Kirby
BUILDING SYSTEMS

# PRODUCT BROCHURE

## COMMITTED TO **EXCELLENCE**

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# INTRODUCTION TO KIRBY

We are our customer's partners in progress. We know they have complex challenges and many responsibilities. As they are conceptualizing and executing projects, PEB are just one part of their responsibilities. When it comes to the Kirby PEBs, however, we ensure that our customers are worry-free.

From ensuring customized engineering designs that optimize efficiencies, to accurate drawings and project planning and using of SAP to plan inventories and meet targeted timeline, we are devoted to exceeding our customer's expectations every time.

Our experienced and talented team works with our client partners to give them pre-emptive solutions that go beyond ordinary specifications to ensure efficiencies for our partners. We can handle complex requirements and often deliver innovative engineering solutions that add tremendous value for our customers.

We bring over 45 years of experience as pioneers in the category, across manufacturing, retail, transportation and logistics to create bespoke solutions for our partners.

We have worked with clients globally and have an extensive presence in the Middle East & Africa, India, South East Asia and Europe.

With an annual capacity of over 550,000 MT, we are the undisputed leaders and pioneers in the industry and are capable of handling any project. While we deliver steel structures at one level, what we truly believe we deliver at a fundamental level - is total peace of mind for our clients.

**Kirby Building Systems** established in 1976 is a global leader in the design and manufacturing of pre-engineered steel buildings and structures, offering customers a wide range of customized, cost-effective steel building solutions. Kirby's global spread extends across Middle East, Africa, Asia, Indian subcontinent and South East Asia with production capacity exceeding 550,000 MT annually, operations across 70 countries and workforce of 4,000 people.

Kirby globally offers one of the most comprehensive product portfolios ranging from pre-engineered steel building, structural steel and storage solutions. We offer a wide range of steel solutions tailored to our customers' specific needs including pre-engineering steel buildings, storage solutions/industrial racking systems, and broad array of our steel building products that cover applications in major market segments including heavy industry. infrastructure, high-rise buildings, warehouse, factories, oil and gas and leisure structures.

**Kirby South East Asia** has been doing business since 1999 and started operation in Vietnam from 2008, with its 50,000 MT annum capacity plant in Vietnam. Kirby South East Asia has supplied and built over 600 buildings through Vietnam, Australia, Bangladesh, South East Asia and African markets

| 1976 | 2000 | 2006 | 2007 | 2008 |
|---|---|---|---|---|
| First Kirby plant start production in Kuwait | Inauguration of Hyderabad Plant, India | Inauguration of Kirby Haridwar Plant, India | Inauguration of Ras Al Khaimah Plant, UAE | Inauguration of Dong Nai plant, Vietnam |



## VISION

To be recognized as the global leader for the design, manufacture, supply and erection of Pre-Engineered Steel Buildings (PEB) and Structures.

## MISSION

Kirby will achieve this vision by consistently delivering high-quality products to our customers, accompanied by personalized service and a commitment to excellence.

# CERTIFICATION & AWARDS

ISO 9001
BUREAU VERITAS Certification

ISO 9001:2015
ISO 14001:2018
OHSAS 18001:2015

EN 1090-1

SINGAPORE STRUCTURAL STEEL SOCIETY

- Winning Infrastructure Excellence Awards for Best PEB Project.
- Winning the Sliver Award for HSE excellence by American Society of Safety Engineers

**2011**

Winning the Sliver Award for HSE excellence by American Society of Safety Engineers

**2013**

Inauguration of Halol Plant, Gujarat, West India

**2022**

Inauguration of Damam Plant, Saudi Arabia

**2023**

- Visibility across Middle East, Africa, Asia, Indian subcontinent & South East Asia
- Total capacity 550,000 MT annually

  Operations across 70 countries
- Supplied over 65,000 buildings worldwide
- Workforce of 4,000 people

**Today**

# VALUES

- **Straight-talking:** We encourage open debate where the best ideas win.
- **Customer centric:** We put our customers at the center of our focus and initiatives with the objective of providing them with unmatchable levels of services and products
- **Teamwork:** We actively share information and ideas, enthusiastically working to make those around us better
- **Diversity and respect:** The diversity of our workforce is an asset and we treat everyone with dignity and respect regardless of status, gender, education, ethnicity or religion.
- **Empowerment:** We empower people to make decisions with a bias for action.
- **Employees as core assets:** We believe that our employees are our most valuable resource, and do whatever it takes for their continuous training, development and motivation.
- **Meritocracy:** The rewards and career advancements of our people are based on their performance and capabilities, not on their influence.

**PEB** is a steel structure built over a structural concept of primary members, secondary members, and the cover sheeting connected to each other. The structural members are custom designed to be lighter in weight and high in strength. It can be fitted with different structural additions like trusses, mezzanine floors, fascia, canopies and crane systems as per user requirements.

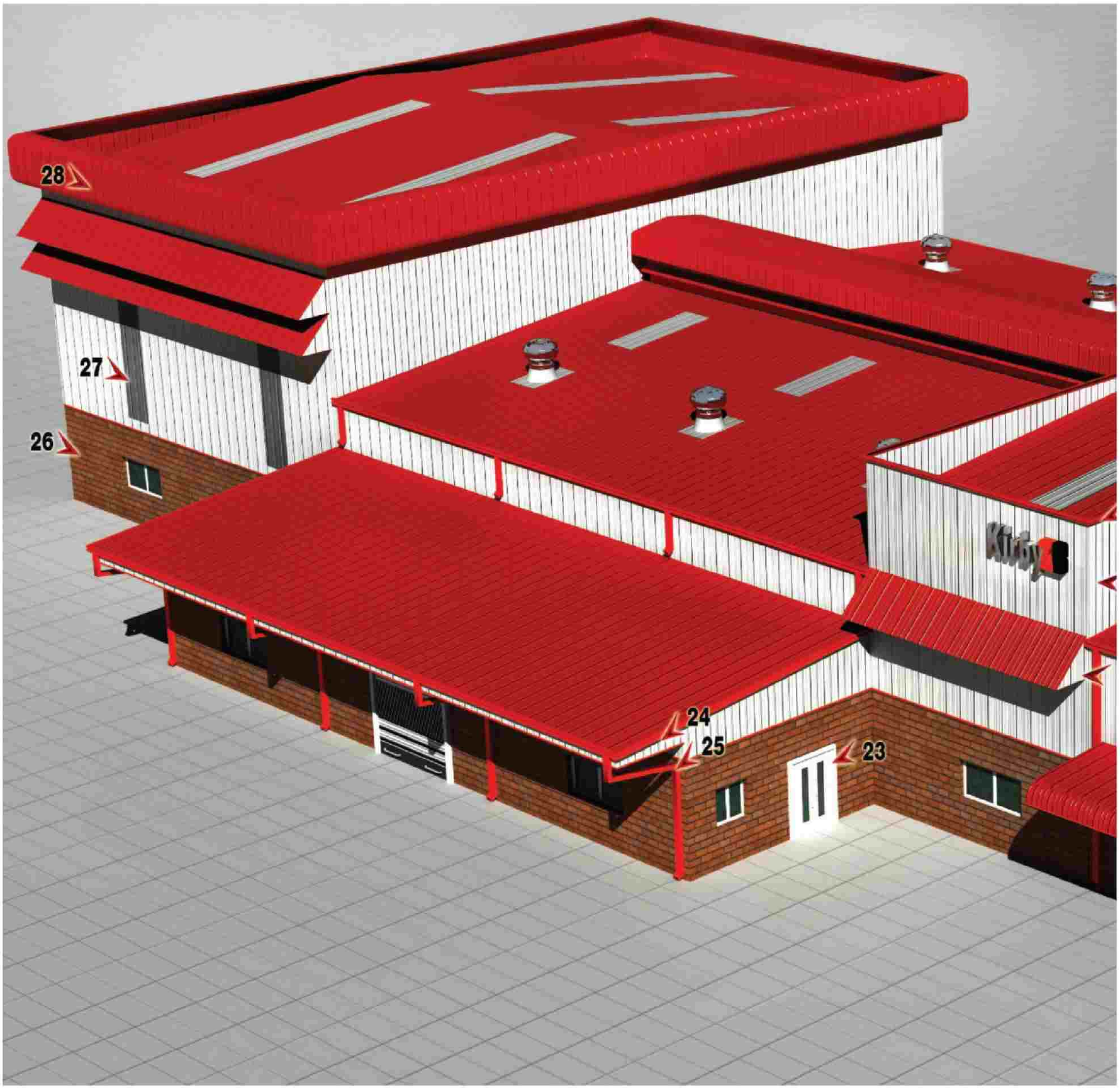
**There are many advantages of PEB as mentioned below**

- Single source responsibility
- Faster installation
- Economical
- Factory-controlled quality (ISO 9001/14001 Certified)
- Practically maintenance free
- Clear spans exceeding 90 M
- Flexibility in expansion
- Energy efficient roof and wall systems
- Earthquake-resistant

**There are various applications of PEB as mentioned below**

- Warehouses/Cold Storages
- Factories / Industrial Buildings
- Low Rise Office Buildings/Supermarkets
- Showrooms/Workshops
- Aircraft Hangars / Metro Stations
- Shipyards / Ports
- Sports Stadiums / Auditorium
- Petrol Stations / Car Parks
- Schools/Colleges / Hospitals
- Community / Recreational Buildings

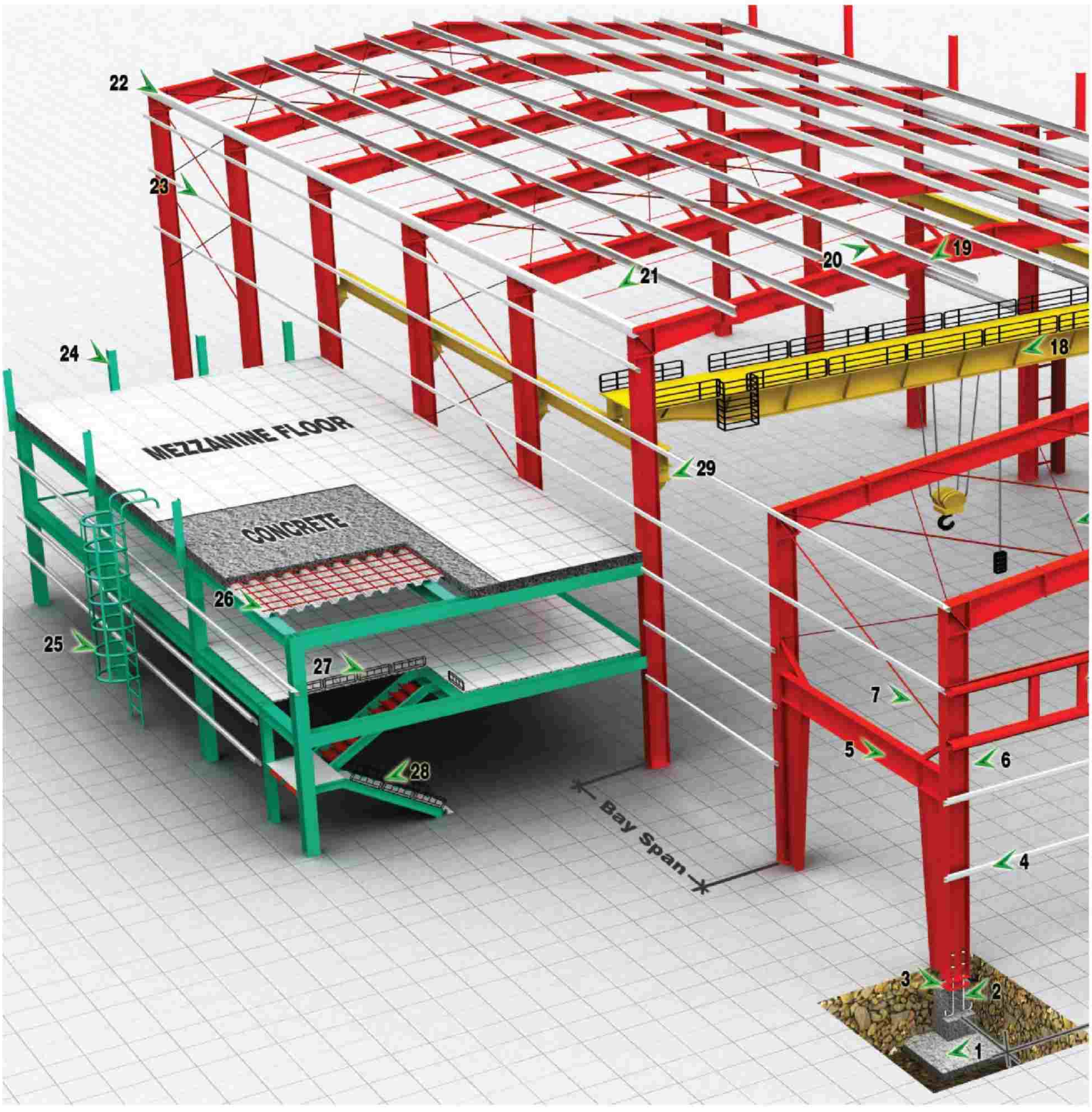
# Building Components



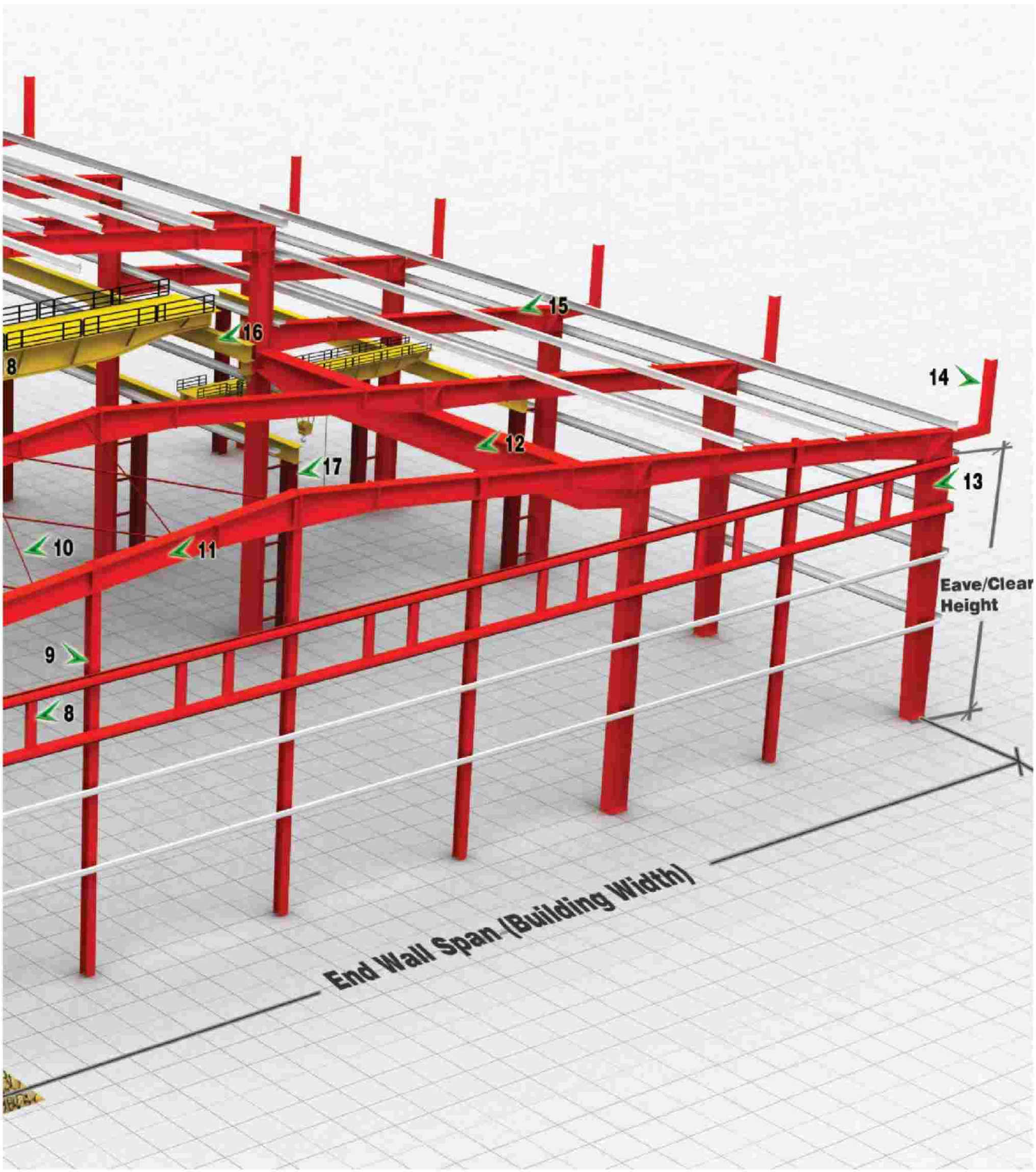

1. Kirby Roof Panel
2. Kirby Wall Panel
3. Canopy
4. Roll Up Door (Manual/Electrical)
5. Double Slide Door
6. Rake Trim
7. Sky Light (Translucent Panel)
8. Ridge Ventilator (With Bird Mesh)
9. Power Ventilator
10. Eave Gutter
11. Louver With Bird Mesh
12. Masonry Trim
13. Window With Insect Screen
14. Downspout


15. Single Walk Door
16. Curved Eave
17. Industrial Louver
18. Corner Trim
19. Eave Trim
20. Flush Fascia
21. Strip Skylight
22. Roof Monitor
23. Double Walk Door
24. Roof Extension
25. Return Downspout
26. Brick Wall
27. Wall Light (Translucent Panel)
28. Curved Cantilever Fascia

# Building Components (contd.)




1. Concrete Footing
2. Anchor Bolts
3. Base Plate
4. End Wall Girt
5. Portal Bracing
6. Main Frame Straight Column
7. Wall Bracing (Angle/Rod/Cables)
8. Framed Opening (Window/Louver)
9. End Wall Wind Column
10. Roof Bracing (Angle/Rod/Cables)
11. Main Frame Rafter
12. Jack Beam
13. Main Frame Tapered Column
14. Cantilevered Fascia Frame




15. Lean To Frame
16. Crane Beam
17. Crane Column
18. EOT Crane
19. Roof Purlin
20. Flange Brace
21. Sag Rod
22. Eave Strut
23. Side wall Girt
24. Flush Fascia Frame
25. Cage Ladder
26. Deck Panel with Steel Mesh
27. Hand Rail (Steel)
28. Staircase (Checker plate/C channel)
29. Crane Bracket

# STRUCTURAL SYSTEM

**Structural systems** are the main load carrying and support members of a pre-engineered building. The shape and size vary based on application and requirements.

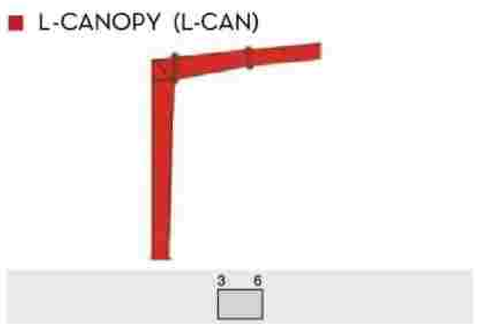
The main frame members are the main load carrying member of a structural system which include columns, endwall posts, rafters and other main support members.

All structural steel sections and welded plate members shall be designed in accordance with the applicable sections, relating to design requirements and allowable stresses, of the latest edition of the American Institute of Steel Construction "Specification for the Design, Fabrication and Erection of the Structural Steel for Buildings"

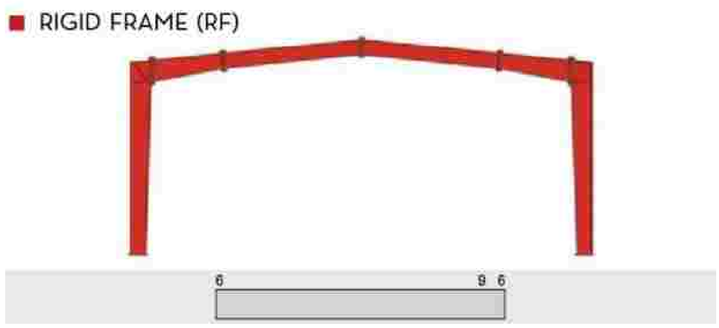
General guidelines on recommended frame types for different widths are given below:

## Main Frames

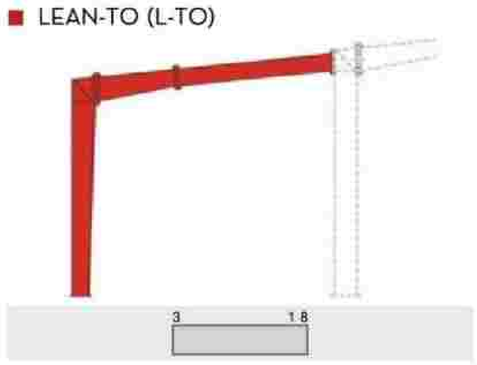
L-CANOPY (L-CAN)



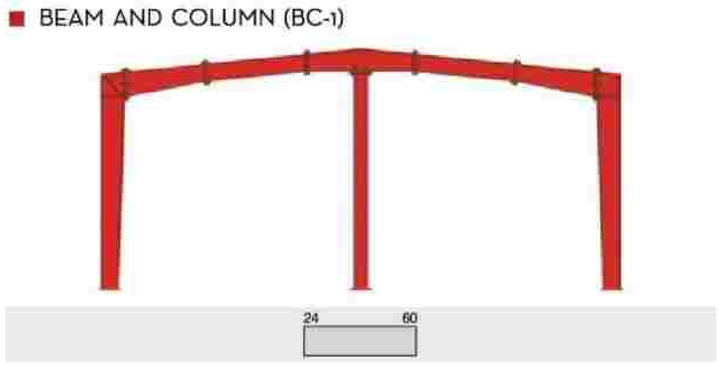

RIGID FRAME (RF)



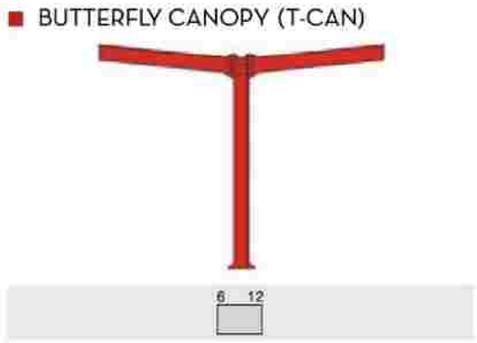

LEAN-TO (L-TO)



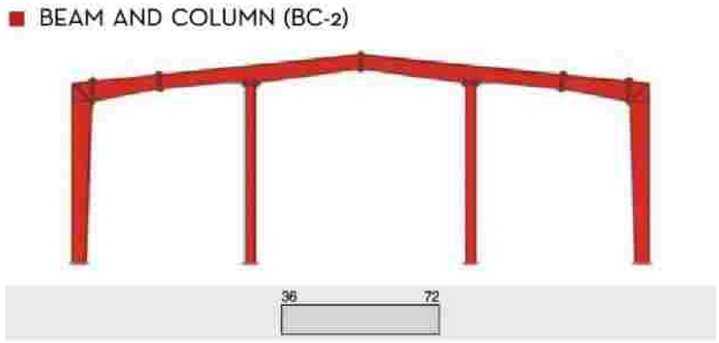

BEAM AND COLUMN (BC-1)



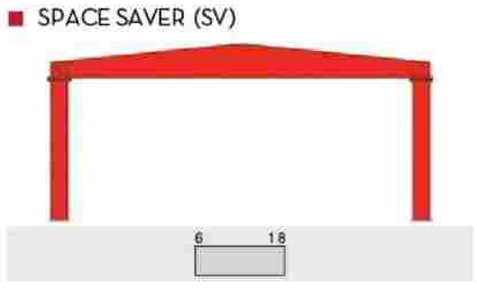

BUTTERFLY CANOPY (T-CAN)



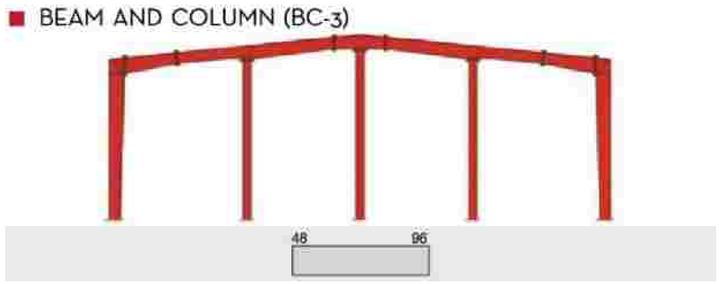

BEAM AND COLUMN (BC-2)



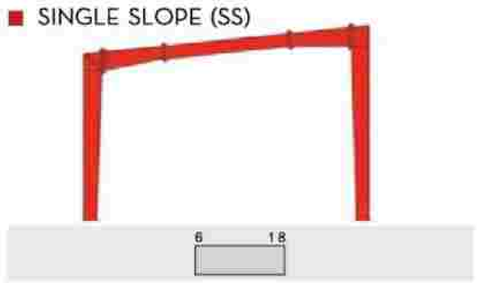

SPACE SAVER (SV)



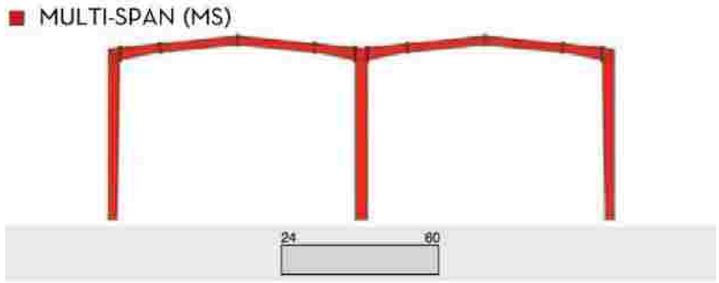

BEAM AND COLUMN (BC-3)




SINGLE SLOPE (SS)




MULTI-SPAN (MS)




Suggested width range (meters) ..... for most economical buildings
Standard Eave Height: 3M-8M; Std Bay Spacing: 6M/7.5M/9M;
Standard Loadings: Live Load; 0.5/0.6/1.0 KN/M², Wind load: 0.75/1.0/1.25 KN/M²

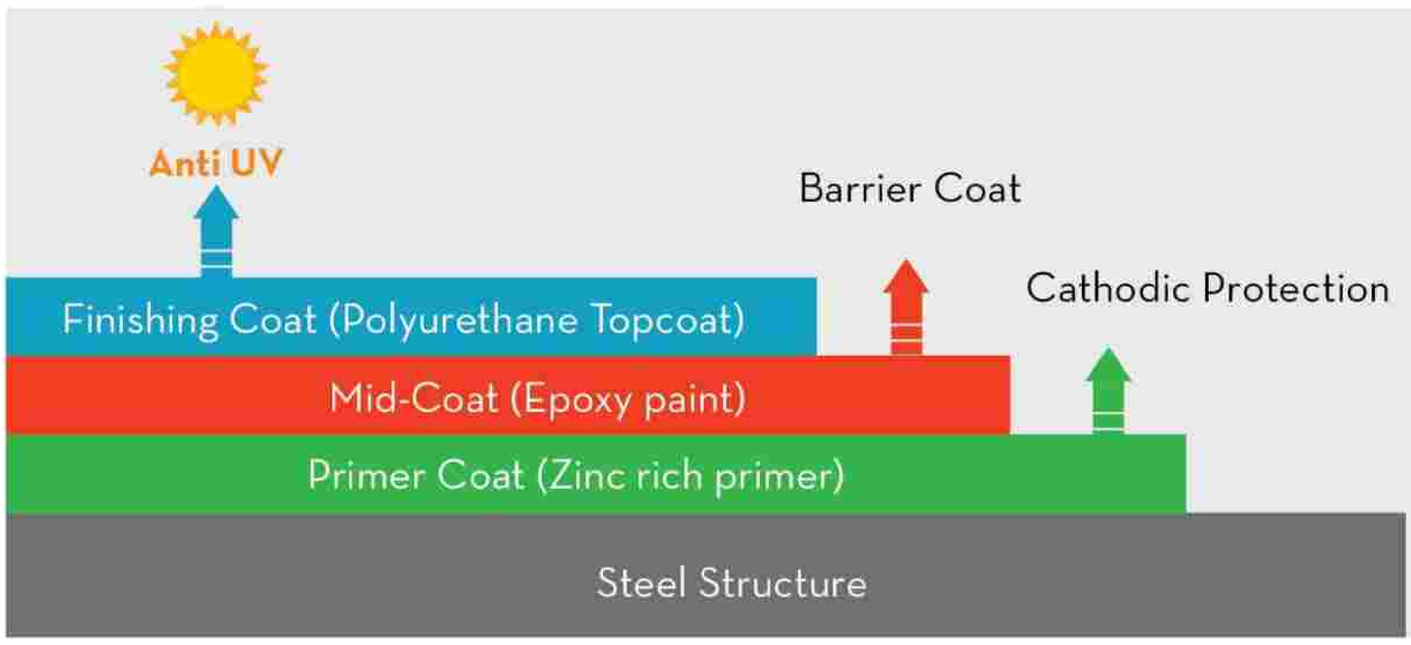
# Painting System

In the steel construction sector, the same types of paint are used from project to project. Each type of paint is designed to meet specific needs to satisfy the particular requirements of each individual project. Paint finishes can be used for aesthetic purposes, permanent or temporary protection, and colour identification.

Paint consists of a particular pigment, dispersed in a particular binder, dissolved in a particular solvent then the number of generic types of paint is limited. The most common method of classifying is by their binder type.

The three most important binders (resins) used in modern paints are Acrylic, Alkyd and Epoxy polymers

The paint system is one or more layers of paint, each layer within a paint system has different functions such as corrosion protection, barrier, aesthetic, solar protection. These functions are described by example below:




**Layer thickness**

Alkyd: 40 micron

Epoxy: 50-100 micron

**Durability of paint**

Low: 2-5 years

Medium: 5-15 years

High: > 15 years

1 **Primer Coat**

Main function of primer coat is to protect steel from corrosion. The binder for primer can be based on alkyd, epoxy and in order to increase cathodic protection ability, the paint constituent is added to make zinc rich primer. In this case, Zinc serves as a "sacrificial metal", acts as an anode to protect the steel from corrosion.

**Kirby Standard Primer:** Apply only 1 coat (40 microns) of Red/Grey Oxide Primer (Alkyd). This primer is easy to apply and get an economic advantage but offer limited protection ability against rust. They are designed to provide temporary protection during transportation and erection and provide a uniform appearance.

2 **Mid Coat**

Mid-coat are mainly barrier coats. They protect underlying coats, build thickness and provide good adhesion for subsequent coats.

3 **Top Coat**

Finishing coat are mainly aesthetic. They provide required colour, provide a smooth surface to allow cleaning and shedding of water. They also have U-V reflective properties (solar protection) if the paint constituent is added aluminum.

> "In order to obtain best painting quality, the top coat should be applied on job site because it will minimize touch up work and ensure homogeneousness of color of painting coat."

## Mezannines

Standard Mezzanine Floor Systems consist of galvanized profiled steel deck, joists, beams and intermediate support columns. Main beams can span in lateral directions and joists in longitudinal directions.

## Crane Support Systems

Buildings can be designed to support any required crane system. Generally, overhead travelling cranes up to 15 MT are supported on brackets. For higher capacities, an independent support system is provided. Crane support for overhead travelling cranes includes brackets, beams and bracings. In addition, buildings can be designed to carry JIB-Carnes, Mono Rail Cranes, Wall Travelling Cranes, Semi-Gantry Cranes as well.

## Fascias

Fascias are used for architectural purposes to conceal the gable of the building. A variety of fascias either straight or inclined can be provided. Fascias are cantilevered from the main frame columns on the sidewall and from the wind columns on the end wall. Flush Fascias or Parapet Fascias can also be provided.

Kirby provides fascias specially designed to your requirements. These fascias can have vertical, horizontal or curved sheeting to enhance the architectural look of your building.

## Canopies

Wall canopies over doors and windows at sidewall or end wall are available.

Sidewall canopies are supplied without soffit panel and end wall roof extension canopies are supplied with K.R. soffit panel unless noted otherwise.

End wall roof extension canopies are not to be supplied with soffit panel if the building remains open all around. Canopy brace angle should be supplied for bay spacings over 7000 mm or as required.

# Trusses

The KIRBY Truss System is one of the company's most popular and highly economical products. It is a rigid structure, ideal for large span roof systems, multiple bay buildings and as mezzanine floor framing.

Significant reductions in clearances and building heights are possible by running service pipes/ducts through the trusses. Foundation costs also are reduced due to fewer columns being required to support larger spans.

The KIRBY Truss System structures are individually designed to meet the specific requirements of each building and are fabricated utilizing high quality efficient fixtures. The system allows for easy erection as all connections are field bolted. Except for field splices on very large spans, no site welding is required.

# Curved Beams

Kirby provides curved sections with variable depth

and tapered memebers and capability of providing the curvature in 3 dimensions.

Flange ranges from 125 mm x 5 mm to 400 mm x 16 mm, and Depth ranges from 200 mm to 1200 mm

1. Design and production system is integrated with that of the building structure - ensuring on-time delivery.
2. Accurate detailing and manufacturing techniques assure correct appearance and perfect fit at site.
3. Flange ranges from 125mm x 5mm to 400mm x
4. 16mm.
5. Depth ranges from 200mm to 1200mm.
6. Mass production of members with 10m radius or
7. more.
8. Variable depth and tapered members.
9. Capability of curvature in three dimensions.

# Open Web Joists

The Open Web Steel Joist is a secondary steel truss member fabricated from crimped angles welded onto top and bottom chords. The elements of the open web joist are made of hot rolled as well as cold formed Grade 50 steel. Open Web Steel Joists are used as mezzanine joists, roof purlins, among others.

**Advantages**

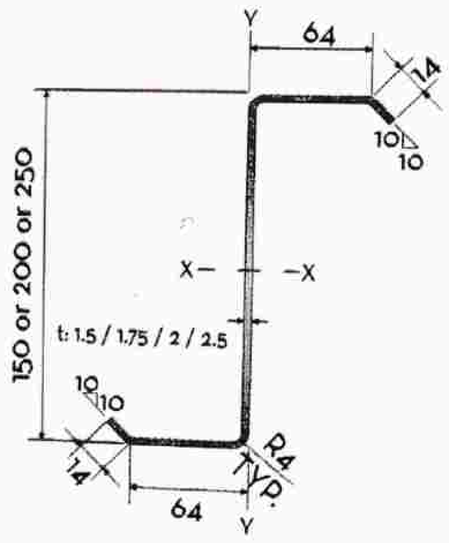
1. Offers an economical solution for long span carrying heavy load or light load compared to conventional steel structure.
2. Allows more clearance to the building by minimizing the mezzanine overall depth by designing beam at the short direction and the joists at the long direction without increasing the weight.
3. Ducts and mechanical accessories can be installed in between the web openings.
4. Cambering prevents tiles, partitions or any other delicate finishing from cracks by maintaining the finish floor level straight.

# SECONDARY MEMBERS

Z-Purlins, eave struts and C-Sections are cold formed from steel which has minimum yield strength of 345 MPa (50,000 psi) and will conform to the physical specifications of ASTM 570 - Grade 50 or ASTM A653 - Grade 50 or equivalent. We can also supply purlin with G450Mpa. We offer two choices of surfaced coating (1) Hot-dip-galvanized with 275GSM coating and (2) Zn-Al-Mg coating. These can be chosen based on environment condition of the building being constructed.

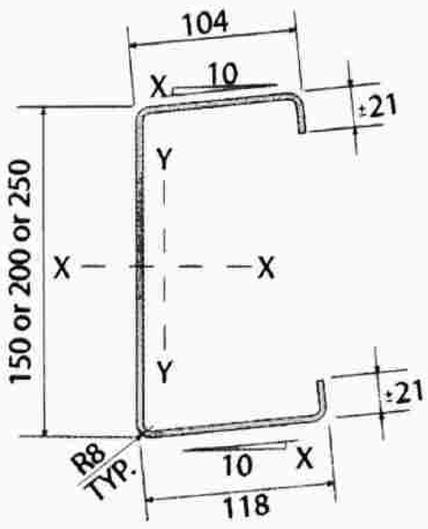
## 1 Z - purlin

Purlins are roll-formed Z sections with thickness 1.5 2.5mm, 150, 200 & 250mm deep with 64mm flanges with a 14mm stiffening lip formed at 450 to the flange

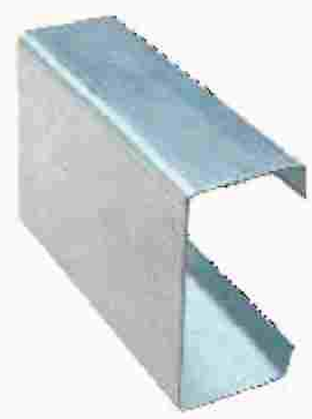



## 2 Eave strut

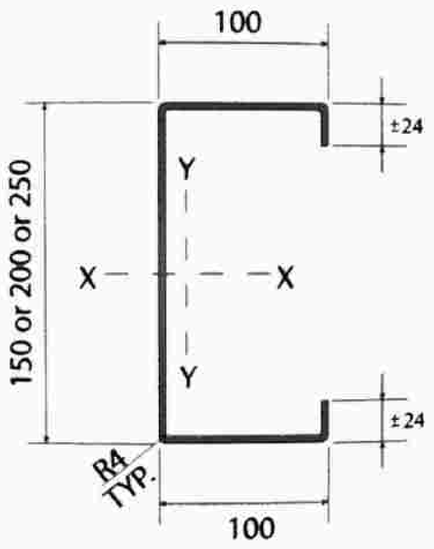
Eave struts are 150, 200 & 250mm deep with a 104mm wide top flange, a 118mm wide bottom flange; both both are formed parallel to the roof slope. Each flange has a 21mm stiffener lip




## 3 C - section

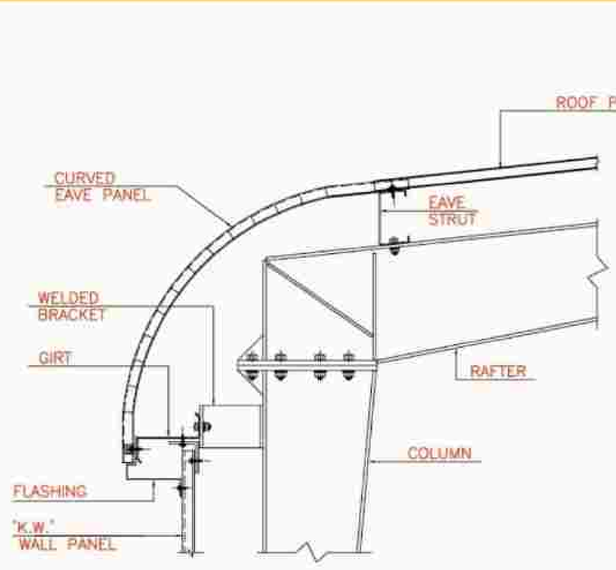


C- Sections are 150, 200 & 250mm deep with standard thickness 1.5 2.5mm and a 100mm flange. The flanges are perpendicular to the web and have a 24mm stiffening lip

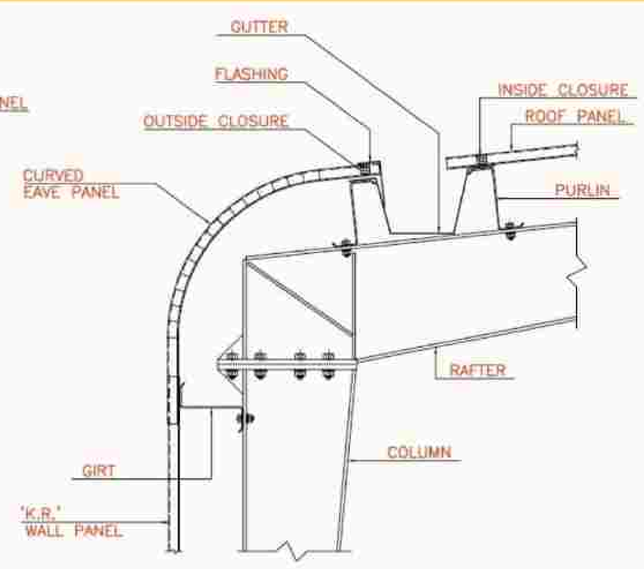



## 4 Curved eaves

Curve Eaves can transform the look of any building. Curved canopies and walkways provide an inviting entryway into commercial establishments. Curved eaves eliminate seam lines and provide a smooth line for the eye to follow. Our crimping-curving process increases the rigidity of the Curved panels making this choice of panels not only visually appealing but also practically durable.




DETAIL AT EAVE WITHOUT GUTTER (WITH PROJECTION)




DETAIL AT EAVE WITH GUTTER (WITHOUT PROJECTION)

5

# Bracing System

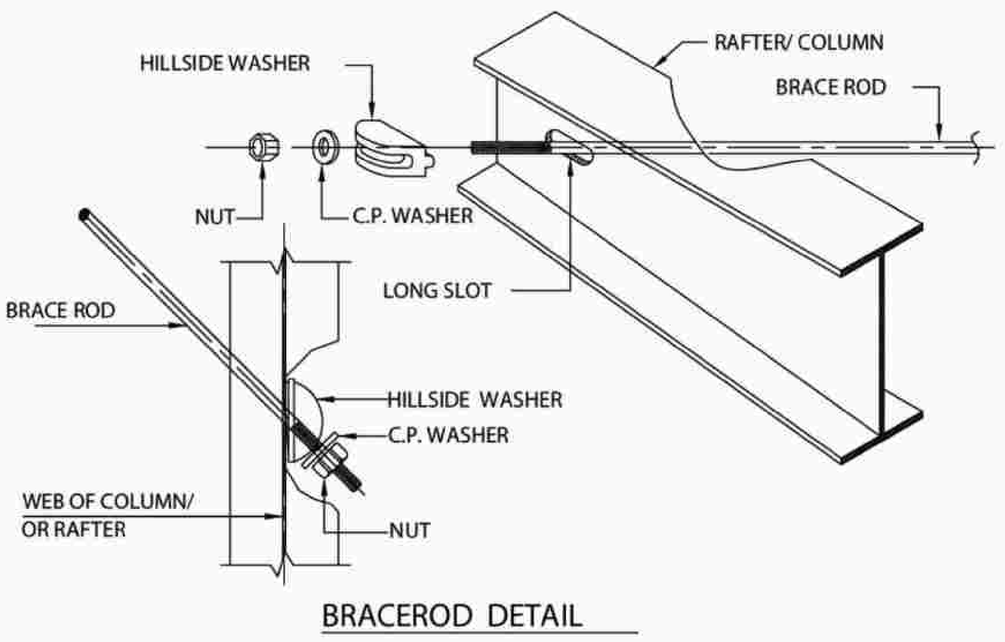
Bracing system includes roof bracing and wall bracing. Roof bracing is usually diagonal while wall bracing can be diagonal, portal, x-portal.

• Diagonal (X-bracing): can be rod or angle bracing that is cheap bracing option.

• Rod bracing: is connected to rafter or column by nut, washer and hill side washer.

• Portal bracing: is provided where X-bracing is not allowed due to a requirement of clear non-obstructed space.

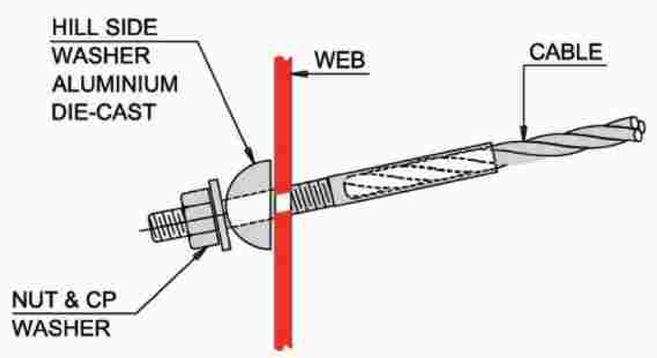
The bracing system must be installed properly to make sure the load is transmitted down to the column base or foundation. Bracing rod is painted red or grey alkyd primer 40 micron DFT or hot dip galvanizing ASTM A153 will confirm to the physical specifications of ASTM A-36 or equivalent.



BRACEROD DETAIL

## Cable bracing

Cable bracing is made of extra high strength seven strand cable and can be designed to accommodate any length to ensure the stability of the building against forces in the longitudinal and lateral direction due to wind, cranes and earthquakes. It is made of a cable which is forged into a rod terminal and this arrangement is then fixed on a structure using a hill side washer, nut washer and a nut.



CABLE END CONNECTION

## Rod bracing

Rod bracing shall have a minimum yield strength of 250MPa(36,000 psi) and will conform to the physical specifications of ASTM A-36 or equivalent.

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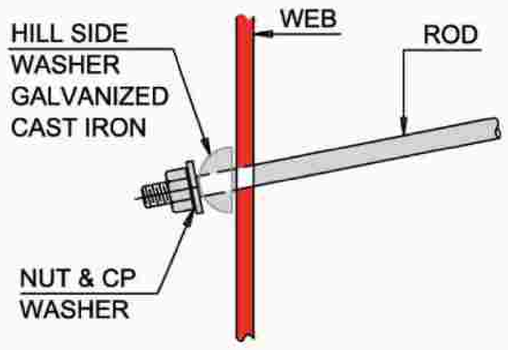
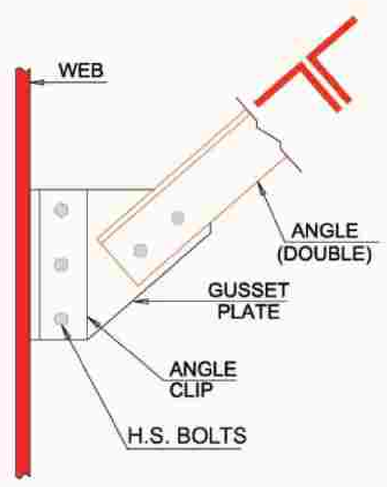


BRACE ROD CONNECTION

## Angle bracing

Angle Bracings are used to withstand the actions of longitudinal forces ( tension only). These angles shall have minimum yield of 250 Mpa(36,000 psi) or 345 Mpa(50,000 psi)



ANGLE BRACE CONNECTION

6

## Sag rod

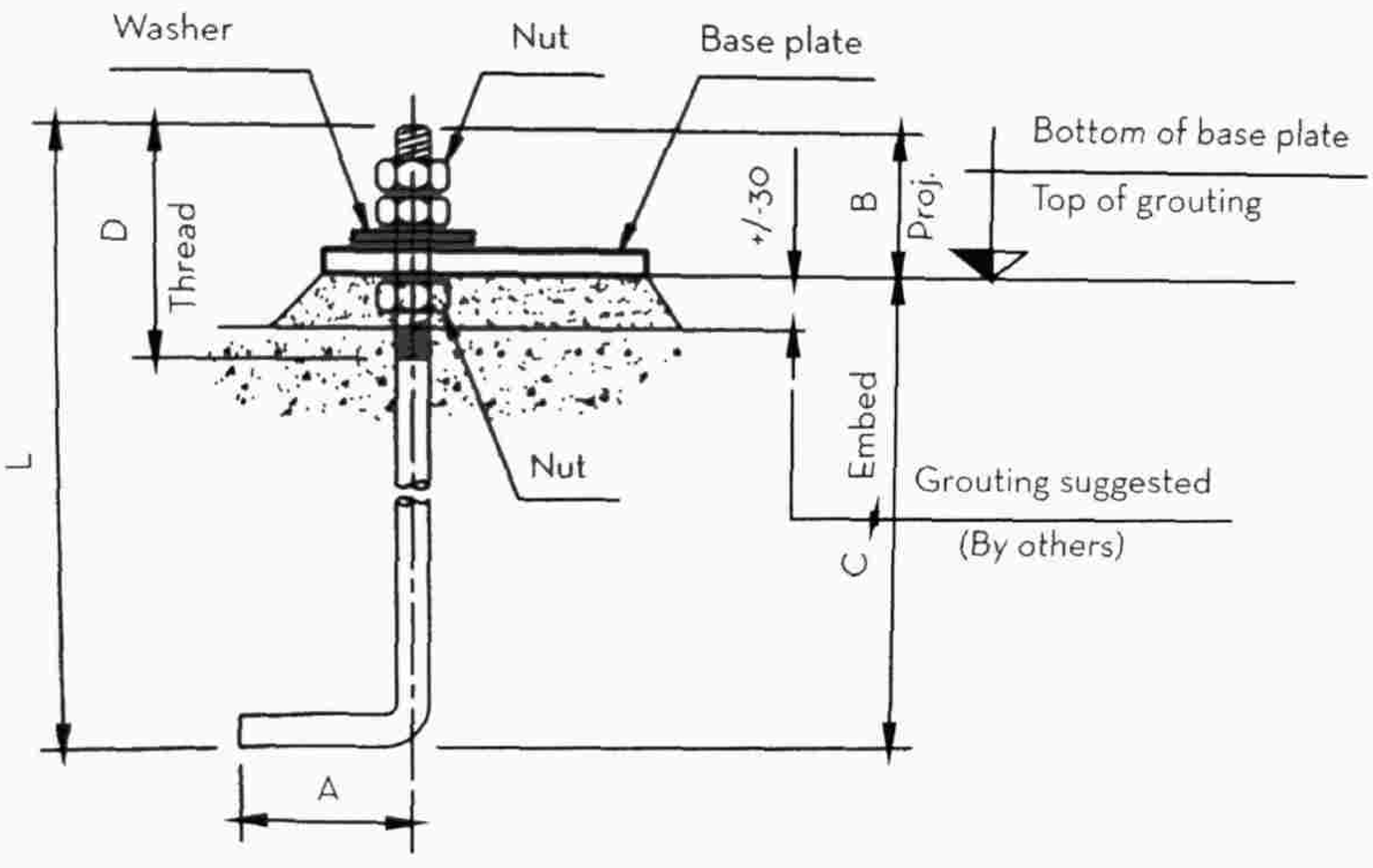
A tension member used to limit the deflection of a girt or purlin in the direction of the weak axis. Sag Rod is electro-galvanized or hot dip galvanized. Diameter is from 12mm to 16mm

7

## Anchor bolt

A tension member used to limit the deflection of a girt or purlin in the direction of the weak axis. Sag Rod is electro-galvanized or hot dip galvanized. Diameter is from 12mm to 16mm

12 - 24 mm (diameter)




Anchor bolt detail setting

# CLADDING SYSTEMS

Kirby panels are prepared with a multilayered coating system to ensure long life and optimum coating adherence. The base material is pre-treated, before applying a corrosion resistant primer and top coat. Kirby Cladding systems come in six standard color options. We can support requirements for RAL colours on request.

## Panel Profiles

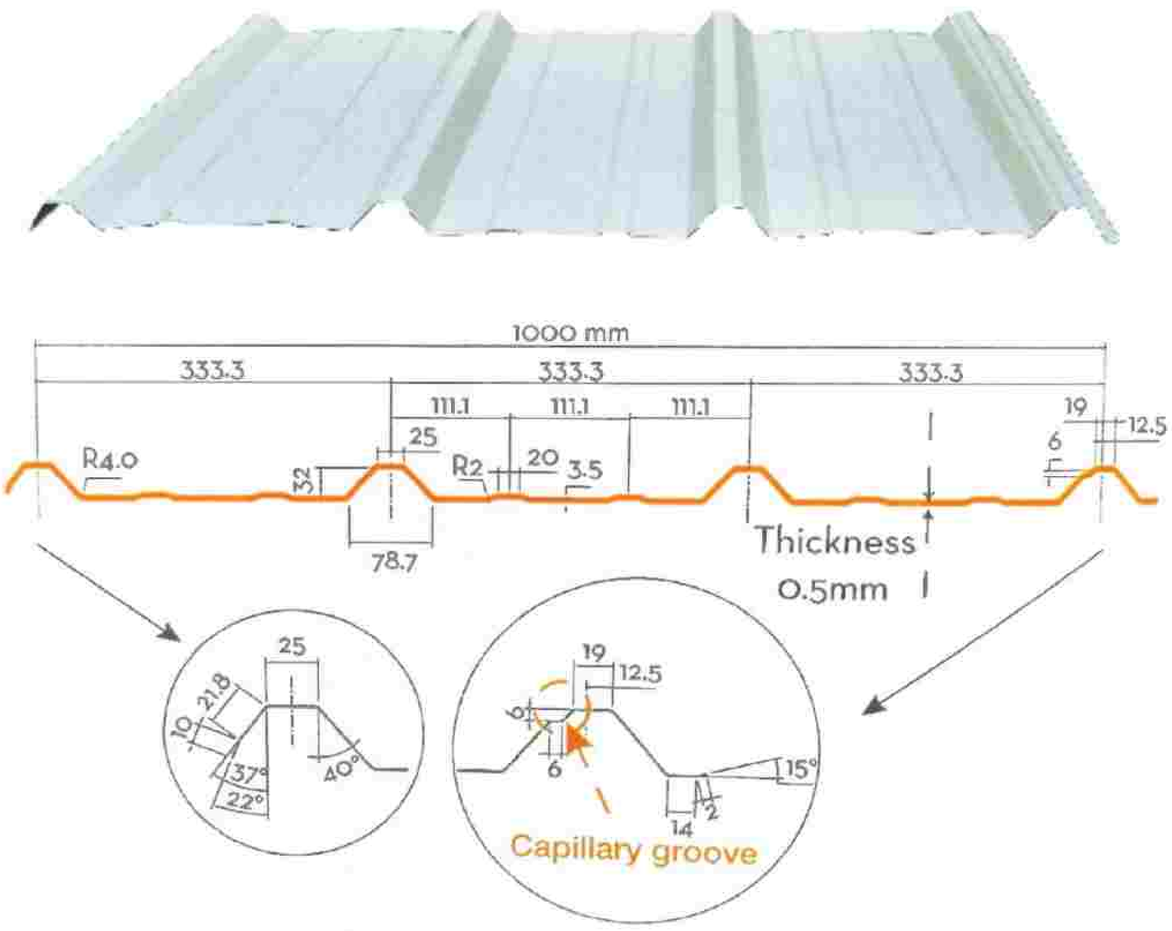
Kirby offers three types of affordable, durable and easy-to-install cladding panels to enhance the visual appearance of our customers' buildings.

### KIRBY ROOF & WALL (KR32)

Kirby Roof & Wall Panel is strong and cost effective and is designed for efficient roofing & wall cladding applications. The bearing leg design permits easier installation and maintenance, supports thicker layers of insulation and allow easier curvature for a visually appealing finish. It has a capillary groove which prevents water leakage.

**Coverage Width:** 1000mm

**Rib Depth:** 32mm



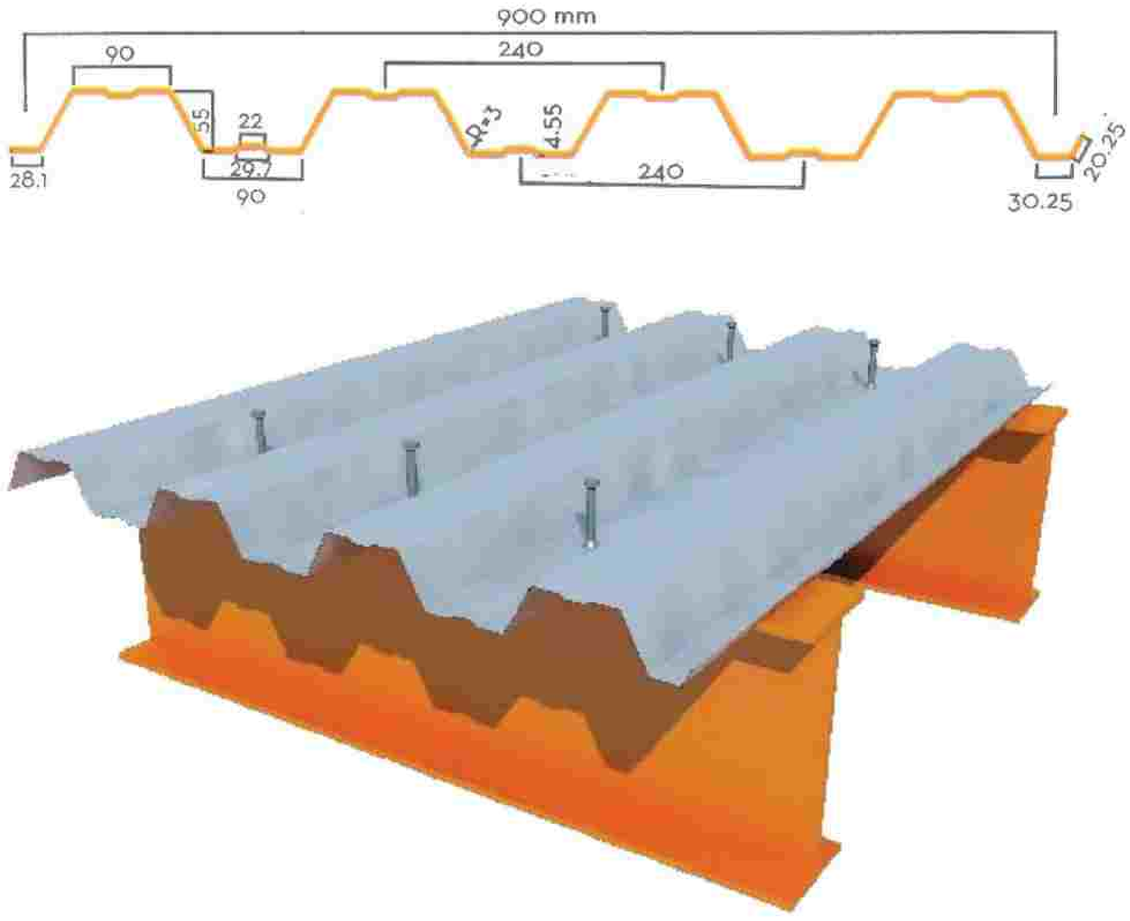

### KIRBY DECKING PANEL (KV-55)

Kirby Decking Panel is an ultra-strong profile designed as a permanent shuttering to support wet concrete used in decking applications. The profile provides a stable and rigid working platform that removes the need for additional framework to support concrete.

Kirby Decking Panel has 55mm deep major ribs and is spaced 240mm center to center. Additional minor stiffening ribs are located in the middle of major ribs. The panel provides 900mm cover width.

**Coverage Width:** 900mm

**Rib Depth:** 55mm

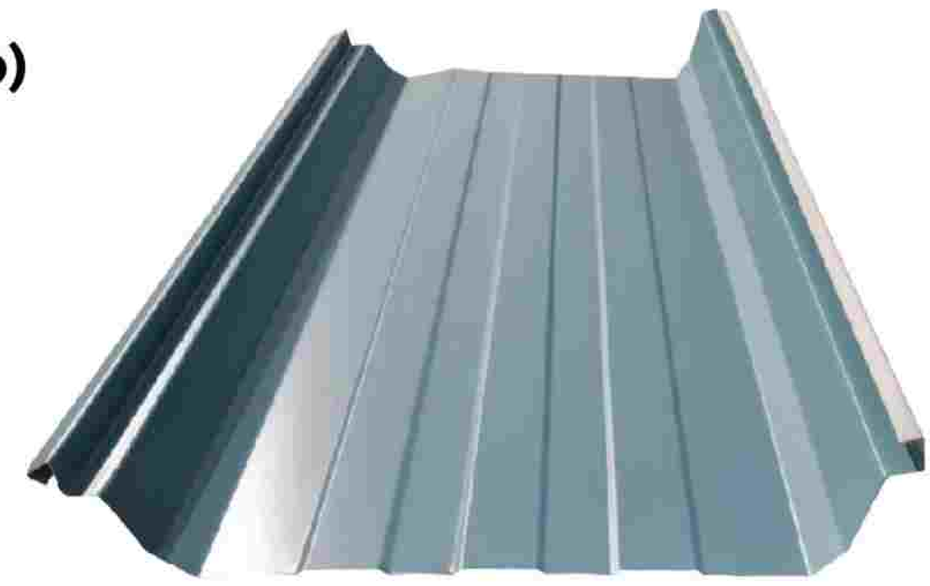


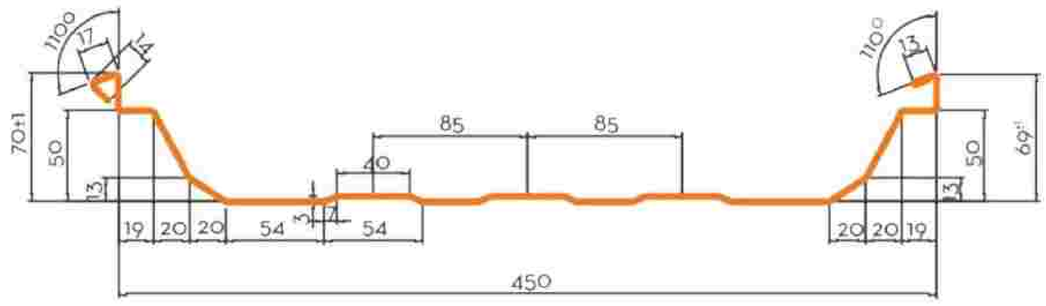
# KIRBY STANDING SEAM PANELS (KSS450)

The introduction of the Kirby Standing Seam Panel Systems (KSS-450) with double lock standing seam ends eliminates the risk of leakage at fasteners and side and end laps due to the concealed fastening system and provides excellent protection in all weather conditions.

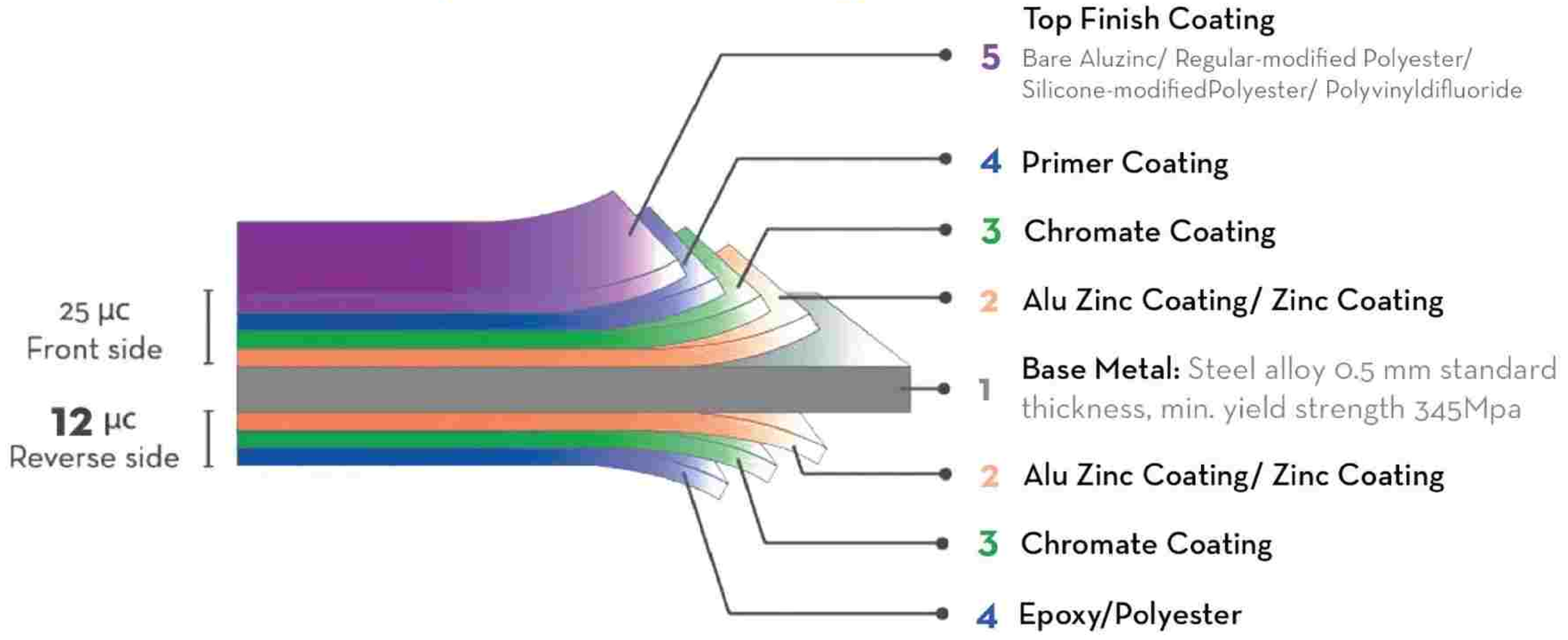
**Coverage Width:** 450mm

The KSS-450 roof system is the most specified standing seam roof system in the market since many years






## Cross section of painted sheeting




## Six Standard Color Options

Artic white

Caribbean blue

Desert beige

Sun gold

Autumn green

Aluzinc

# INSULATION

Kirby can provide insulation for roofing & wall cladding with four types of materials: Glasswool, Mineralwool, Air Bubbles, and Polyethylene Foam. Kirby also provide Wall & Roof PUF Panel.

## 1. Glasswool

Glassswool are manufactured from stable glass fibers bonded with thermosetting resins. They are light in weight, strong, resilient and easy to handle. Products are available unfaced or with a variety of facings to suit the applications: white vinyl, FSK, metalized polyester, kraft paper and glass tissue with nominal density from 10kg/m3 to 48kg/m3. Products are generally recommended for thermal and/or acoustic insulations of all buildings walls and roofs.

## 2. Mineralwool

Mineralwool are manufactured from stable rock fibers bonded with thermosetting resins and are light weight, strong and resilient and easy to handle. Mineralwool are fine and uniformly distributed that ensure excellent uniform thermal resistance of building roll. Mineralwool are available with Aluglass, FSK (Aluminum Foil/glass scrim/Kraft paper laminate) facing which provides an efficient vapor barrier. Kraft Paper facing is also available.

| Specification | Glasswool | Mineralwool |
|---|---|---|
| Density (kg/m3) | 10-48 | 36-48-64 |
| Thickness (mm) | 25-100 | 40-100 |
| Length (m) | 10-45 | 5-10 |
| Width (m) | 0.4- 0.6-1.0-1.2 | 1.1-1.2 |
| Fireproof | Grade A | Grade A |
| Moisture absorption | <1% (BS2972, ASTM C1104/ 1104 M) | <1% (BS2972, ASTM C1104/ 1104 M) |
| Working temperature range | 80℃-100℃-230℃ | 100℃-750℃ |
| Thermal conductivity (W/m.K,50℃) | 0.055-0.035 | 0.047-0.038 |

# 3. Air bubbles

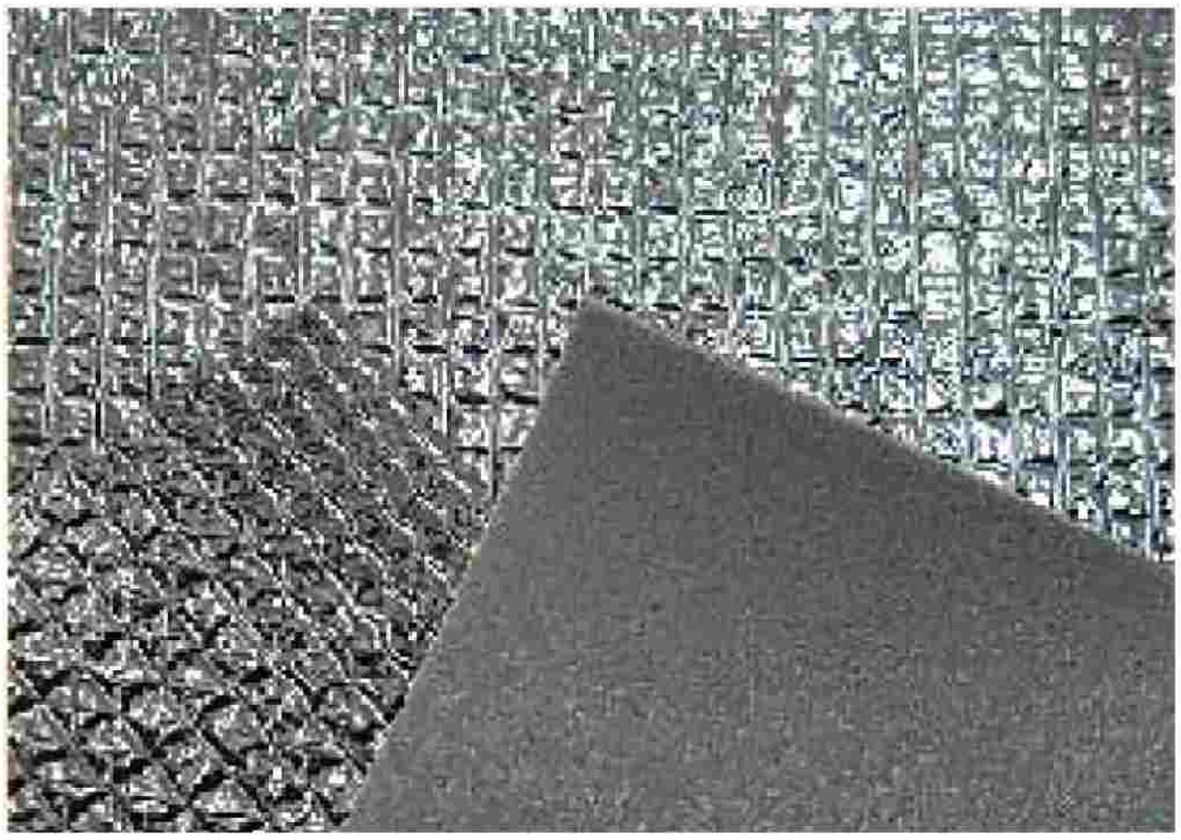
Air bubbles is a thermal reflective insulation made of two external pure aluminum foil layers covering a single core layer of polyethylene bubble air film. The bubble air is 10mm diameter. The aluminum foil is silver bright reflects the heat radiation. The polyethylene bubble air sheet prevents the thermal conductivity and is sound proof.

Air bubbles is high strength, waterproof, fire retardant. The aluminum foil is anti-oxidant treated to withstand different weather conditions. Product is manufactured by American standard.

| Property | Standard | Unit | Value |
|---|---|---|---|
| Sheet structure | Aluminum foil/ bubble air bag 10mm diameter/ Aluminum foil | | |
| Roll Size | | mxm | 1.55 x 40 |
| Sheet thickness | | mm | 4 (±0.3) |
| Roll weight | | kg | 20 (±0.3) |
| Yeild strength | | g/m | 311.13 |
| Reflectivity | ASTM C1371 | % | 99.96 |
| Emissivity | ASTM C1371 | € | 0.045 |
| Classification of Surface Spread of Flame (Aluminum surface) | BS-476.Part 7 | | Class 1 |
| Elongation | ASTM D638 | % | 13.05 |
| Tensile strength | ASTM D638 | N | 33.61 |
| Tear strength | ASTM D1004 | kN/m | 16.24 |
| Bursting strength | ISO 13938-2-99 | | 120.8 |
| Water absorption | ASTM E960 | g/ft2hr | 0.19 |
| Resistant to mold and bacteria | | | Yes |
| Toxicity | | | No |
| Thermal Conductivity | | W/m.K | 0.03 -0.019 |

## 4. Polyethylene Foam

| SPECIFICATIONS | |
|---|---|
| Thickness | 20mm - 100mm |
| Density | 31.2 Kg/m³ |
| Dissipation of smoke | 30m |
| Thermal conductivity | 0.026 W/mK |
| Temperature range | -50 °C +/- 100 °C |
| Ability to ignite | 500 °C |
| Roll width | 100cm |
| Roll length | 50 - 100m |
| Water vapor permeability | 0.0 g/m²/24hrs |
| Tensile strength | 325kPa |
| Elongation | 90% (min) - 130% (max) |
| Thermal shrinkage | 1.1% (min) - 1.7% (max) |



Polyethylene foam is elastic product consisting all properties: thermal insulation (with three modes: blocking heat, reflecting 97% radiant heat, convection heat), noise insulation, strong, nice.

It is produced from polymerization processing and MDI as main ingredients, they have closed cell structure. Dimension of closed cell is very small and this leads to excellent thermal and sound insulation, negligible water absorption. This closed cell have more outstanding thermal insulation properties in comparison with glasswool, air bubbles, vulcanized rubber or other insulation.

## 5. Kirby Concealed Fastener Wall Panel

Self-supporting metal panel system, insulated with rigid PUR foam, with a concealed-fixing method for high quality industrial and commercial buildings, where good aesthetics are paramount.

The special double labyrinth joint of this panel, provides mechanical resistance and insulation superior to any other wall panel product of this kind, the panel external micro-V increases the aesthetic appeal of this panel, which can be orientated both vertically and horizontally as required.

Because of the particular shape of the joint, blind fastening are applied to the V-cut on the male edge of the outside sheet. Two screws with center distance of 30 mm should be used for each panel and each stud.

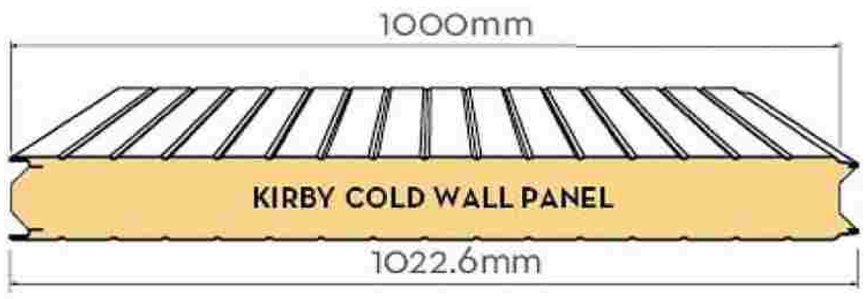
Outside walls are made mounting such panels one next to the other.

| Table of safe spans | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S mm | K | | Panel weight kg/m² | p | p p p<br>Δ l Δ l Δ l Δ | | | | | p<br>Δ l Δ | | | | |
| | Kcal m²h°C | Watt m²°C | 0,6 + 0,5 | p = (daN/m²) | 60 | 80 | 100 | 120 | 150 | 60 | 80 | 100 | 120 | 150 |
| 60 | 0,29 | 0,34 | 11,91 | l = | 4,40 | 4,10 | 3,75 | 3,45 | 3,00 | 3,80 | 3,55 | 3,30 | 3,00 | 2,60 |
| 80 | 0,22 | 0,26 | 12,67 | l = | 5,20 | 4,65 | 4,25 | 3,90 | 3,35 | 4,50 | 4,00 | 3,70 | 3,35 | 2,90 |
| 100 | 0,18 | 0,21 | 13,43 | l = | 5,80 | 5,15 | 4,75 | 4,30 | 3,70 | 4,90 | 4,45 | 4,10 | 3,75 | 3,20 |

# 6. Kirby Cold Wall PUF Panel

Kirby Cold Wall is a range of self-supporting metal panels with state-of-the-art polyurethane with a labyrinth joint for the construction of positive temperature cold storage warehouses and rooms.

Kirby Cold Wall range has been designed to provide a complete solution to the requirements of the cold storage industry




| Panel sheets specifications | |
|---|---|
| Polyester primer | 5 micron |
| Non-loxic food-graded STANDARD polyester finish paint. RAL 9010 | 20 micron |
| Back-coat | 5 micron |
| Resistance to saline mist | ≥ 500 h (ECCA T8) |
| Resistance to saline moisture | ≥ 1000 h (ASTM D2247) |

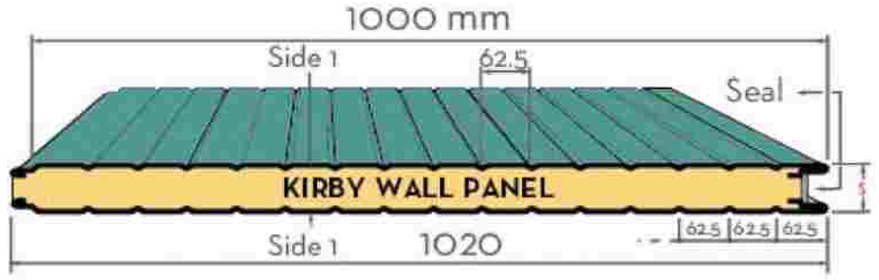
| Panel foam specification | |
|---|---|
| Average density | 38kg/m³ |
| Thermal conductivity | 0.024 - 0.03 W/m.K |
| Temperature range | -40+80 °C |
| Free from CFC | |

| Table of safe spans | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S mm | K | | Panel weight kg/m² | | | p<br>Δ p.p. + 20 l Δ p.p. + 30 | | | | | | |
| | Kcal m²h°C | Watt m²°C | 0,45+0,45 | 0,5 + 0,5 | 0,6 + 0,6 | p = (daN/m²) | 0,45+0,45 | 0,5+0,5 | 0,6+0,6 | 0,45+0,45 | 0,5+0,5 | 0,6+0,6 |
| 80 | 0,22 | 0,26 | 10,63 | 11,48 | 13,17 | l = | 5,25 | 5,80 | 6,10 | 4,70 | 5,30 | 5,55 |
| 100 | 0,18 | 0,21 | 11,44 | 12,29 | 13,99 | l = | 5,90 | 6,80 | 7,20 | 5,25 | 6,20 | 6,55 |
| 120 | 0,15 | 0,18 | 12,20 | 13,05 | 14,75 | l = | 7,35 | 7,80 | 8,20 | 6,70 | 7,10 | 7,50 |
| 150 | 0,12 | 0,14 | 13,33 | 14,18 | 15,88 | l = | 8,35 | 9,20 | 9,60 | 7,50 | 8,40 | 8,80 |

# 7. Kirby Wall PUF Panel

This profile is most suitable to overshadow the fasteners.

It can be applied as External/Internal walls for commercial and industrial applications.



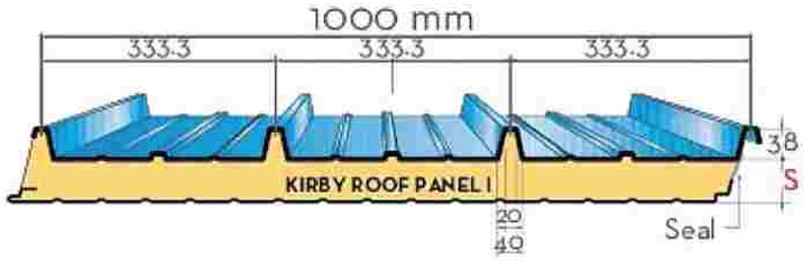

| Panel sheets specifications | |
|---|---|
| Polyester primer | 5 micron |
| Non-loxic food-graded STANDARD polyester finish paint. RAL 9010 | 20 micron |
| Back-coat | 5 micron |
| Total sheet thickness | 0.6/0.5/0.4 mm |
| Bottom sheet thickness | 0.5/0.4/0.3 mm |

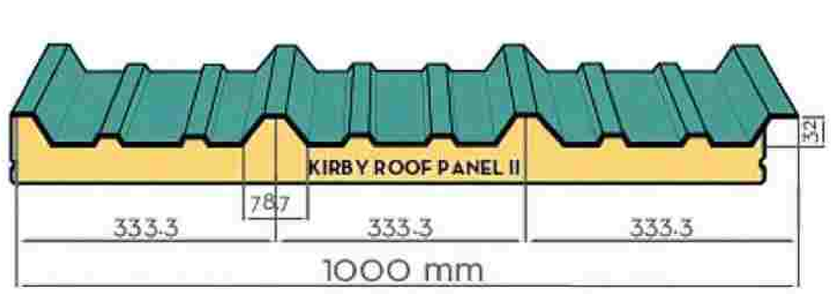
| Panel foam specifications | |
|---|---|
| Average density | 36 ± 2kg/m³ |
| Thermal conductivity | 0.024 - 0.03 W/m.K |
| Temperature range | -40+80 °C |
| Free from CFC | |
| Type of foam | B2, B3 & PIR |

**Table of safe spans**

| S mm | K Kcal m²h°C | K Watt m²°C | Panel weight kg/m² 0,4 + 0,4 | Panel weight kg/m² 0,6 + 0,6 | P = (daN/m²) | 60 | 80 | 100 | 120 | 150 | 60 | 80 | 100 | 120 | 150 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | 0,66 | 0,77 | 7,70 | 11,08 | I = | 2,05 | 1,90 | 1,75 | 1,65 | 1,55 | 1,75 | 1,60 | 1,50 | 1,40 | 1,30 |
| 30 | 0,56 | 0,65 | 7,89 | 11,23 | I = | 2,60 | 2,45 | 2,30 | 2,05 | 1,85 | 2,25 | 2,10 | 1,90 | 1,80 | 1,65 |
| 35 | 0,48 | 0,56 | 8,08 | 1,46 | I = | 3,20 | 3,00 | 2,80 | 2,50 | 2,20 | 2,80 | 2,60 | 2,40 | 2,20 | 2,00 |
| 40 | 0,43 | 0,50 | 8,27 | 11,65 | I = | 3,40 | 3,20 | 3,00 | 2,80 | 2,50 | 3,10 | 2,90 | 2,70 | 2,50 | 2,20 |
| 50 | 0,35 | 0,41 | 8,65 | 12,03 | I = | 3,90 | 3,65 | 3,40 | 3,10 | 2,75 | 3,45 | 3,20 | 2,95 | 2,75 | 2,40 |
| 60 | 0,29 | 0,34 | 9,03 | 12,41 | I = | 4,40 | 4,10 | 3,75 | 3,45 | 3,00 | 3,80 | 3,55 | 3,30 | 3,00 | 2,60 |
| 80 | 0,22 | 0,26 | 9,79 | 13,17 | I = | 5,20 | 4,65 | 4,25 | 3,90 | 3,35 | 4,50 | 4,00 | 3,70 | 3,35 | 2,90 |
| 100 | 0,18 | 0,21 | 10,59 | 13,99 | I = | 5,80 | 5,15 | 4,75 | 4,30 | 3,70 | 4,90 | 4,45 | 4,10 | 3,75 | 3,20 |
| 120 | 0,15 | 0,18 | 11,35 | 14,75 | I = | 6,40 | 5,70 | 5,25 | 4,75 | 4,05 | 5,50 | 4,90 | 4,50 | 4,10 | 3,50 |

# 8. Kirby Roof PUF Panel




| Panel sheets specifications | |
|---|---|
| Polyester primer | 5 micron |
| Polyester finish paint | 20 micron |
| Back-coat | 5 micron |

| Panel foam specification | |
|---|---|
| Average density | 36 ± 2kg/m³ |
| Thermal conductivity | 0.024-0.03 W/m.K |
| Temperature range | -40+80 °C |
| CFC free from CFC | |
| Type of foam | B2, B3 & PIR |

## Table of safe spans

| S mm | K Kcal m²h°C | K Watt m²°C | Panel weight kg/m² | | p p p Δ l Δ l Δ l Δ | | | | | | | p Δ l Δ | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0,5 + 0,4 | P = (daN/m²) | 60 | 80 | 100 | 120 | 150 | 200 | 250 | 60 | 80 | 100 | 120 | 150 | 200 | 250 |
| 20 | 0,51 | 0,59 | 9,42 | \| = | 4,70 | 4,10 | 3,65 | 3,30 | 2,90 | 2,50 | 2,25 | 4,20 | 3,65 | 3,20 | 2,90 | 2,60 | 2,25 | 2,00 |
| 30 | 0,51 | 0,59 | 9,42 | \| = | 4,70 | 4,10 | 3,65 | 3,30 | 2,90 | 2,50 | 2,25 | 4,20 | 3,65 | 3,20 | 2,90 | 2,60 | 2,25 | 2,00 |
| 40 | 0,40 | 0,46 | 9,80 | \| = | 5,00 | 4,40 | 3,90 | 3,55 | 3,20 | 2,75 | 2,45 | 4,50 | 3,90 | 3,50 | 3,20 | 2,85 | 2,45 | 2,20 |
| 50 | 0,33 | 0,38 | 10,18 | \| = | 5,30 | 4,60 | 4,10 | 3,75 | 3,35 | 2,90 | 2,60 | 4,75 | 4,10 | 3,65 | 3,35 | 3,00 | 2,60 | 2,30 |
| 60 | 0,28 | 0,33 | 10,56 | \| = | 5,60 | 4,85 | 4,35 | 3,95 | 3,55 | 3,05 | 2,75 | 5,00 | 4,30 | 3,90 | 3,55 | 3,15 | 2,75 | 2,45 |
| 80 | 0,22 | 0,25 | 11,32 | \| = | 6,20 | 5,30 | 4,80 | 4,35 | 3,95 | 3,35 | 3,05 | 5,50 | 4,70 | 4,40 | 3,95 | 3,45 | 3,05 | 2,75 |
| 100 | 0,18 | 0,21 | 12,08 | \| = | 7,05 | 6,05 | 5,45 | 4,95 | 4,45 | 3,80 | 3,45 | 6,20 | 5,40 | 4,90 | 4,45 | 3,95 | 3,45 | 3,05 |

# ACCESSORIES

## Roofing Accessories

### SKY LIGHTS & WALL LIGHTS

Produced from polyester containing UV stabilizer and high quality fiber glass. In addition, it is protected by two layer sealable films so it can stand the exterior environment. It can maintain its translucency and mechanical properties

for a long time which brings high economic efficiency. It manufactured under ASTM D3841-97, which is set exclusively for F.R.P roong.

| Specifications | |
|---|---|
| Thickness | 1.5 - 3 mm |
| Tensile strength | 123 MPa |
| Flexural strength | 276 MPa |
| Light transmission (opal) | 55% |
| Thermal transmission | 60% |
| Thermal expansion | 3.5 x 10-5cm/cm°C |
| Flammability | 38mm/min |
| Profile | KR32/ KSS450 |

### TURBO VENTS

Wind driven Turbo ventilators are powered by the wind to create effective ventilation for different industries. Turbine or Turbo ventilators are round metal vents with fins in them. Rotation causes a centrifugal force on the tip centrifugal force on the tip of the fins which suck out the stale hot air from inside of the building. The faster the wind, the faster the turbine will rotate and exhaust the heat, smoke, fumes, humidity.

| Specifications | |
|---|---|
| Material | Stainless steel |
| Weight | 10 +/-0.5 kg |
| Diameter | 600 mm +/-5 mm |
| Center width | 720 mm +/-5 mm |
| Rotary bar | Ø21 |
| Ball bearing | Koyo 6203$^{zz}$ |
| Base of ventilator | Stainless steel |
| Accessories | Stainless steel |

### RIDGE VENTILATORS

Gravity type with bird screen and Mechanical control Damper, standard size is 3000 mm long with a throat opening of 300 mm.

| Ventilation rates for types of building | |
|---|---|
| Boiler house/engine room | 15-30 |
| Living quarters, rooms & wards | 15-20 |
| Classrooms, canteen | 5-15 |
| Offices, commercial shops, factories | 5-10 |

# Windows and Louvers

## LOUVERS

Adjustable louvers are with overlapping blades allowing free air flow. Size is as per request. Incorporating stainless steel insect mesh, hand crank and blade adjustment lever.

## ALUMINIUM WINDOWS

Designed for installation with Kirby wall panel, double slides or as per request, self flashing with reinforced clear glass and removable half insect screen. Standard size is 1 m x 1 m. Multiple windows can be formed by joining the jamb fins together.

# Doors

## SLIDING DOORS (SINGLE OR DOUBLE LEAF)

3 m, 4 m, and 5 m wide and 3 m to 5.5 m high. Other sizes are available on special order.

## AIRCRAFT HANGAR DOORS

Kirby SEA encourages esteemed customer to procure aircraft hangar doors directly from their approve venders.

## WALK DOORS (SINGLE OR DOUBLE)

915 mm or 1830 mm wide x 2134 mm high made of 20 gauge electro-galvanized steel with honey core. Fireproofing is 60, 90 and 120 minutes or as request. Door fixture is provided.

# Other Accessories

## CONNECTION BOLT

Shall be ASTM & DIN standard. All bolts have hex head, zinc plated & hotdip gavanized finishing.

## SELF DRILLING SCREW

Shall be DIN standard with EPDM bonded washer & class 3, 1000 hrs SST (Salt Spray Test) finishing.

## SEALANT

Flexible sealer tapes made from Butyl rubber for sheeting side laps, end laps and accessories.

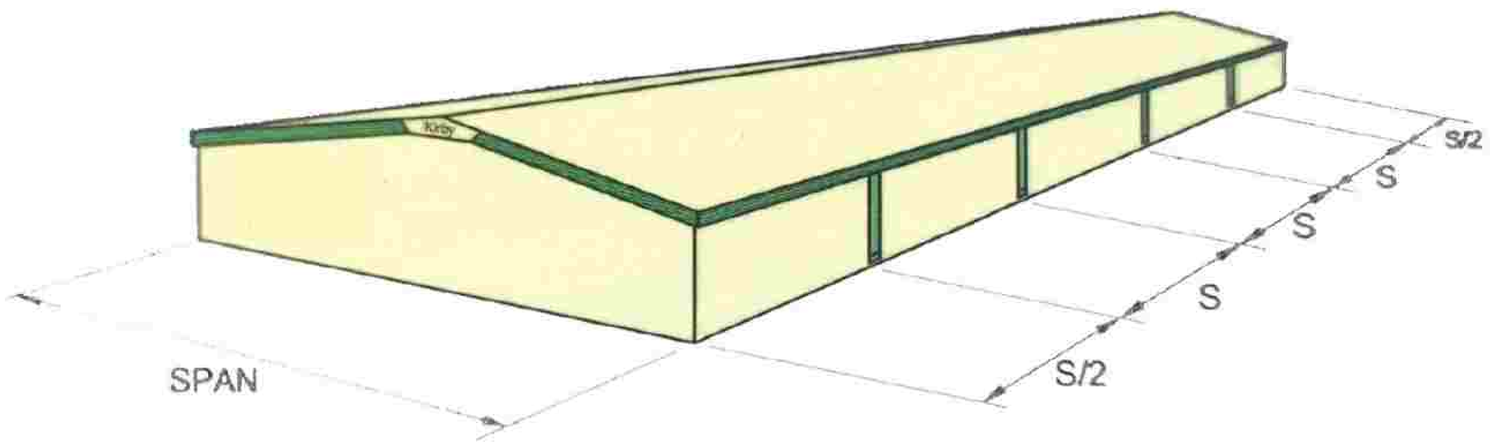
# WATER DRAINAGE

The water drainage systems include two main members:

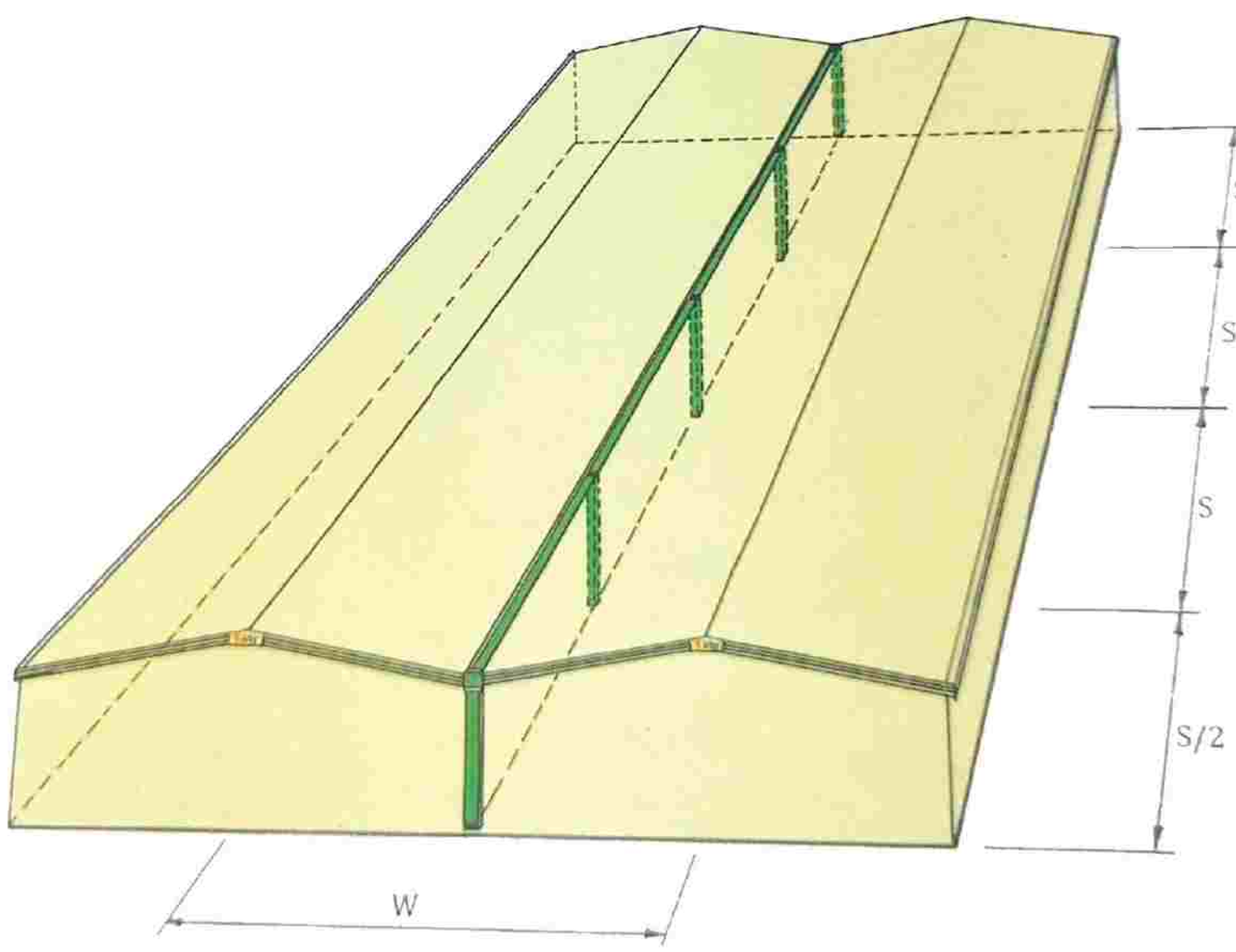
**Gutter:** a light gauge metal member at an eave, valley or parapet designed to carry water from the roof to downspouts or drains. There are two types of gutter: eave gutter and valley gutter. The gutter is galvanized, galvalume (color or plain) or stainless steel with thickness of 0.5mm, 0.6mm, 0.7mm, 1.0mm, 1.5mm

**Downspout:** a conduit used to carry water from the gutter of a building. Its shape is rectangular or round galvanized, galvalume or PVC with various size: 090, 0110, 0140, 160, $200.

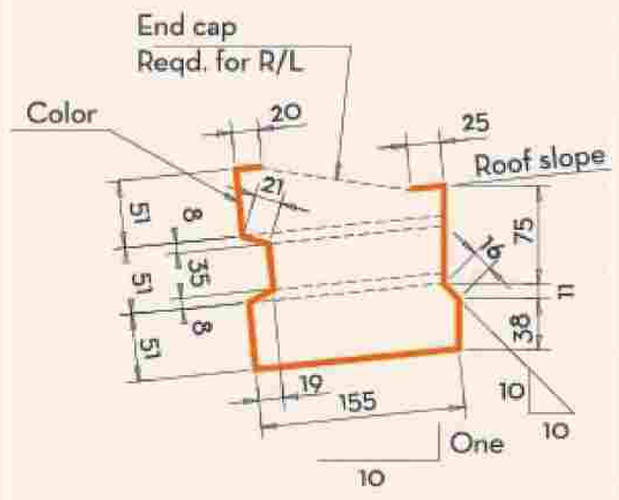
## Eave Gutter



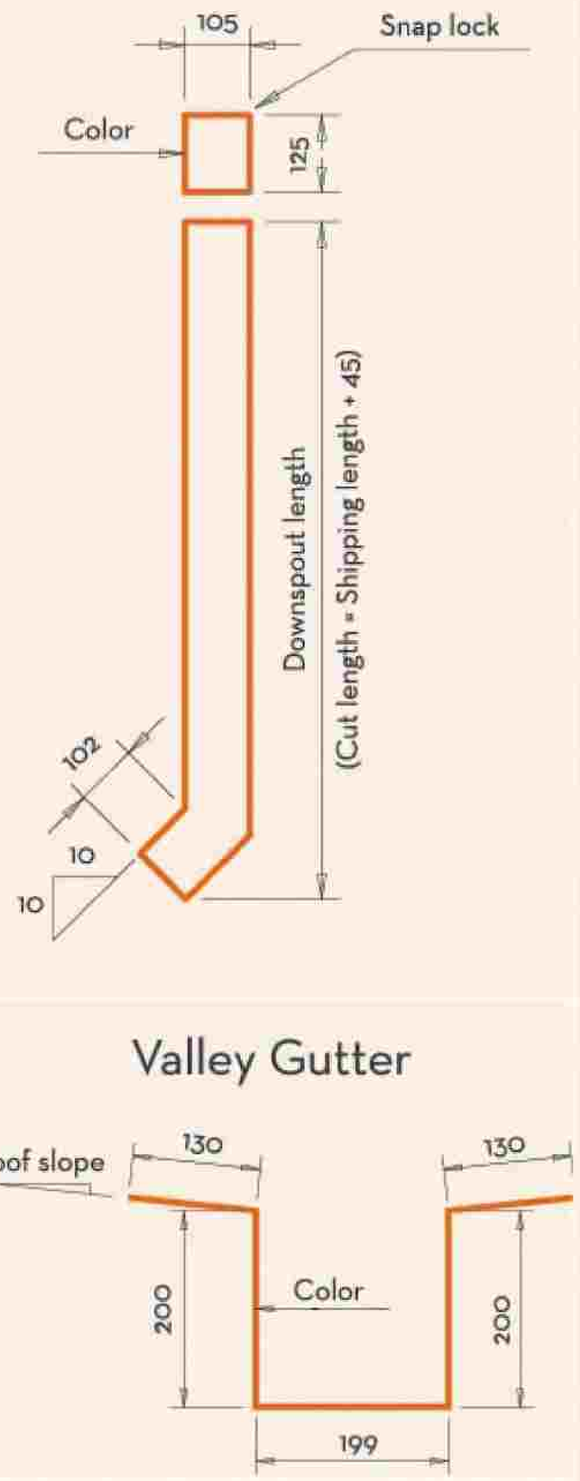

## Valley Gutter




Eave gutter




Downspout




Valley Gutter

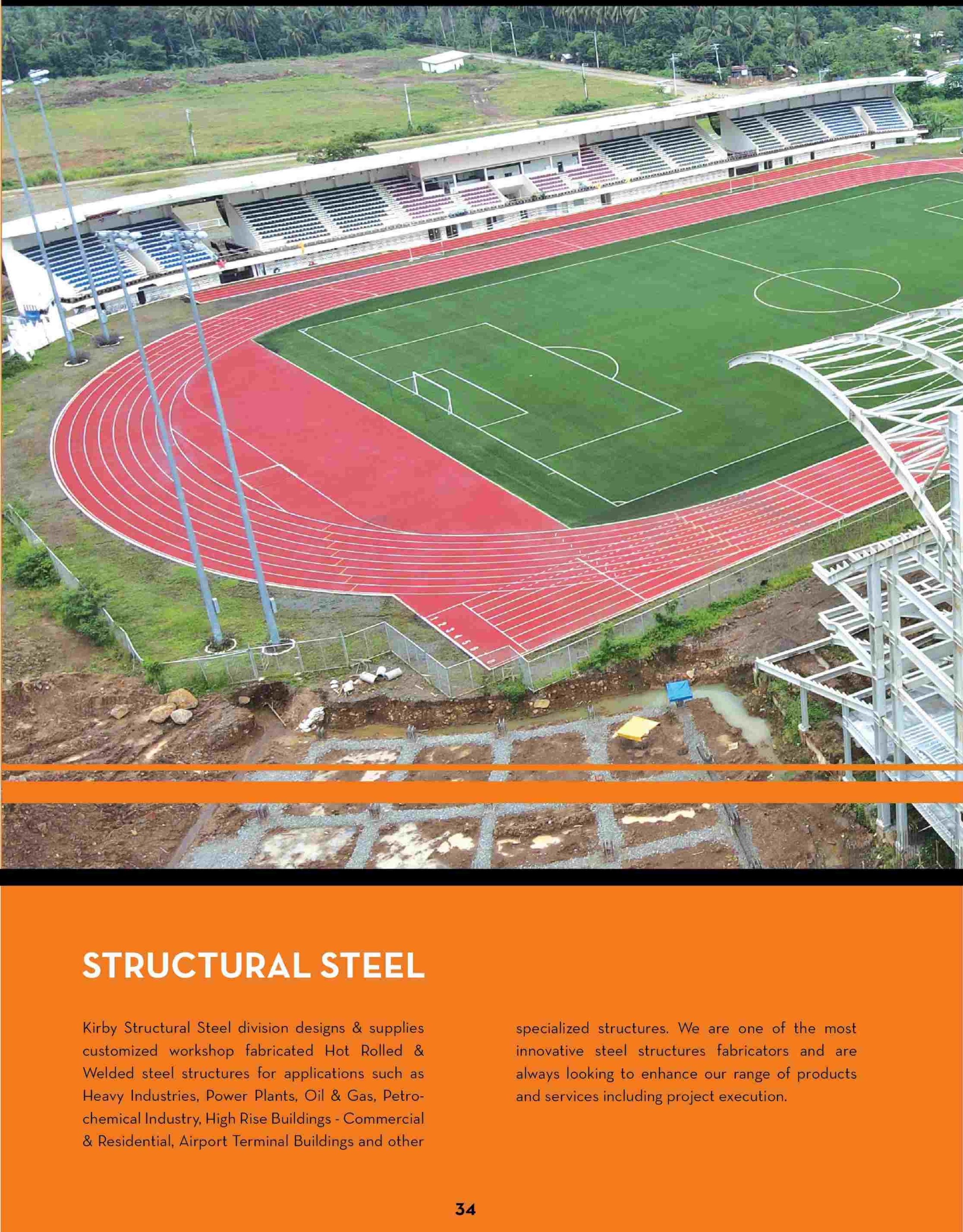
Kirby provides various solutions for water drainage

## Downspout at every column

## Downspout at alternate columns

## Big valley gutter and no interior downspout

## Siphon system



# STRUCTURAL STEEL

Kirby Structural Steel division designs & supplies customized workshop fabricated Hot Rolled & Welded steel structures for applications such as Heavy Industries, Power Plants, Oil & Gas, Petrochemical Industry, High Rise Buildings - Commercial & Residential, Airport Terminal Buildings and other specialized structures. We are one of the most innovative steel structures fabricators and are always looking to enhance our range of products and services including project execution.

Structural steel has traditionally been fabricated on-site, mainly due to lack of infrastructure for transporting heavy sections from an off-site workshop to a project site. Moreover, there is often insufficient space at a site to set up a fabrication workshop and skilled labor is available at a premium. These issues can always be mitigated by workshop-made steel structures which are proving to be more efficient in terms of quality and timelines. This helps to reduce the time and cost of execution, and is expected to fuel the demand for steel structures in future. The speed of execution is a critical factor for any large industrial or infrastructure project and is a driver for a shift towards the factory- made fabrication. The projects that took longer periods to complete a few years ago are now being executed in a shorter amount of time, resulting in a considerable amount of cost savings. Faster construction will propel the industry towards factory-made steel structures, owners and consultants will realize the advantages in terms of uniformity of finish and better quality, as asteel producers align their rolling sections as per the design needs.

| | ON SITE FABRICATION | WORKSHOP FABRICATION |
|---|---|---|
| Practice | Preferred in heavy industries | Global model. Applicable for industrial, Commercial & Infrastructure segment. |
| | More time for construction | Less time for construction |
| Quality & Wastage | Quality issues due to human component & high wastage due to unorganized nature | Factory controlled environment leading to uniform quality & minimal wastage |
| Limitations | Cannot be employed in sites with Inflammatory restrictions or building construction sites | No such restriction |
| Labor | Availability of skilled labor across geographies is a constraint | Easier to maintain a pool of skilled workforce for in-house fabrication |

## Structural Steel Delivery Models

The structural steel has traditionally been fabricated on-site mainly due to lack of infrastructure for transporting heavy sections from an off-site workshop to project site. Moreover, there is often insufficient space at a site to set up a fabrication workshop and skilled labor is available at a premium. These issues can always be mitigated by workshop made steel structures which are proving to be more efficient in terms of quality and timelines. This helps to reduce the time and cost of execution, and is expected to fuel the demand for steel structures in future. The speed of execution is a critical factor for any large industrial or infrastructure project & is a driver for shift towards the factory made fabrication. The projects that took longer period to complete a few years ago are being executed in much lesser time thereby resulting in considerable amount of cost savings. Faster construction will propel the industry towards factory made Steel Structures and owners and consultants will realize the advantages in terms of uniformity of finish and better quality, as steel producers align their rolling sections as per the design needs.

### Industrial

Steel Plants
Metal Smelters
Cement Plants
Chemical Plants
Fertilizers and Petrochem
Oil & Gas Structures etc.

### Infrastructure

Power Plants
Airport Terminal
Buildings Railway
Bridges Transmission
Towers Telecom
Towers Bridge Girders

### Commercial Buildings

High Rise Buildings
Commercial & Residential
Shopping Malls
Multiplexes, etc.

## Engineering

The engineering department uses the latest versions of internationally renowned industry standard 2D and 3D software for designing and detailing.

Kirby upholds its position at the cutting edge of the industry due to its commitment to quality and customer satisfaction. Skilled structural engineers using the very latest in computerized engineering design and detailing systems permit the selection of the most economical, accurate and efficient framing and cladding systems.

## Design Software

The Design/Engineering Department are fully computerized, utilizing the latest software packages to enable them to produce the most economical structures in the shortest time possible.

The software packages most frequently used are: STAAD PRO, PROKON, AUTO CAD, BOCAD, ETABS, and TEKLA STRUCTURES.

## Welding

All welding operations are carried out in accordance with Kirby's approved welding procedures by independently qualified welders. Kirby welders are trained to perform the welding processes SAW, SMAW & FCAW and are AWS D1.1 qualified for various positions including 6GR for T, K, and Y connections. During the welding operation all welders are continually monitored to ensure that the welding parameters, as detailed in the relevant procedure, are adhered to and that the level of workmanship is maintained.

All items, after completion of welding are visually inspected against the requirements of AWS D 1.1 for compliance. Any visual discontinuity is marked and repaired immediately. Only when the item has been fully passed and accepted it will be released to blasting and painting All welding inspections are entered onto the Piece Monitoring System.

## Non Destructive Testing

Welding Inspection & Non-Destructive Testing monitoring of welding variables like voltage, amperage and welding consumables is carried out as per approved welding procedure specifications. In addition, visual inspection is carried out on 100% of each section to ensure highest quality in manufacturing.

Kirby is capable of performing UT, MPI & PT as per AWS D1.1/D1.1M requirements. Further, Kirby has the capability to carry out ultrasonic and radiography, tests and the results of all NDT examinations are entered on the Piece Monitoring System.

## Structures for high-rise buildings

Kirby SEA has facilities for production of complex structures required for Commercial buildings, such as offices, shops and mixed residential-commercial buildings, multi story factory buildings, schools and hospitals.

The commercial sector demands buildings that are rapid to construct, of high quality, flexible and adaptable in application, and energy efficient in use. KSEA has in house facilities for design and manufacturing of structures for high rise buildings. While designing the buildings due consideration is given to clear floor spans, cladding systems, painting requirements, services required and speed of construction.

We follow the system of concept design development based on customer's need and then prepare final design incorporating all the requirements. The result is a most optimized solution meeting expectations of esteemed customers. The benefits of steel buildings for high rise construction are:

- Column free spans, permitting flexibility in use.
- Good accuracy as all members are manufactured using factory controlled processes.
- Ease of extension and adaptation in future including needs for re-service.
- Variety of cladding options.
- Long design life and ease of maintenance.
- Energy efficient design.
- Less wastage and recyclability of material.
- Easy to dismantle and relocate.
- Building comfort with high levels of thermal insulation.
- Rapid and safe installation.
- Material deliveries are phased out so that storage space requirement is reduced

# COLD ROLL FORMED BUILDING

Cold-formed steel structures are made from structural quality sheet steel that are formed into shape either through press-braking blanks sheared from sheets or coils, or more commonly, by roll forming the steel through a series of dies.

No heat is required to form the shapes (unlike hot-rolled steel), and thus the name cold-formed steel. Cold-formed steel members and other products are thinner, lighter, and easier to produce, and typically cost less than their hot-rolled counterparts.

CFS framing for floors and interior walls are very competitive with lumber and engineered wood products. CFS framing provides builder and consumers flexibility in design option that can not be economically accommodated using traditional framing materials (i.e., larger open space, longer spans, and doorways).

- Health Care Centres
- Community Centers
- Schools
- Site offices
- Mass Housing
- Relief Camps
- Labour Camps
- Defence Shelters

- Spans up to 15 m
- Clear height upto 3 m
- Variety of sheeting - galvalume & galvanized
- Wall Options - sheeted & block works
- Covered ceilings - roof liners
- Insulation for roof and wall
- Partition walls
- Custom designed
- Special accessories like doors, windows, ventilators, etc.

# PHILIPPINES

## Cebu International Airport

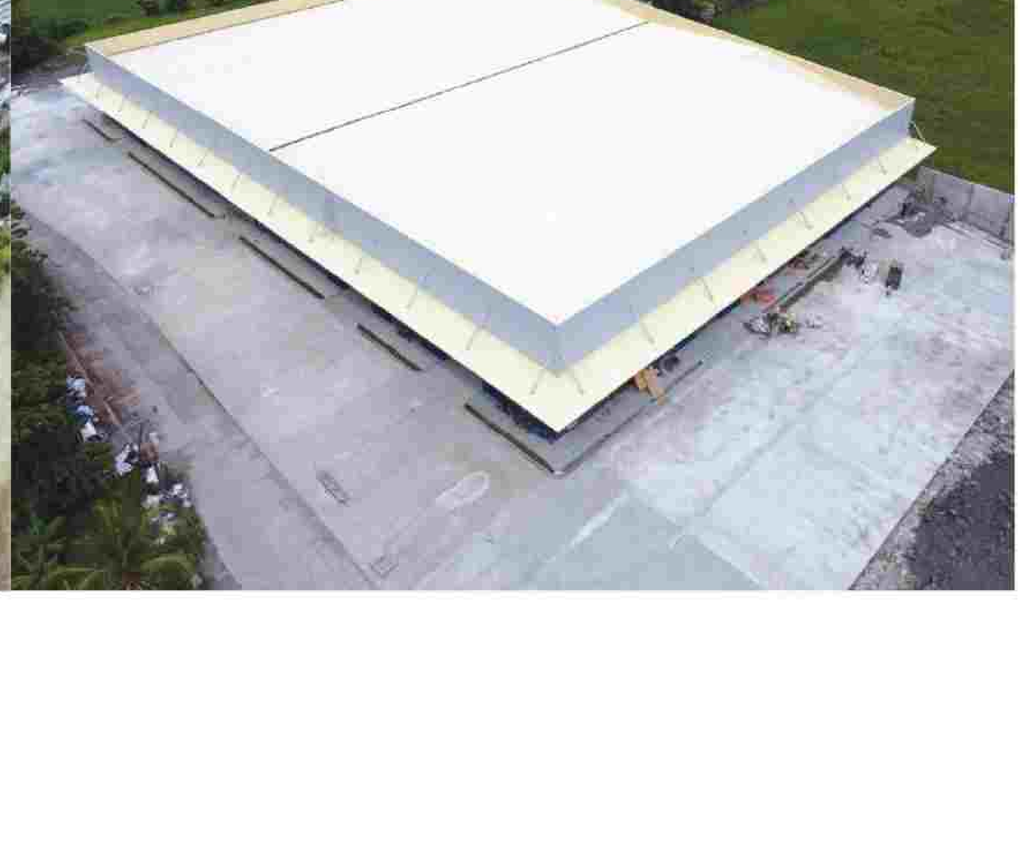
## Clarin Bridge

## Davao UP Stadium

## Isabela Convention Center

## High - rise Building


## Warehouse



# INDONESIA

## Bali Trans Studio

## Mahindra Accelo Steel Factory

## TOA Paint Factory


## Asian Paint Karawang Factory

## Wilmar Coal Storage

## Panca Puri Logistics Hub

## Fiber Papertech Seaport Warehouse

## Fiber Papertech Seaport Warehouse

# THAILAND

## Coal Yard

## Denla British School

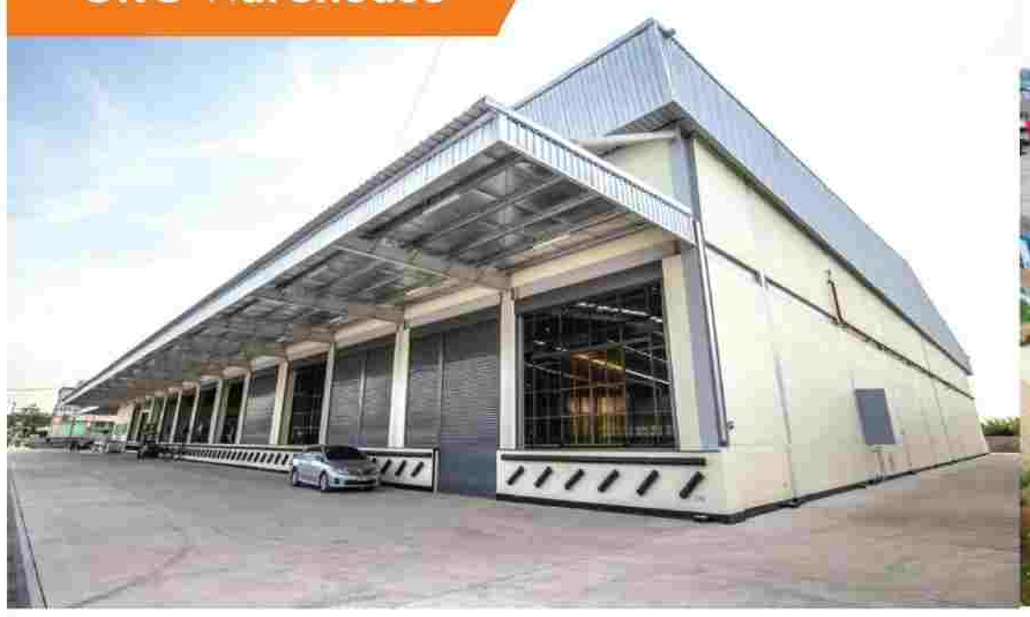


## Warehouse

## Shoppe Sorting Centre

## RAAP Warehouse

## URC Warehouse



## URC Warehouse

## Ruam Cement Prathumthani Warehouse

# VIETNAM

## Mazda and THACO Showrooms



## Pipe rack: Thi Vai cold LPG storage


## Mong Duong Thermal Power Plant

## Helicopter Hangar

## Olam Pepper Factory


## FEEDONE Aquatic feed Factory

## Glory Metal Factory

## Alibaba Warehouse

# MYANMAR

## Sinma Showroom


## Zifarm Pyrex Pharma Factory


## S.P.PETPACK Plastic Packaging Manufacturing Factory

## Indorama Ventures Packaging Factory

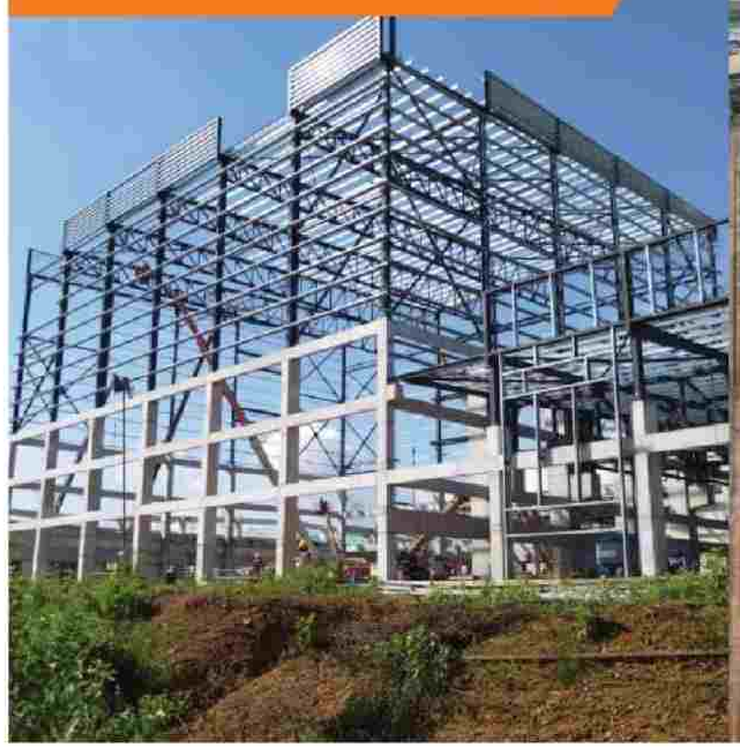

## PHEE Warehouse

# SINGAPORE

## High - rise building

# MALAYSIA

## Warehouse & Factory



# CAMBODIA

## Sumi Wiring System Factory


## Warehouse

# LAOS

## Laos Coca-Cola Bottling Factory


## Chemical Warehouse

# AUSTRALIA

## Sumi Wiring System Factory


## Bingo Eastern Creek Recycling Factory

# SRI LANKA

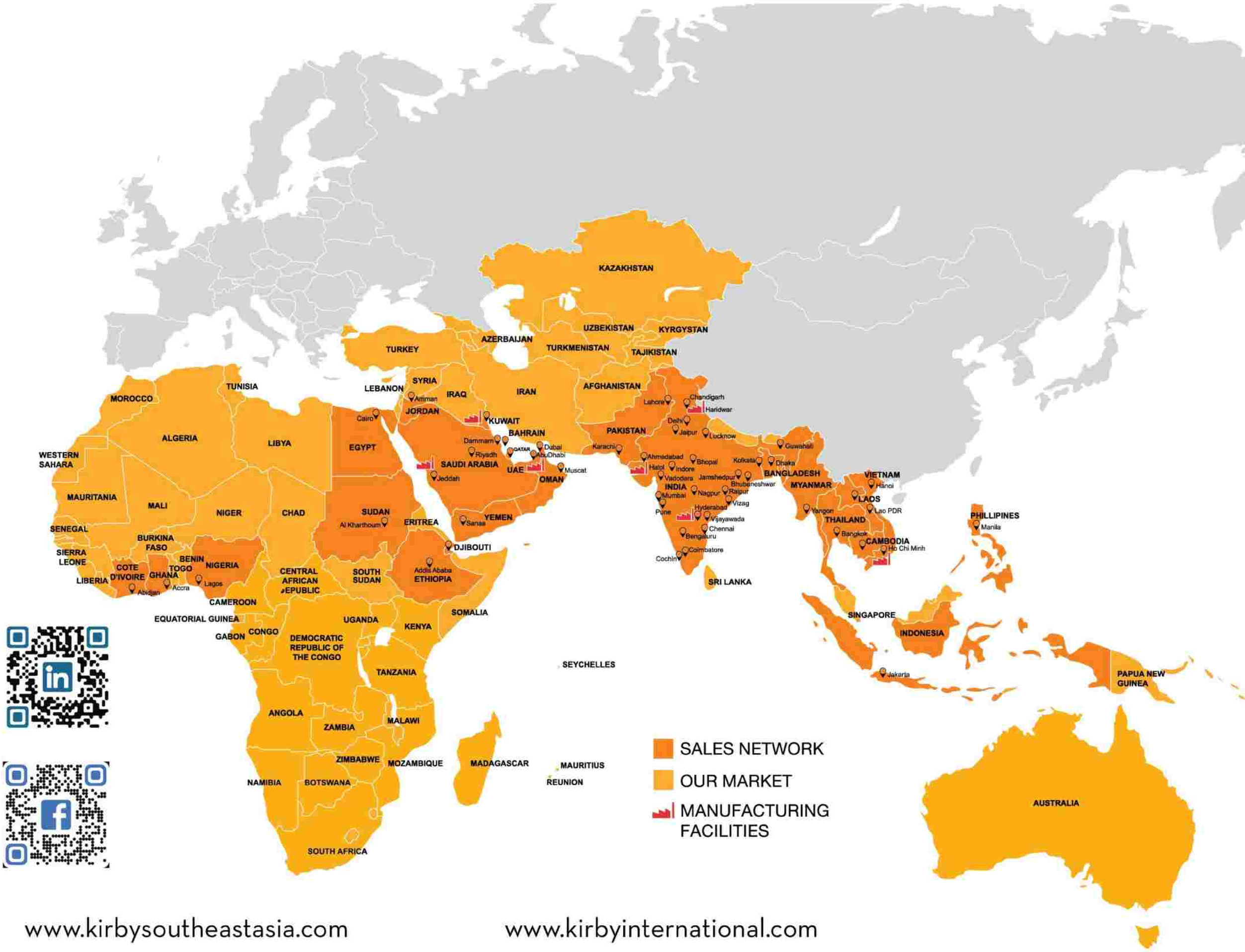
## CTB Warehouse

## DHL Warehouse


# BANGLADESH

## Check Point System Factory


## Universal Menswear Factory




www.kirbysoutheastasia.com www.kirbyinternational.com

Kirby BUILDING SYSTEMS

A subsidiary of Alghanim INDUSTRIES

KIRBY SOUTHEAST ASIA

**Dong Nai Plant, Vietnam**

Road No.8, Nhon Trach III Industrial Zone, Phase II, Nhon Trach District, Dong Nai Province, Vietnam.

**Shualba, Kuwait Plant**

KIRBY BUILDING SYSTEMS - KUWAIT, Plot 1, Block 2, West Shuaiba Industrial Area, P.O. Box 23933 Safat, 13100 Kuwait.

**Ras Al Khimah, United Arab Emirates Plant**

Al Jazeera Industrial Area Ii, Ras Al Khaimah, Uae, P.o. Box 6624, Ras Al Khimah, UAE.

**Jeddah, Saudi Arabia Plant**

KIRBY CONTRACTING COMPANY (SPC) L.L.C., Industrial City -1, P.O. Box 86648, Jeddah – 21492, Saudi Arabia.

**Hyderabad Plant, India**

Unit 1, Plot Nos 8-15, IDA Phase III, Pashamylaram, Sangareddy Dist. - 502 307, Telangana, India.

**Haridwar Plant, India**

Unit 2, Plot No 2, Sector 11, Integrated Industrial Estate, SIDCUL, Haridwar - 249 403, Uttarakhand.

**Halol Plant, India**

Plot No 741, 742/1, 748, 749, Halol GIDC Phase-II,Halol Maswad Industrial Estate, Halol Godhra Highway, District Panchmahal, Gujarat – 389 350, India.

**Middle East And Africa Corporate Office**

Tel: (965) 23262800 Email: kirby@alghanim.com

**India Corporate Office**

Tel: (91) 8455224401 Email: kirby@kirby-india.com

**South East Asia Corporate Office**

Tel: (84) 54221155 Email: sales@kirby.vn