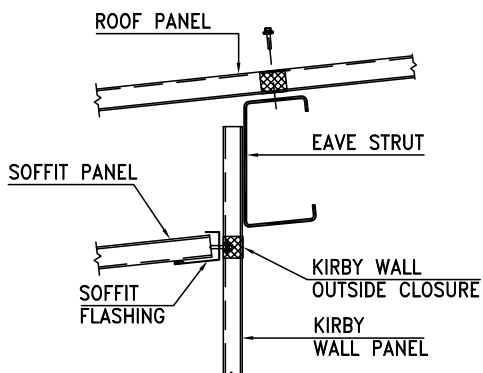
WITH EAVE TRIM



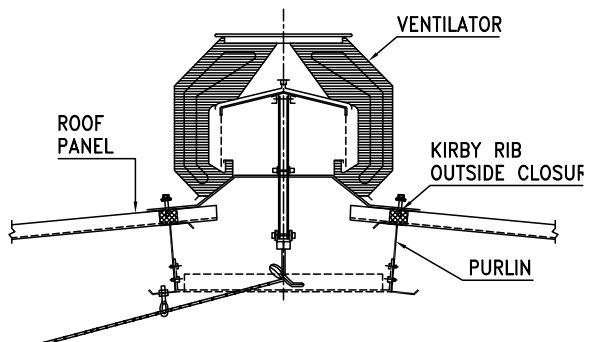
WITH EAVE GUTTER



AT LEAN-TO
(BELOW ROOF LINE)

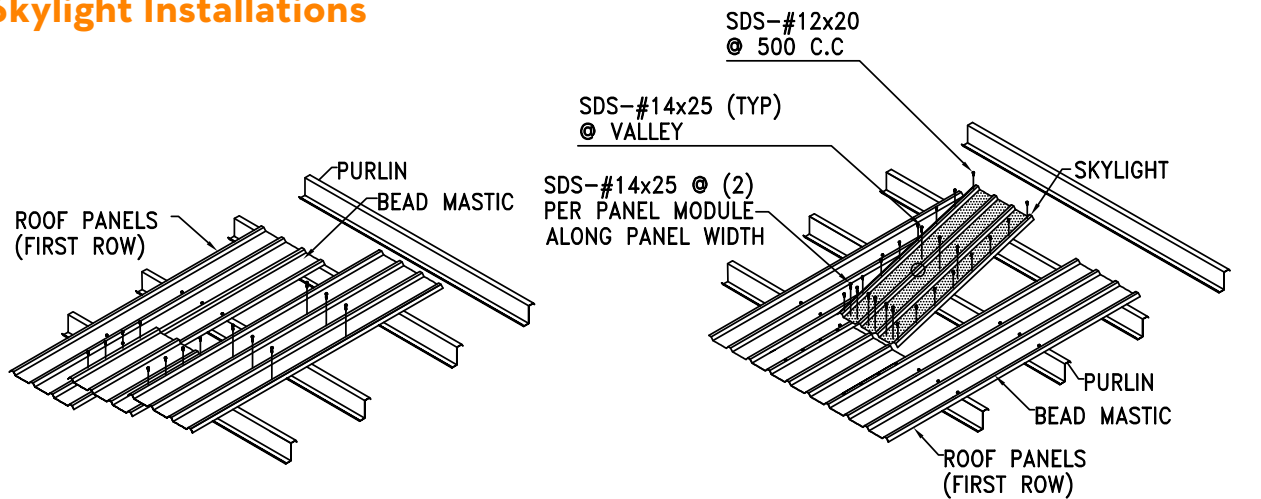


WITH EAVE SOFFIT



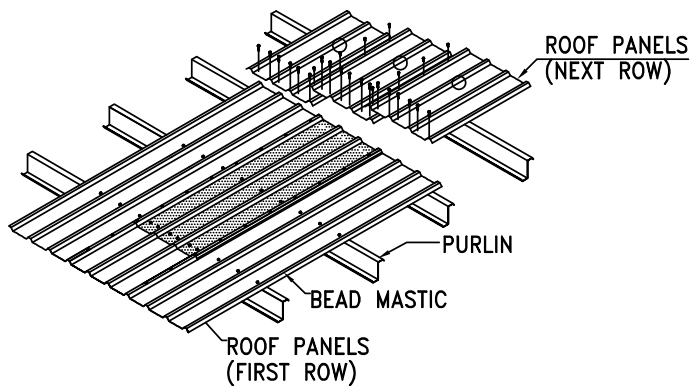
AT RIDGE VENT

Skylight Installations

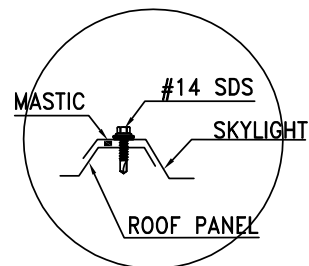


1. FIX ROW OF ROOF PANELS TO THE PURLIN IN THE SEQUENCE SHOWN.

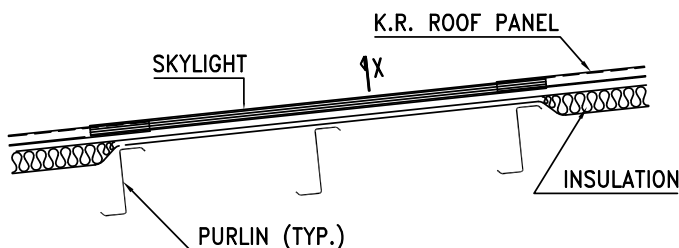
2. FIX SKYLIGHT ABOVE ROOF PANELS.



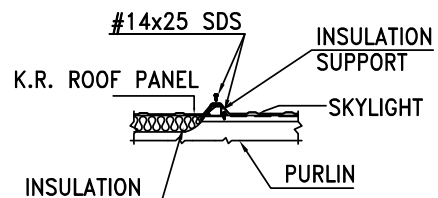
3. FIX NEXT ROW OF ROOF PANELS IN THE SEQUENCE SHOWN.



SIDE LAP DETAIL



SECTION THRU' SKYLIGHT



SECTION - X

NOTE:

Skylights shall be installed as roof is sheeted. Protective measures are to be taken to prevent

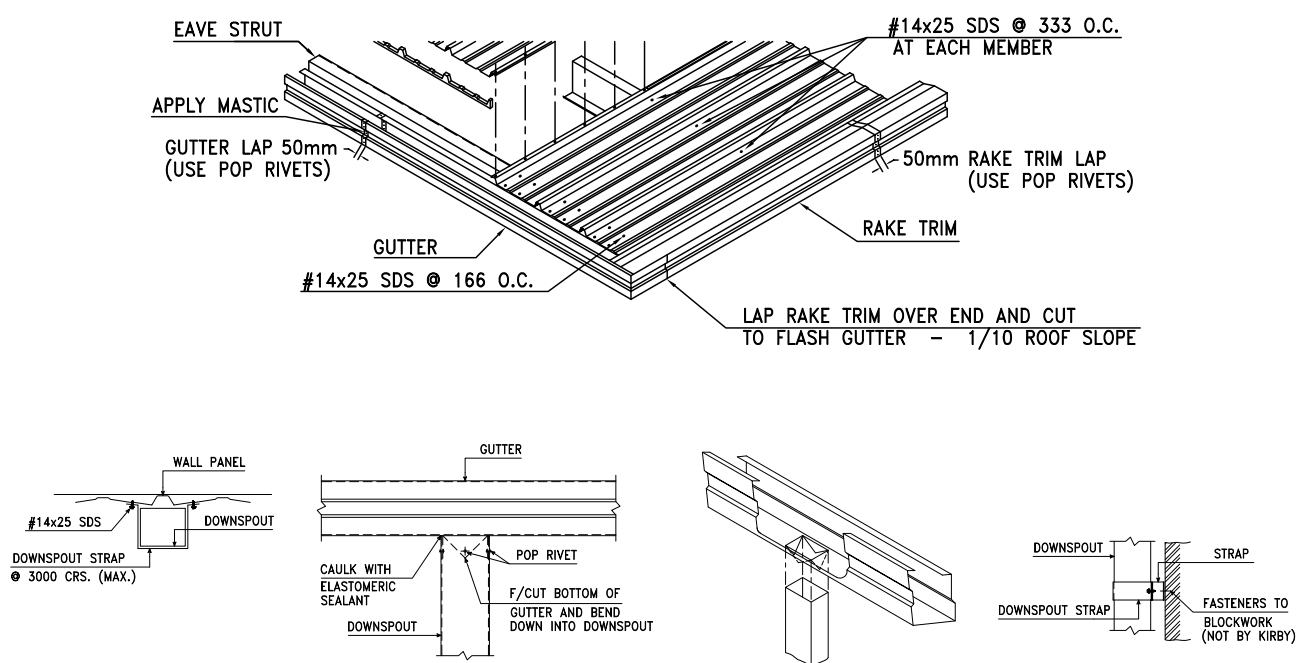
personnel damaging the skylight. **Do not walk on Skylights.**

Flashing, Gutter & Trim

The correct installation of flashing, gutters, and trim cannot be over-emphasized. The overall appearance of the finished building depends primarily on the quality of the installation of the flashing, gutters and trim. Keep all gutter and flashing lines straight. Make all bends sharp and neat. Be sure edges are not jagged, dented,

crimped, or serrated. End joints and laps must be closely controlled.

Rake trim, flashings, and gutters, to be spliced with rivets only, with a bead of elastomeric sealant in the joint.



GUTTER AND DOWNSPOUT ASSEMBLY

NOTE:

Flashing should be stored off the ground to avoid moisture and handling damage. Elevate one end of the package above the lower end to encourage drainage in case of rain. Always wear gloves when handling sheet metal. Safety first!

1. Assemble as many pieces of gutter on ground as can be handled to get a straight line.
2. Elastomeric Sealant should not be applied on the outside face of the gutter / trims. It

should be placed inside the lap. Any sealant squeezing outside should be cleaned off. If left in places it will absorb dust and visibly it will be shabby.

3. Down spout to be spliced on ground to the required length before fixing.
4. Cut gutter with two diagonal cuts and bend down tabs to receive down spout. Seal with sealant and fasten with rivets/ screws. (3 Nos)

Sliding Door & Ridge Vent

Sliding doors:

1. The guide channel to be fixed in concrete as per the dimension mentioned in the drawing.
2. Ensure top of guide channel and FFL are at same level.
3. Any concrete / mortar spilled into the channel should be cleaned immediately.
4. The track header channel has to be checked for straightness and then brackets to be tightened.
5. Ensure the wall cladding is completed before fixing header beam.
6. Complete the door frame assembly, check diagonal dimensions and tighten bolts. Fix the sheets, trims and accessories (handle, lock plate) on ground.
7. Fix the leaf to the door trolley. The door trolley to be fixed towards outer face of door leaf to ensure verticality.
8. Check for the free movement and verticality of the door leaf by adjusting the door trolley nuts.
9. Ensure to provide a gap between door leaf and FFL (12 mm)

NOTE:

1. Ensure the finished brick wall should be in line with steel line.
2. Check for window / RCC / down spouts obstructions and relocate the same for the free movement of door leaf.

Ridge vents:

1. Assemble the ridge vent completely on ground.
2. Lift the unit and fix on roof panel. The roof panel should have 9 Nos of SDS screws per panel.
3. Align the ridge vent centerline to match with roof ridgeline.
4. Ensure that KRO closures are fixed and properly sealed.
5. Install the rope assembly for damper movement.

NOTE:

1. Check for easy sliding rod pin in damper slide channel.
2. Check for easy sliding of lifter arm between the damper slide channels.
3. The ridge vent is designed as permanently open. It has to be closed only when there is sandstorm.

ASSEMBLY DRAWINGS WILL BE SUPPLIED ALONG WITH BUILDING INSTALLATION DRAWINGS.

SANDWICH PANELS & ACCESSORIES INSTALLATION

Sandwich Panels Installation

Receipt of material at site:

All the panels are factory tested and certified by our Quality Assurance Department.

Please check the condition of the goods immediately after receipt of the same.

Incase of any damage please file a claim with the transport immediately.

THE INSTALLATION DRAWINGS SHOWING THE SIZES AND LOCATION OF ALL SANDWICH PANELS WILL BE ISSUED ALONG WITH SHIPPER LIST.

BEFORE PLACING ANY PANEL INTO POSITION, CHECK THE INSTALLATION DRAWINGS. ALL THE PANELS ARE MARKED WITH PART MARK.

Panel storage:

Following procedure to be followed for storing the panels at site.

Storage of panels inside a covered shed:

The panels should be stored in an area where they are not susceptible to damage. Also ensure the place of storage is free from moisture and the panels are stored on a level surface.

Storage of panels outside without any shed:

When the panels are exposed to the atmosphere, the following care to be taken:

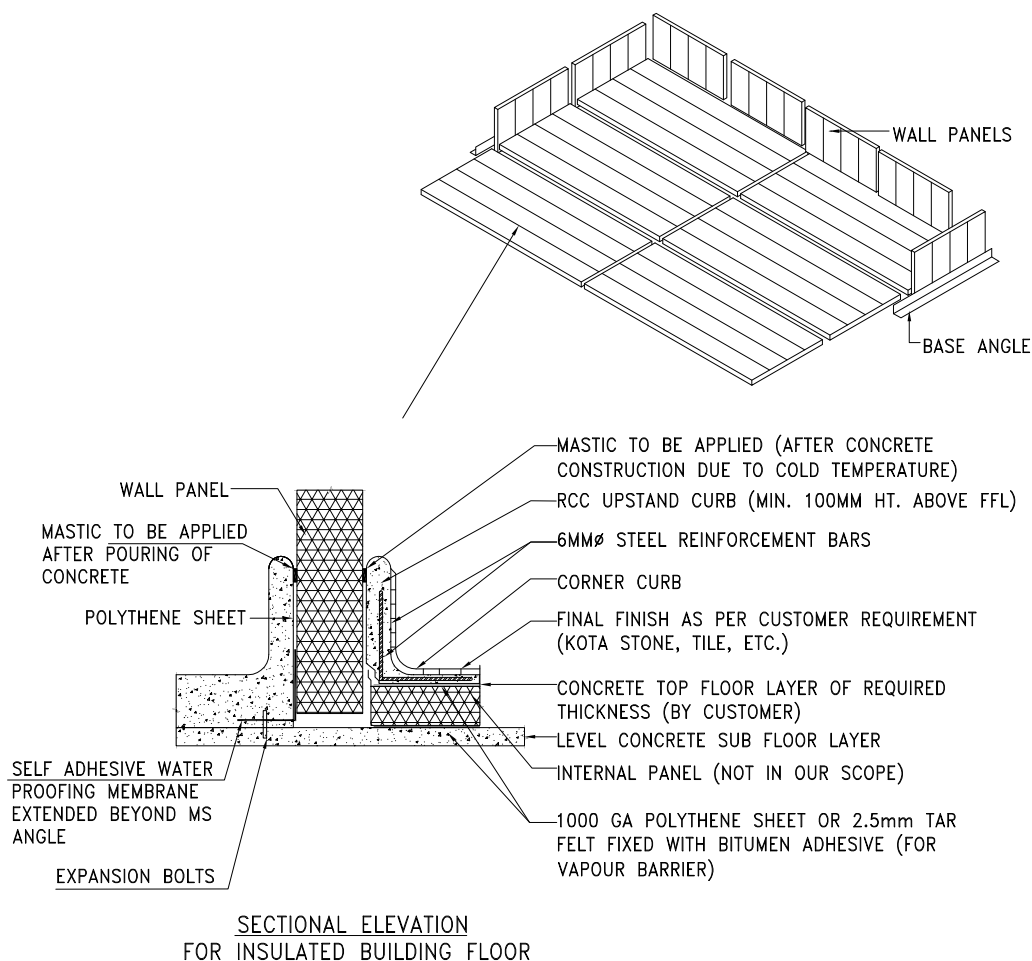
Provide wood spacers at regular intervals and place the panels above that. This is to allow ventilation in order to prevent moisture stains on the sheet metal laminations. Cover the stack of panels with tarpaulin to avoid sunlight and moisture. Take care that the tarpaulin does not go to the ground, as it will block the air circulation.

Insulated building floors:

Sketch below shows the installation of the floor where floor panels are not available. On the concrete floor, lay a 1000 gauge polythene sheet or 2.5mm Tar felt fixed with bitumen adhesive as a vapour barrier. Lay the PUF slab of required thickness in staggered form. Finally the required layer of concrete to be laid over the slabs & finished.

Buildings with prefabricated floor panels:

After the floor levelling is complete, installation of prefabricated panels can begin. Refer to the floor layout drawing, which shows a clear identification of the panels such as end panels, center panels etc. Level each panel and engage the cam lock after each panel is leveled. Be sure that the floor panels for the door cut out (if applicable) are installed in correct position as per the layout drawing. After the panels are placed & the locks are engaged, lay the Aluminium chequered plates & fasten the plate to the panels with the help of Aluminium pop rivets.



Cam locks:

Illustrates the lock and pin housing located inside the PUF panels. A 8mm Allen key is required to tighten the cam lock. The cam lock must first be set by inserting the Allen key into the cam lock hole (which is pre-drilled) and turning anti clockwise until the resistance is felt. Now the two panels can be locked together by butting and turning the Allen key in a clockwise direction until the two panels are securely drawn and locked.

“ DO NOT OVER TIGHTEN “

Wall panel installation:

After the floor panels are placed (in case of pre-fabricated panels) or the floor leveling is completed, the wall panel Installation should begin at the corners.

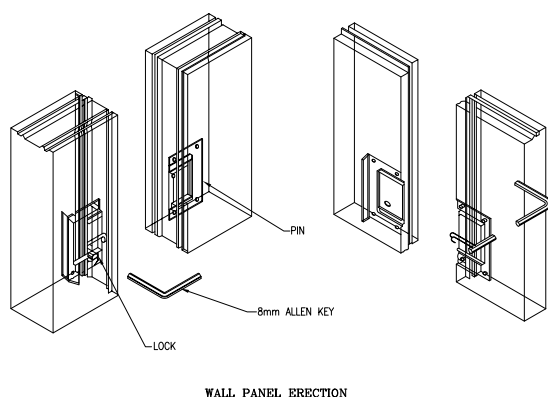
Please read the layout drawings carefully for proper location of panels.

NOTE:

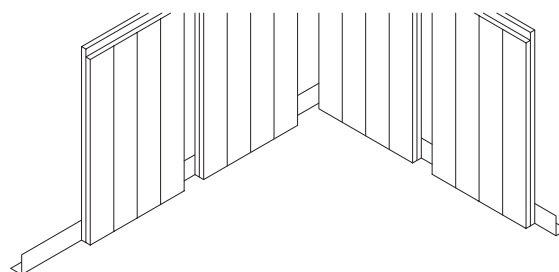
“ WALL PANELS MUST BE PLUMB “

All the panels will have a notch at the top to enable the seating of the ceiling panels. This is the indication of the top.

SKETCH - 5



SKETCH : 6



Door Installation Procedures

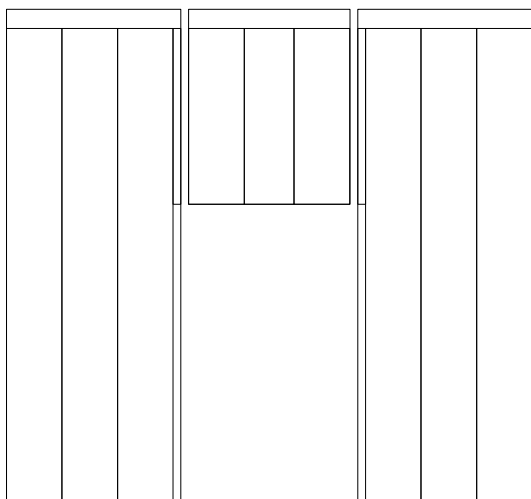
Door section:

The door section consists of three panels, which will be marked individually. Assemble panels as per the drawings.

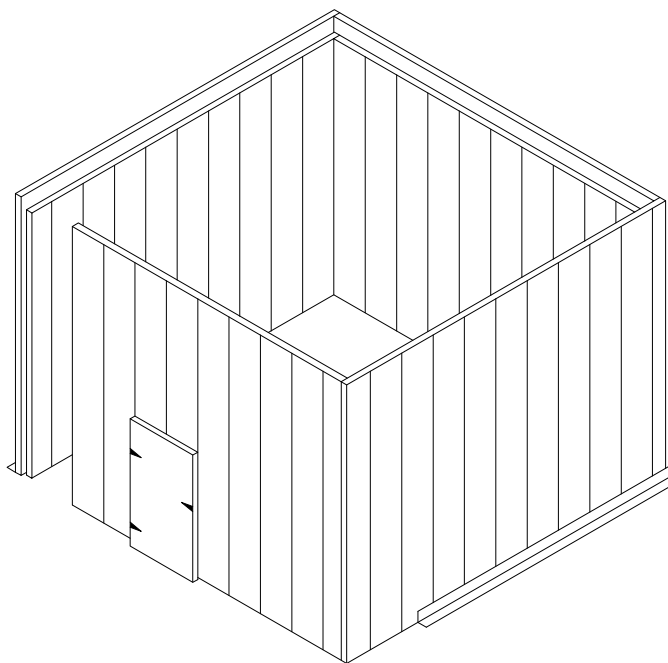
Read the drawing carefully before starting installation. After the three panels are assembled to form a frame, the PVC plastic strip (as a thermal break) must be placed and aluminum angles to be fixed with the help of pop rivets, as per the sketch indicated. Refer sketch no.7 & 9.

“ THE DOOR AND THE DOOR FRAME MUST BE HORIZONTALLY AND VERTICALLY ALIGNED TO ENSURE PROPER SEALING OF THE DOOR BEFORE PROCEEDING WITH FURTHER PANELS Installation.”

SKETCH 7



SKETCH 8



Once the door frame is ready in assembled condition, fix the door to the door frame. Align

the door properly. Fix the hinges on to the doorframe and the door handle latch to be fixed

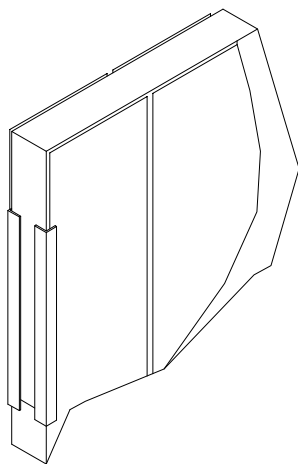
The door must be closed and latched before the door anchor angle is fastened to the floor. Adjust the door latch so that the door will seal on all edges of the gasket. Ensure the gasket is totally sealed all around without any gaps.

In case of building floor, the door will come with a sweeping gasket at the bottom, which has to be adjusted.

NOTE:

Position of door hinges should be properly identified in order to ensure that the sweeping gasket just makes contact with the FFL when the door is in a closed position.

SKETCH: 9



COOLER DOOR FRAME
W/O HEATER

Door frames for freezer rooms:

In case of negative temperature rooms, the doorframe has to be provided with heaters to avoid frost formation. The door heater has to be installed as per the sketch below.

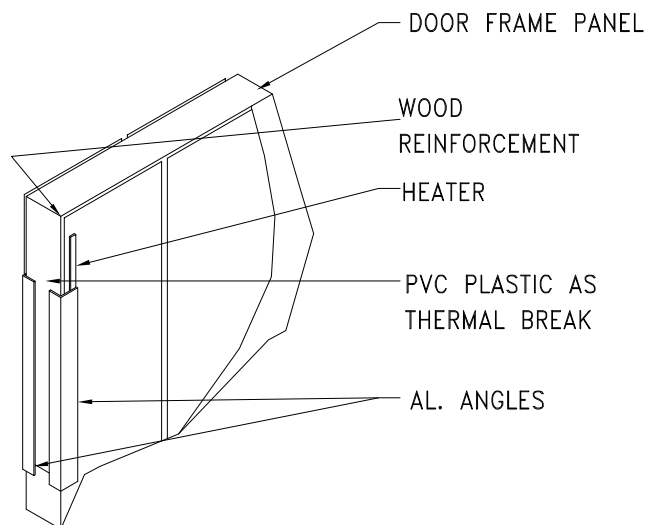
The heater runs on all the four sides.

NOTE:

Cold storage freezer doors require notch out in the building floor for threshold heater (bottom heater wire). Cooler does not require notch out.

After installation of the heater and doorframe set in place, fill remaining notch out with concrete grouting.

SKETCH: 10



COOLER DOOR FRAME
WITH HEATER

Horizontal sliding door:

If installation includes a horizontal sliding door, a separate set of installation instructions will be included in the package.

Ceiling panel installation:

As per the Installation drawing, place the ceiling panels in position on the notch of the wall panels as shown in the sketch no.11.

Place the adjoining panels and align the panels. Ensure proper locking.

NOTE:

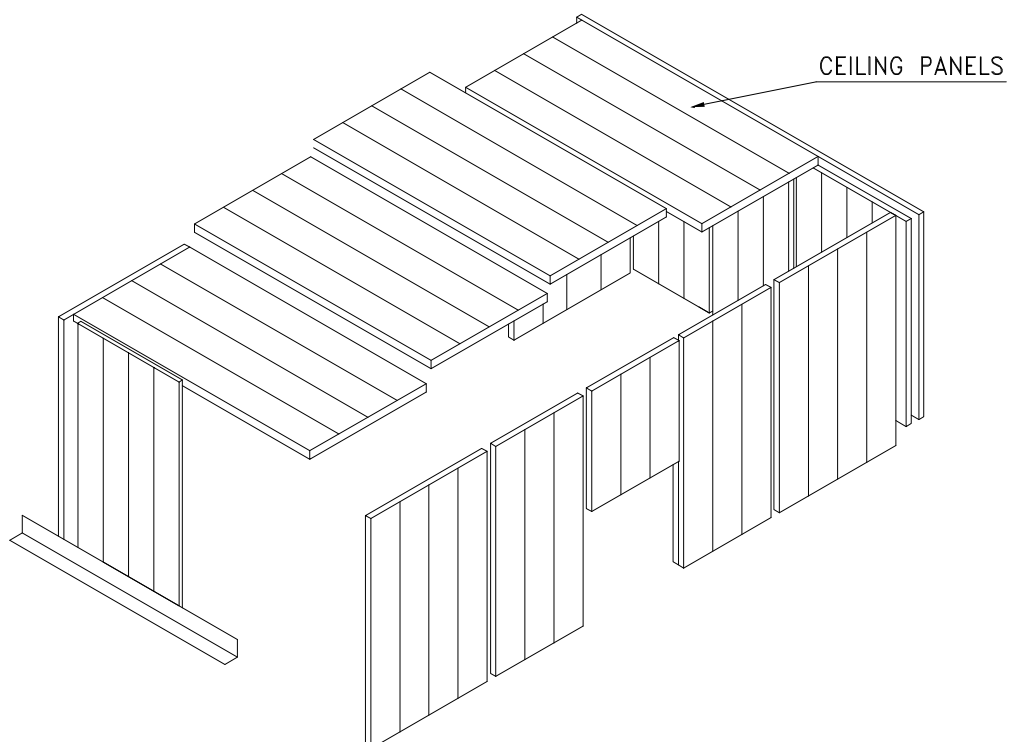
If the panels are not leveled at the top, the ceiling panels will not butt properly and gaps will result.

The level must be corrected immediately otherwise problems will occur at the time of unit start up (unit not in Kirby's scope)

Incase of large storage areas, the ceiling panels have to be supported by the frame. The ceiling support system will vary from project to project. So, the drawing will be furnished on case-to-case basis.

After the completion, the internal and external trims must be fixed (not allowing any gap) with the help of pop rivets at 300mm centers. Silicone sealant application must be done properly to cover any possible gaps.

SKETCH: 11



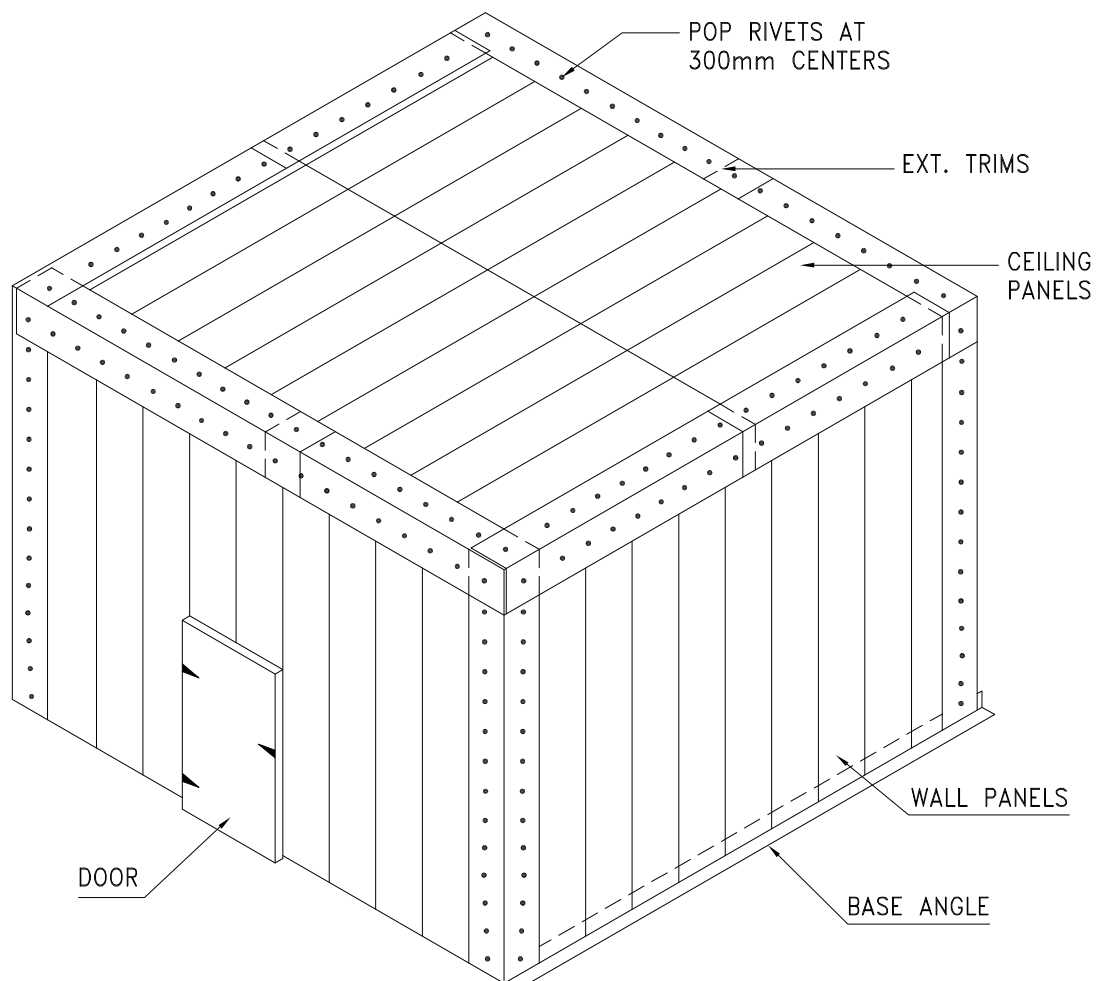
Refrigeration unit mounting:

When the Refrigeration Unit (by others) are to be suspended from the ceiling, ensure the holes which are drilled for supporting the unit are properly sealed with insulation foam or plain puff pieces which shall be supplied along with panels.

Heated air relief vents:

Usually the heated air vents are installed for negative temperature storage rooms where there is a chance of excess pressure developed inside the room. When a project consists of heated air vent, a specific installation sheet will be provided.

Complete erected building:



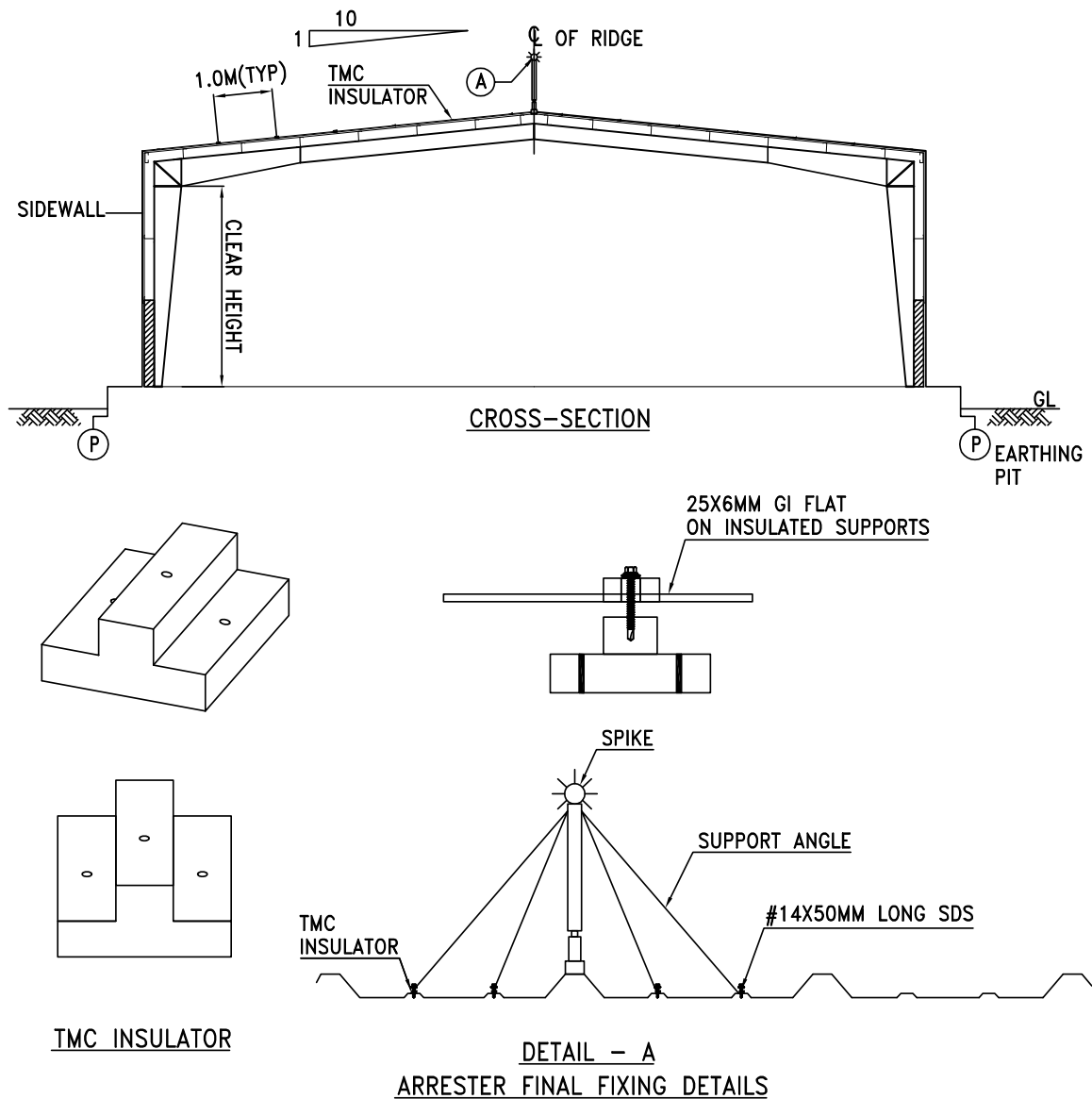
Final checks of installation:

1. Ensure to seal all gaps, penetrations etc., with silicone sealant, which will be supplied in the hardware box along with the panels.
2. Check all the cam locks are engaged and all the joints sealed.
3. Be sure to plug all the holes with the caps provided in the hardware box. This is to prevent moisture from entering.
4. Make sure the heater wire is properly installed.
5. Check whether all the door gaskets seal around the entire door frame perimeter.
6. Check all the door hinges and door handle have been properly tightened and the trims have been fixed without any gaps.
7. Check all the ceiling supporting systems have been installed properly.

Regular maintenance:

- Using warm water and mild detergent, clean the interior and exterior panels.
- The door gaskets should be cleaned by using warm water and wiping dry with a soft cloth. While cleaning, check if the gaskets are intact without any gap. A visual check for wear and tear is also required. If the gasket is torn or broken, it has to be replaced.
- The heater wire around the door frame should be checked periodically. If frost or sweating is noticed, the heater wire must be replaced.
- All the screws and hinges and handles should be checked and tightened if necessary.
- The interior wall panels and ceiling panels must be checked for missing cam lock caps. If found missing the cap has to be immediately fixed to avoid moisture entry.

Lightning Arrester Fixing Details



NOTE:

1. The lightning protection shall be carried out as per IS 2309 / 1989.

2. Earthing pit detail shall be as per IS 2309 / 1989.

MATERIAL CLAIMS POLICY

Material Claims Standard Policy

I. General

A. Definition:

A claim is defined as any request for the replacement of materials related to any job or straight sale already shipped where there is no charge to the customer.

B. Types of Claim:

The majority of claims fall within the following categories :

B.1. Category 1 - Items not received

- .. Any material shown on the shipper and not received on site due to:
 - i) Lost during transportation
 - ii) Back ordered (material not available on the shipping date)
- .. Any items ordered but not included in the shipper and accordingly not received on site.

B.2. Category 2 - Damaged items

Any material received on site is not in good condition.

B.3. Category 3 - Incorrectly fabricated items

Any material not fabricated in a manner suitable for installation in accordance with Kirby's standard product manual and/ or construction drawings.

B.4. Category 4 - Design Errors

Any material manufactured, shipped and found unable to provide the function originally specified in the work order.

B.5. Category 5 - Incorrect Quantities received

Items received in full according to quantities shown on the shipper but found incorrect during construction.

There could be surplus or shortage in any item due to an error in preparing the shipper.

B.6. Category 6 - Buyouts claims

This type is limited to the bought-out items, shipped directly to the site (Not KWT/RAK Plant) without issuing a shipper covering this item from plant.

The claim could be any of the previous four categories.

C. Claims and Insurance

Appendix 1 - which defines :

- i) Kirby's legal responsibilities
- ii) Kirby's definition of shipping terms
- iii) Kirby's commercial responsibilities assumed for and on behalf of the customer (CIF shipments only) is considered as complimentary part of our policy and procedures.

Cost of replacing items lost or damaged during transportation including freight will be paid, eventually, by the insurance company or by customer (If the shipment was not insured) and therefore, requests for such materials cannot be defined as claims and will be treated as an order or straight sale.

II. Procedures

1. Effective 1st February, 2000 sales managers / sales engineers shall receive copies from shipping report with each shipment that goes to their area. This report which will state the back ordered items and expected time of shipping it, eliminates category (I) A (II) as inter company claim i.e. From sales office to H.O. customer should be informed in such cases with all details.
2. Claims Acceptance
Sales offices should not accept any claim unless :

A) Submitted in writing from the customer to the appropriate sales office.

B) Submitted within the following periods :

i) Items not received and / or damaged (cat 1 and 2) :
3. All accepted claims must be reviewed by the sales manager / sales engineer and area technical representatives before forwarding it to the H. Q.
4. All claims must be relayed to H.Q. by Fax or e-mail or in writing to the attention of customer service manager stating the following :
 - a. Date
 - b. Sales Manager or Tech Rep initiating claim is inserted.
 - c. The job number or S/S number is listed.
 - d. The nature of the claim is described.
 - e. The action you require
 - f. Material required, quantity and part number.
 - g. Be sure to sign the request.

- Unpacked Items

5 days from date of arrival to the job site

- Packed items

3 Days from date of arrival to the job site.

ii) Mis-fabricated items and/or incorrect quantities (cat. 3,4&5) anytime during erection with a maximum of one year from date of arrival to site.

Final check prior to handing over job.

After completion of all trims and accessories a final check of the building should be made. The important points being:

All anchor bolts washered and properly nutted.

All bracings in position and tightened.

Base plates resting on concrete pedestals without gaps after grouting.

All bolts in place and high strength bolts tightened to correct torque.

Repainting of installation part mark numbers and burn/smoke marks.

For loose fasteners in roof and wall sheeting.
For missing fasteners in roof and wall sheeting.

Straightness and level of eave gutter, valley gutter joints welded and checked for leakages.

Roof sheets swept, roof and gutter cleaned of drill shaves, wall sheets cleaned of mud and hand marks.

All accessories having manual and mechanical movement operate freely and properly.

Walk door fit in openings and latch properly.

Clean up the site.

Water leak test.

NOTE:

Ensure water jet is not directed on the side and end laps. Use only water foam nozzles.

Do's & Dont's

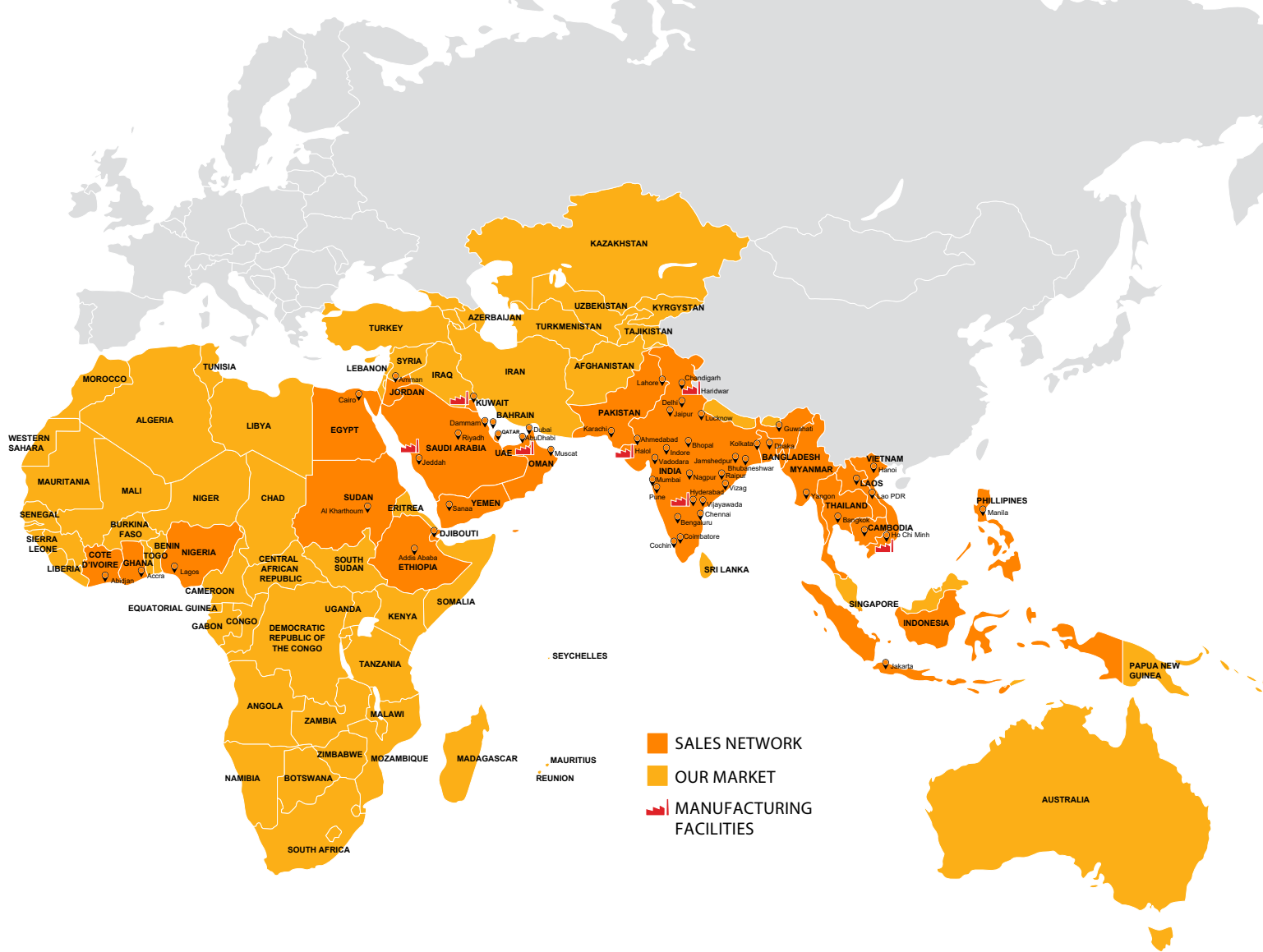
Maintain site order book.
Record critical, bay spacing and diagonal dimensions and confirm for accuracy before installation.
Anchor bolt checking and pedestal leveling, record the observations and finalise the packing plate thickness considering base plate thickness, washer and two nuts.
Check material received VS packing list VS shipper list.
Check tools and tackles mobilized are sufficient to execute the job.
Explain to the supervisors the sequence of Installation.
Installation of flange braces along with purlins at each bay for lateral stability before proceeding with next bay.
Tightening the bolts of column and rafter only after some slack is produced in lifting cables, so that the rafter can be under its own dead load.
Checking the alignment of structure, torque tightening of bolts and nuts.
Checking sheet lines and levels.
Fixing appropriate trims, flashings and closures.
Cleaning the roof sheeting and gutter everyday and after completion.
To cordon off the roof openings till the sheeting is completed and accessories are fixed.
Use of proper electrical board with switches and sockets.
Updating the knowledge and insisting upon safety of and for each worker.
Time schedule monitoring.
Discussion with the respective clients about schedule of installation.

Dont's

Improper and haphazard stacking of material.
Starting Installation on uncured concrete foundations.
Keeping packing plates well inside the base plate and tightening the anchor bolts.
Proceeding with installation without completing the installation and aligning the braced bay.
Pulling the rafter to one side without sufficient counter pull to avoid structural failure.
Non-implementation of safety.
Removal or alteration of structural components (bracings, girts) without Kirby's written permission.
Excess tightening of fasteners, excess torque to high tensile bolts.
Wall paneling without leveling of girts.
Walking on major rib of roof panels.
Leaving opening in the roof for longer period without proper safety precautions.
Sheeting at night times and while raining.
Stacking more than five roof sheets at one location on roof.

SALES OFFICE CONTACT DETAILS

SALES OFFICE	CONTACT NO.	EMAIL ID
KUWAIT	(965) 24962700	kuwait_sales@alghanim.com
DAMMAM	(966) 13 8331678	kirbysaudi_dam@alghanim.com
RIYADH	(966) 11 4763334	kirbysaudi_riy@alghanim.com
JEDDAH	(966) 12 6600139	kirbysaudi_jed@alghanim.com
DUBAI	(971) 4 2591192	kirbydb@kirbybuilding.ae
ABU DHABI	(971) 2 6260024	kirbyauh@kirbybuilding.ae
BAHRAIN	(973) 17214168	kirbybahrain@alghanim.com
QATAR	(974) 44439973	kirbyqatar@alghanim.com
OMAN	(968) 24478935	kirbyoman@alghanim.com
EGYPT	(202) 22748697	kirbyegypt@alghanim.com
YEMEN	(9671) 202837	kirbyyemen@alghanim.com
JORDAN	(962) 6 552 6540	kirbyjordan@alghanim.com
ETHIOPIA	(251) 911255400	kirbyethiopia@alghanim.com
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NIGERIA	(234) 70 45660669	kirbynigeria@alghanim.com
GHANA	(233) 265970956	kirbyghana@alghanim.com
CÔTE D'IVOIRE	(225) 0 758069348	kirby@alghanim.com
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Ras Al Khaimah, UAE

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