

## Technical specifications

### Racking Codes:

FEM 10.2.06	The design of hand loaded static steel shelving
BS EN 15512:2020	Steel static storage systems - Adjustable pallet racking systems – Principles for structural design (European)

### Structural Design Codes:

IS 800 – 2007	General Construction in Steel - Code of Practice
EN 1993-1- Part 3	Design of steel structures. General rules. Supplementary rules for cold-formed members and sheeting (European)
AISI-S100-16	North American specification for the design of Cold – formed steel structural members

### Tolerances:

BS EN 15620 - 2021	Steel static storage systems -Tolerances, Deformations and clearances
--------------------	---

## Raw material

Load bearing members of the system are made from high strength steel having properties as mentioned in table below

The specifications of raw materials used for critical load bearing members are given below:

Component	Material Property	Reference standards
Upright	YS – 355 MPa UTS/YS ratio – 1.1 min	IS 5986:2011, Fe 510 IS 2062:2011, E350 JIS 3101: SS 490 EN 10025 : S 355 JR DIN 17100 : St 52 or equivalent
Beams	YS – 255 MPa UTS/YS ratio – 1.1 min	IS 513 : (Part 1) 2016 Grade: ISC360R IS 5986:2011, Fe 410 IS 2062:2011, E250 JIS 3101: SS 400 EN 10025 : S 235 JR DIN 17100 : St 42 or equivalent
Bracing	YS – 255 MPa UTS/YS ratio – 1.1 min	ASTM A 653M SS GRADE 37 or equivalent
Accessories – Powder coated	YS – 210/250 MPa UTS/YS ratio – 1.1 min	IS 2062 E250/ IS 513 : (Part 1) 2016 or equivalent
Accessories – Galvanized	YS – 210/250 MPa UTS/YS ratio – 1.1 min	ASTM A 653M SS Grade 37 IS277 or equivalent

In addition to high strength, the raw material used for structural load bearing members, possess adequate ductility, to ensure toughness. The material also has the necessary impact strength for cold room applications up to -30 deg C.

Fasteners

All fasteners used are grade 8.8. These are with galvanized finish to suit industrial atmosphere.

Surface finish

For long life and protection from corrosion, All Powder coated components are given a thorough anti-rust treatment. The average dry film thickness (DFT) after powder coating would be on an average 40 microns.

All powder coated components are subjected to an elaborate 4 step, 7 zone anti corrosion treatment, viz. De-greasing as per IS 6005:1998, rinsing, phosphating as per IS 3618:2002 and and De-mineralized water rinsing.

Furthermore, the testing of paint for various physical and chemical properties is done as per ASTM Standards.



Shelving component specification

Uprights

Upright is a roll formed construction made in single piece without welding. Upright has slots at 50 mm. It enables the warehouse manager to utilize the rack optimally to suit the changing SKU sizes.

Uprights are multi bend profiles, designed to offer maximum load bearing capacity with optimum surface utilization ensuring high standards of stability and safety. Uprights are bolted with Base Plates to transfer the load to ground.

The manufacturing process of punching and forming is in one flow and a synchronized operation, thereby providing dimensional accuracy and contour uniformity consistently.



Upright type	GX70
Profile	Omega
Profile width	70mm
Profile depth	65mm
Number of bends	6
No of pieces	single
Beam adjustability	50mm
Mfg. process	Roll forming
Finish	Powder coated
Color	Sky Blue (RAL5015)

**Note- This type of Upright has to be used for Shelving Systems for following Rooms-**

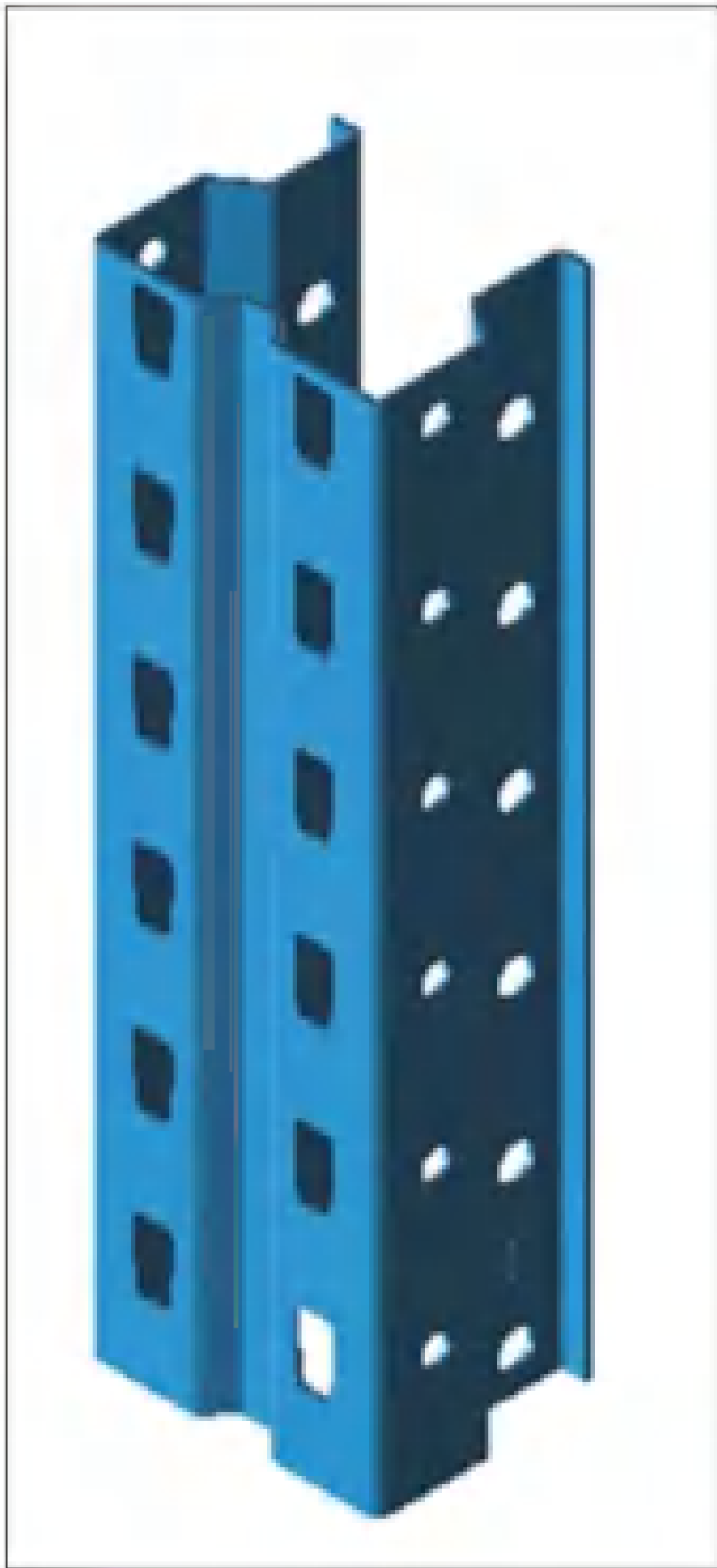
- 1. Non-Stock Room
- 2. Canteen
- 3. Quality Room
- 4. Testing Room
- 5. Substation Room (ERS)
- 6. Bogie Shop Tool Room
- 7. Bogie Shop Material Section 1
- 8. Bogie Shop Material Section 2

## Uprights

Uprights are roll formed construction made in single piece without welding. Upright has slots at 50 mm. It enables the warehouse manager to utilize the rack optimally to suit the changing SKU sizes.

Uprights are multi bend profiles, designed to offer maximum load bearing capacity with optimum surface utilization ensuring high standards of stability and safety. Uprights are bolted with Base Plates to transfer the load to ground.

The manufacturing processes of punching and forming are in one flow and a synchronized operation, thereby providing dimensional accuracy and contour uniformity consistently.



Upright type	GXL90
Profile	Omega
Profile width	90mm
Profile depth	70mm
Number of bends	12
Beam adjustability	50mm
Mfg. process	Roll forming
Finish	Powder coated
Color	Sky Blue(RAL5015)

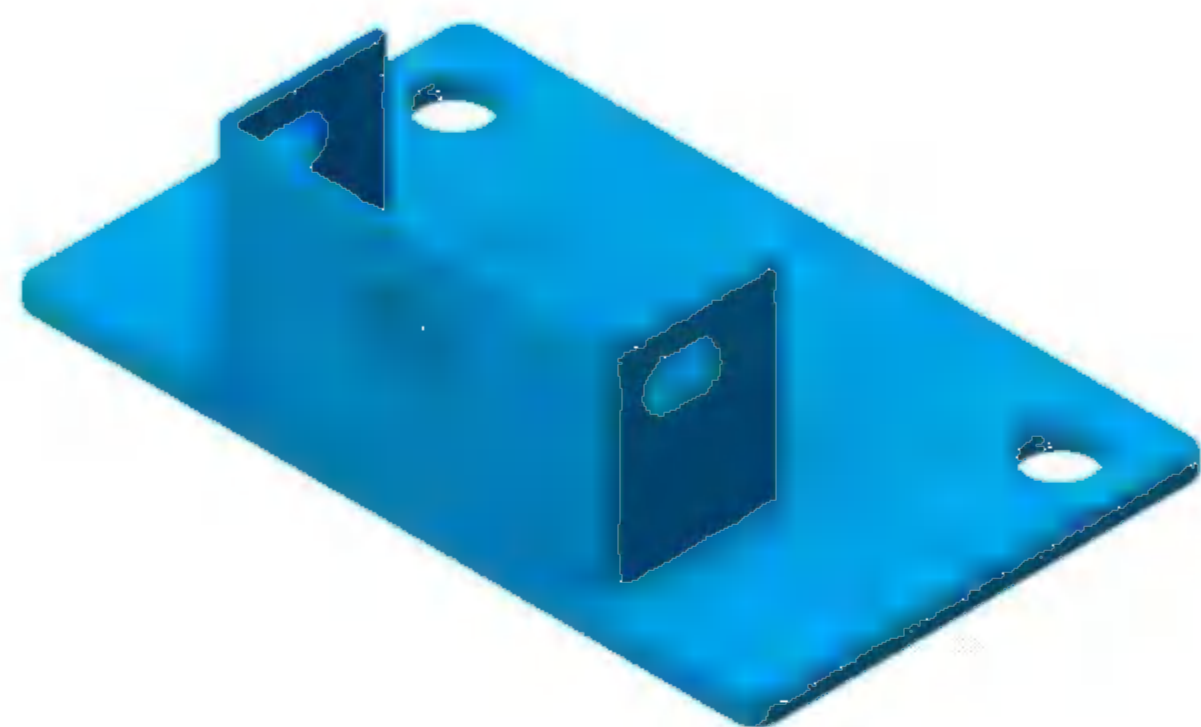
**Note- This type of Upright has to be used for Shelving Systems for following Rooms-**

- 1. Tool Room
- 2. MTS Room

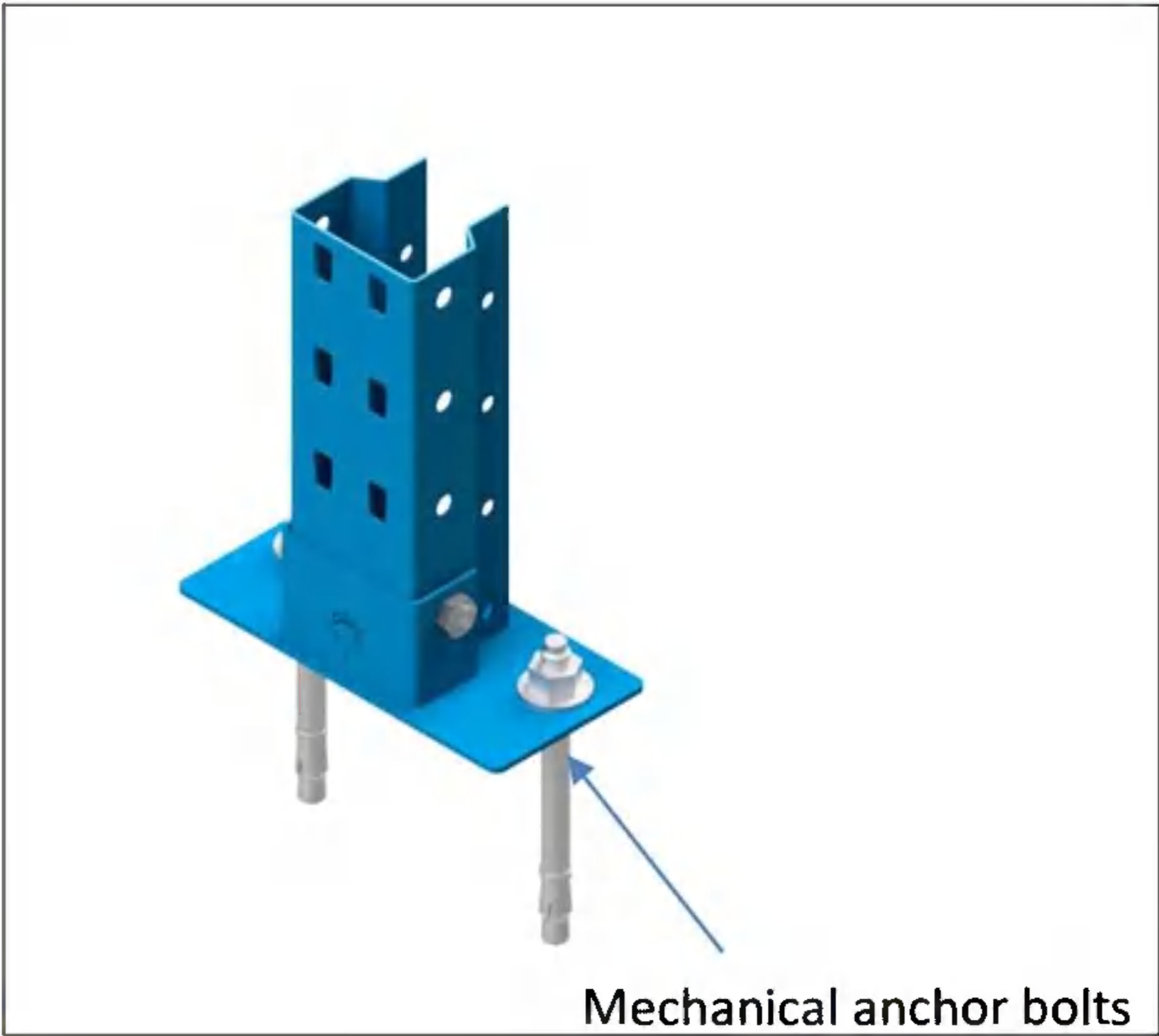


Base plate

It is a Welded construction bolted with upright. They are anchored to the ground using M12x100. Torque type mechanical anchor bolts. Floor level variation shall be adjusted with shims.



Width	160 mm
Depth	110 mm
Connectivity	Mechanical anchors
No of Anchor bolts	2no's of M12x100
Mfg. process	Bending & welding
Finish	Powder coated
Colour	Sky Blue (RAL 5015)



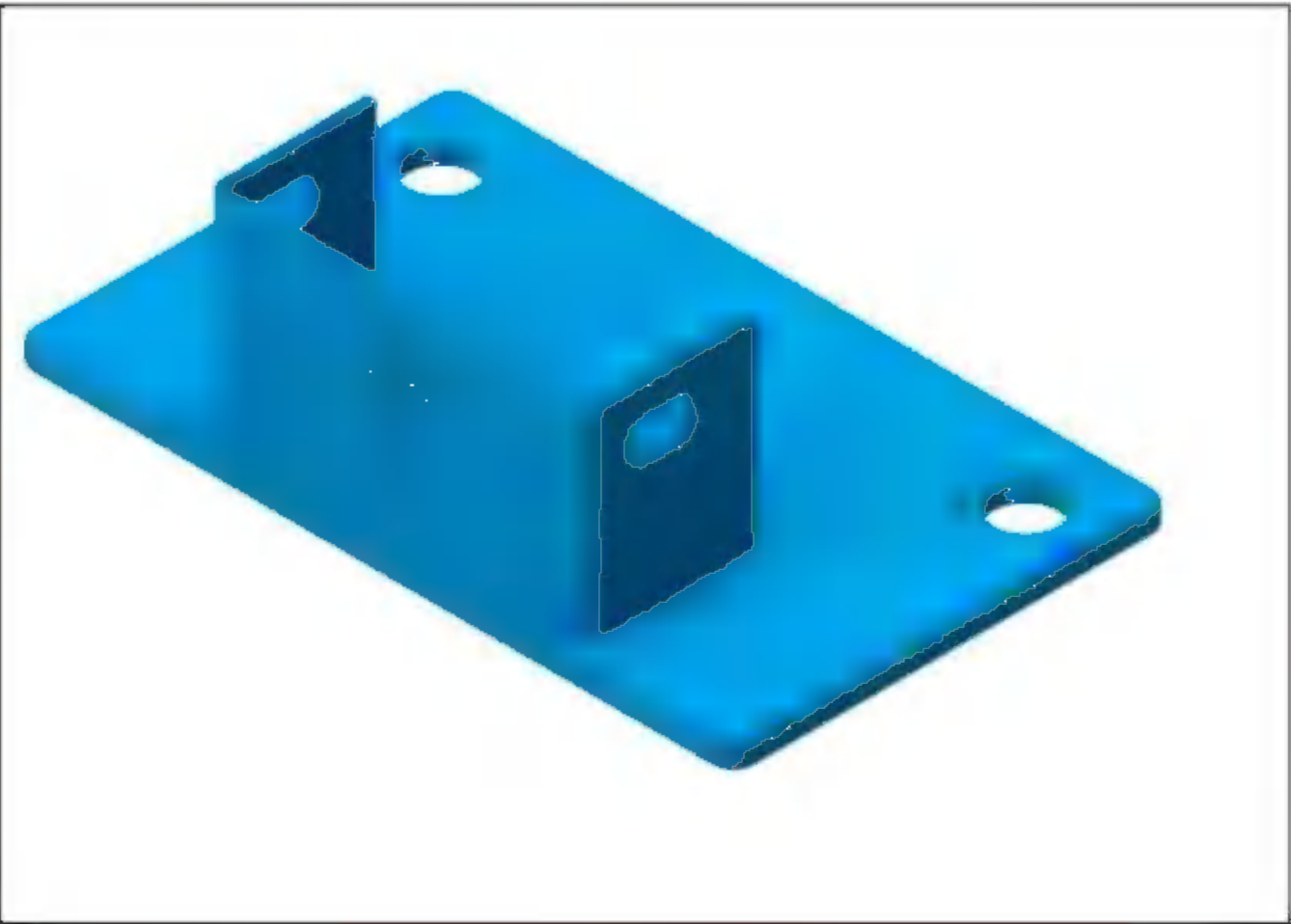
**Note- This type of Base Plate has to be used for Shelving Systems for following Rooms-**

- 1. Non-Stock Room
- 2. Canteen
- 3. Quality Room
- 4. Testing Room
- 5. Substation Room (ERS)
- 6. Bogie Shop Tool Room
- 7. Bogie Shop Material Section 1
- 8. Bogie Shop Material Section 2

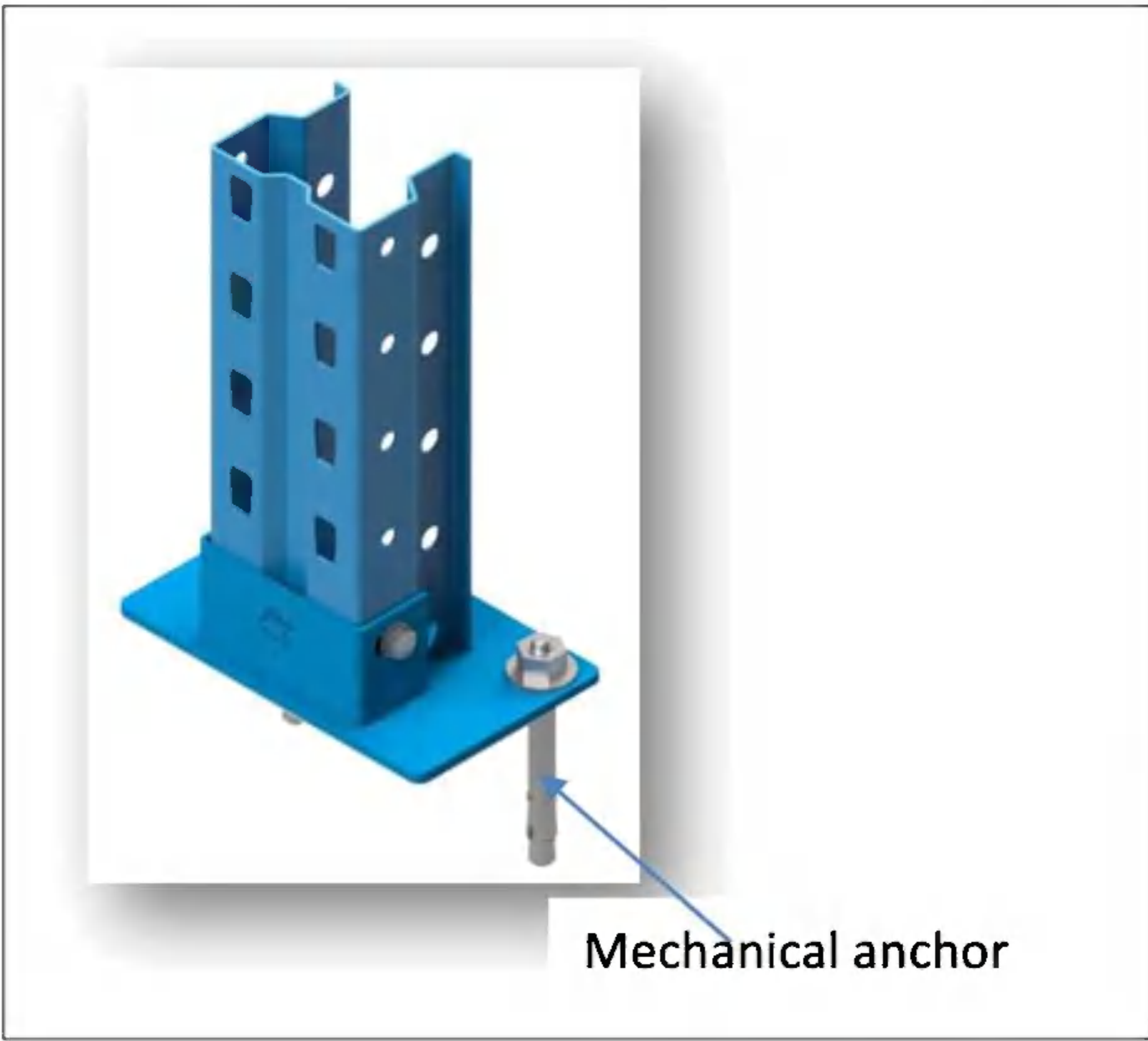


Base plate

It is a Welded construction bolted with upright. They are anchored to the ground using M12 x 100.Torque type mechanical anchor bolts. Floor level variation shall be adjusted with shims.



Width	180 mm
Depth	110 mm
Connectivity	Mechanical anchors
No of Anchor bolts	2no's of M12x100
Mfg. process	Bending & welding
Finish	Powder coated
Color	Sky Blue (RAL 5015)



**Note- This type of Base Plate has to be used for Shelving Systems for following Rooms-**

- 1. Tool Room
- 2. MTS Room

Grouting fasteners

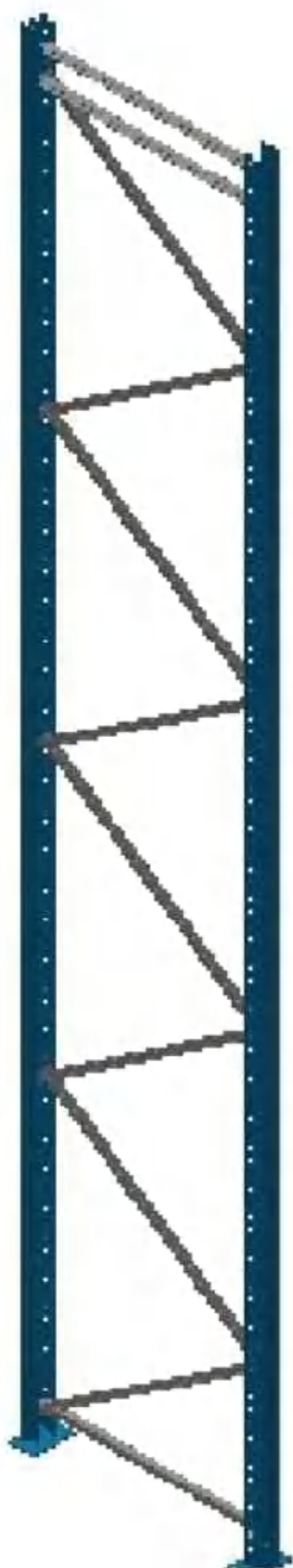


Type	Mechanical anchor Torque type-(non-seismic)
Material	Mild steel
Finish	Zinc plated
Diameter	M12
Embedment depth	70mm

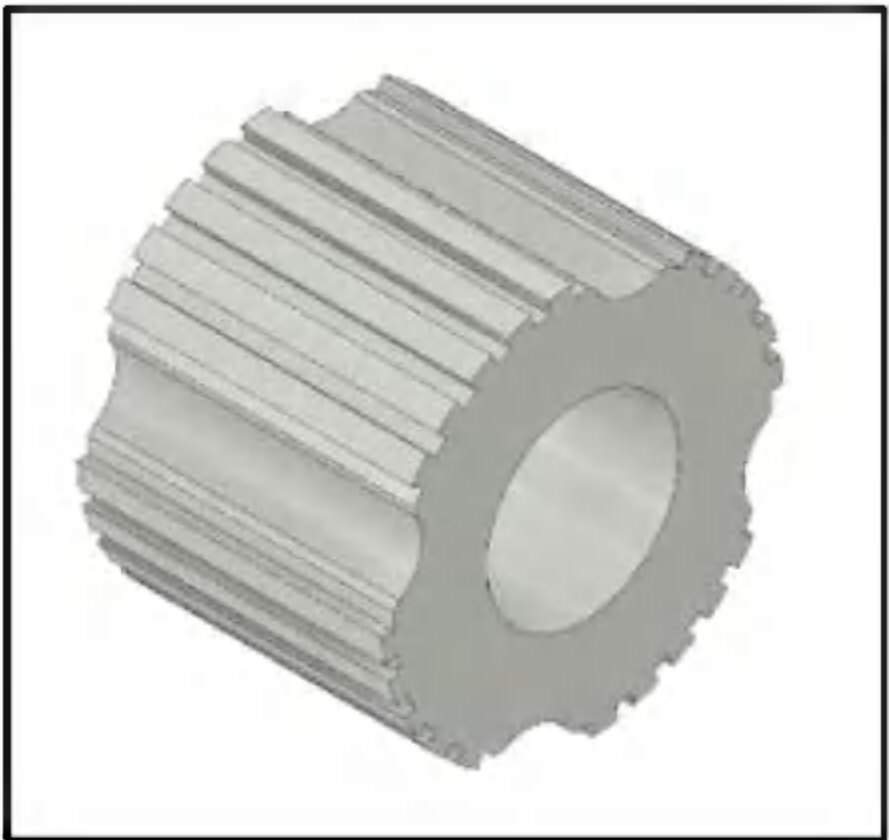
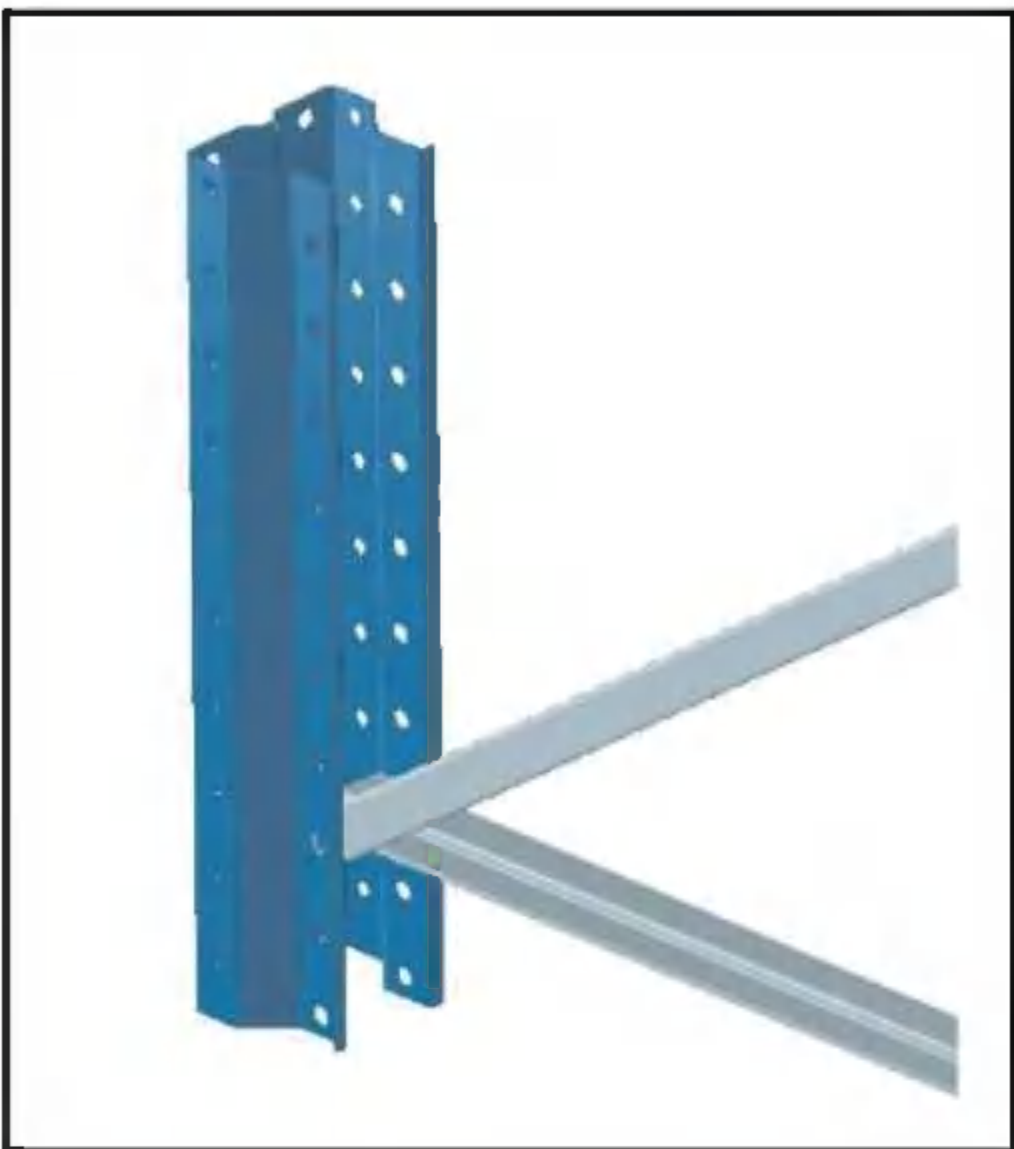


# Bracing

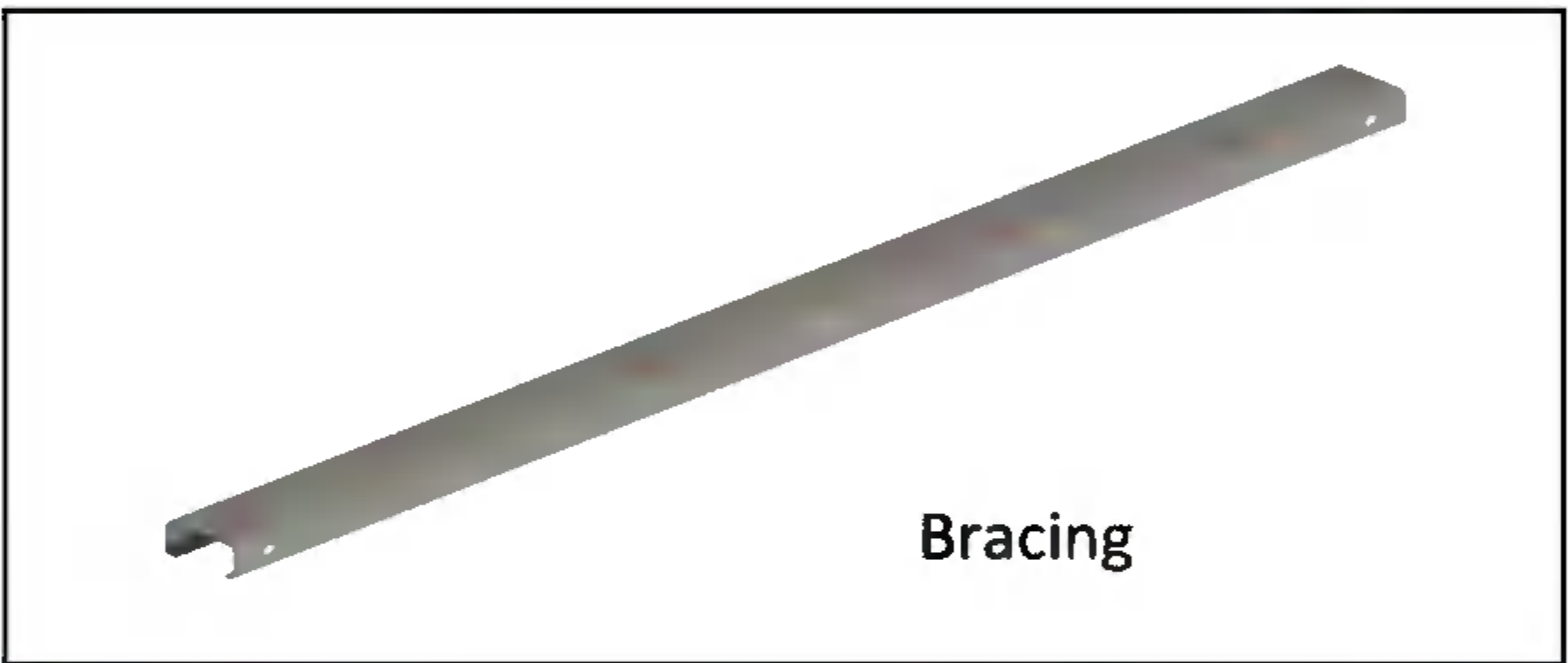
Bracings are lipped channel sections. The bracings connect uprights together to form a frame. These bracings are made through roll forming technology. One end of the horizontal bracing is fitted with a spacer to bridge the gap due to difference in bracing size and opening of upright.



D- Bracing



Bracing Spacer



Bracing

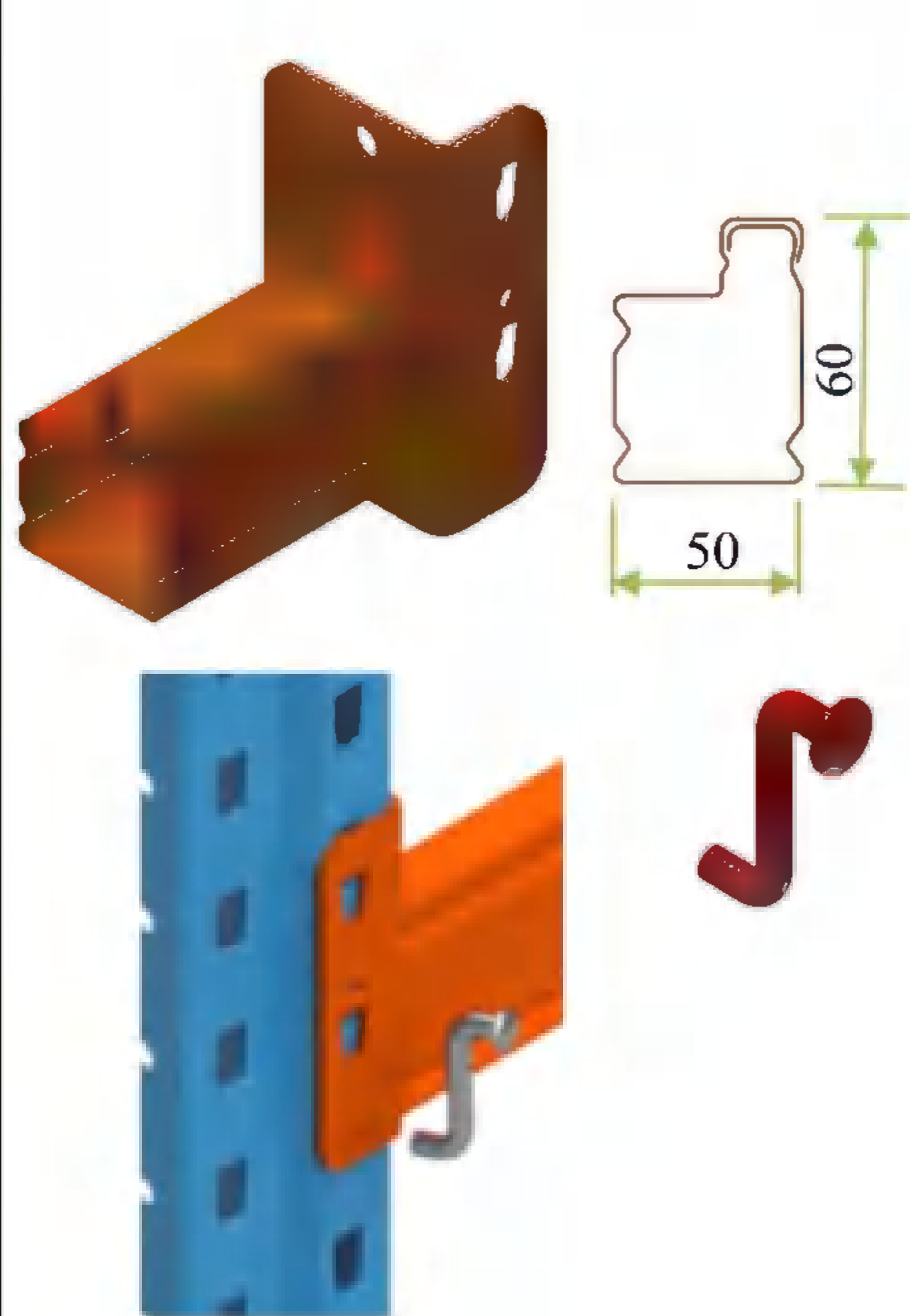
Type of profile	Lipped channel
Mfg. process	Roll forming
No of bend	4
Connectivity	Bolted
Surface finish	Galvanized



Beam – Step Beam

Beams are of L type construction with twin top. Better strength for beams, since it is closed profile, unlike open profiles which tend to buckle for heavy loads or for longer beam lengths. Step is 28 mm width and 20mm depth provision for accommodating decking panel ensuring smooth decking surface and also safety to operators.

Beam locks by locking pins or locking clips ensure that beams are engaged with uprights precisely and prevent any accidental beam dislodgement due to handling equipment.

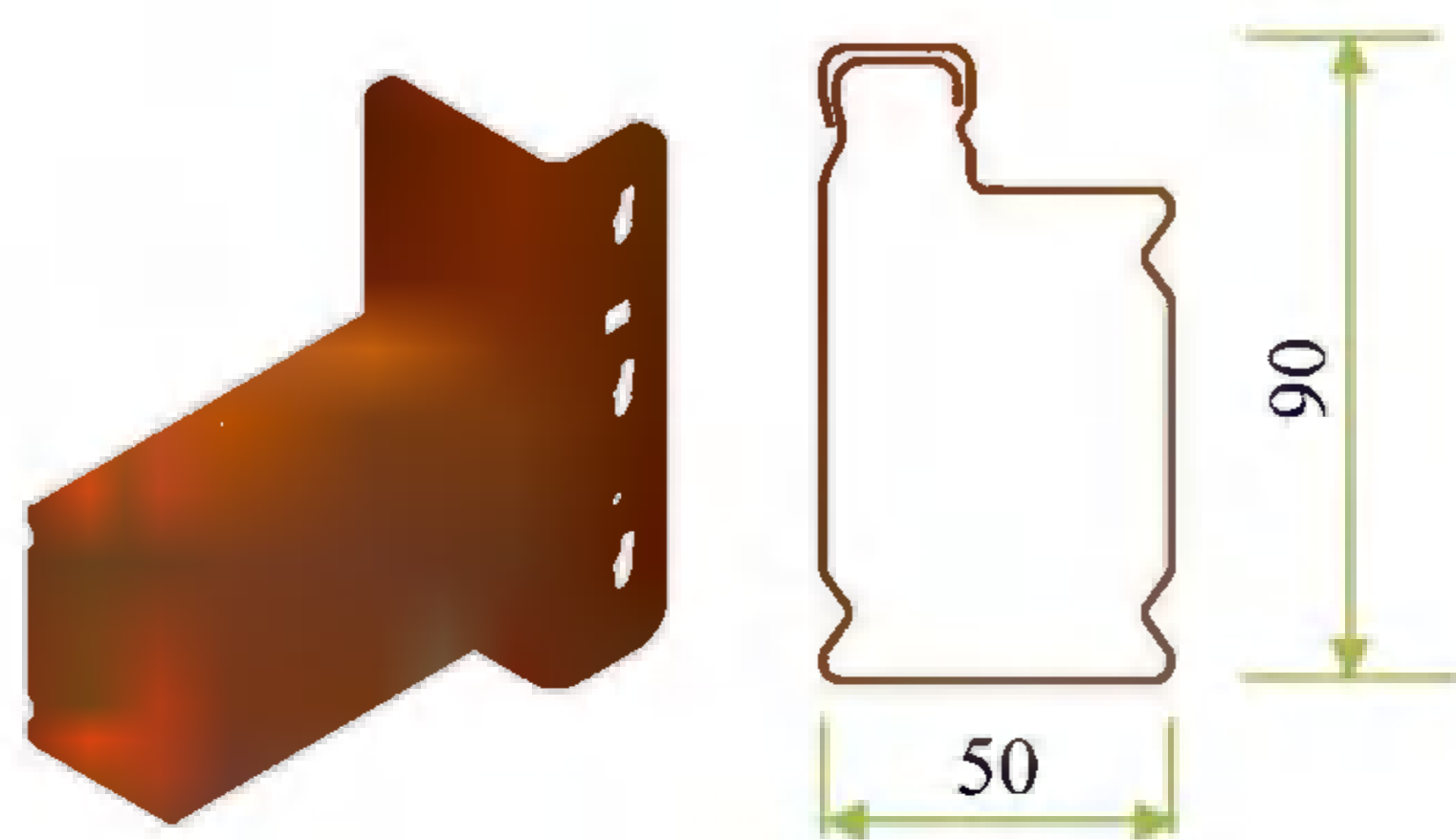


Type of Profile	Box – Twin top
Height	60mm.
Width	50
Step Depth	20 mm
Type of Lip connector	2 Lip
Mfg. process	Roll Forming & Welding
Locking mechanism	Z shaped locking pin
Surface Finish	Powder Coated
Color	Orange (RAL 2004)

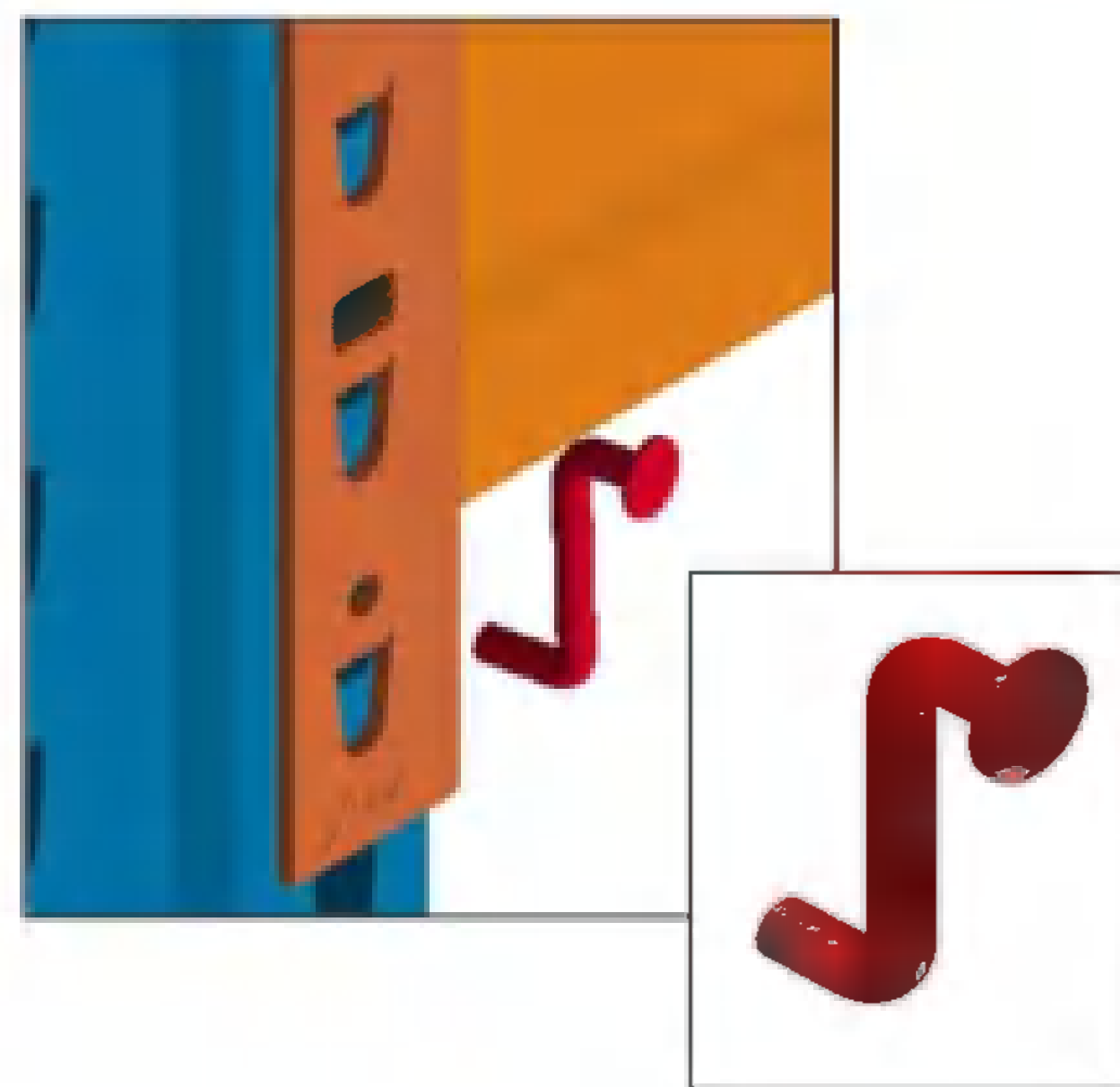
# Beam – Step Beam

Beams are of L type construction with twin top. Better strength for beams, since it is closed profile, unlike open profiles which tend to buckle for heavy loads or for longer beam lengths. Step is 28 mm width and 20 mm depth provision for accommodating decking panel/Mesh ensuring smooth decking surface and also safety to operators.

Beam locks by locking pins or locking clips ensure that beams are engaged with uprights precisely and prevent any accidental beam dislodgement due to handling equipment.



Type of Profile	Box – Twin top
Height	90 mm
Width	50
Step Depth	20 mm
Type of Lip connector	3 Lip
Mfg. process	Roll Forming & Welding
Locking mechanism	Z shaped locking pin
Surface Finish	Powder Coated
Color	Orange (RAL 2004)

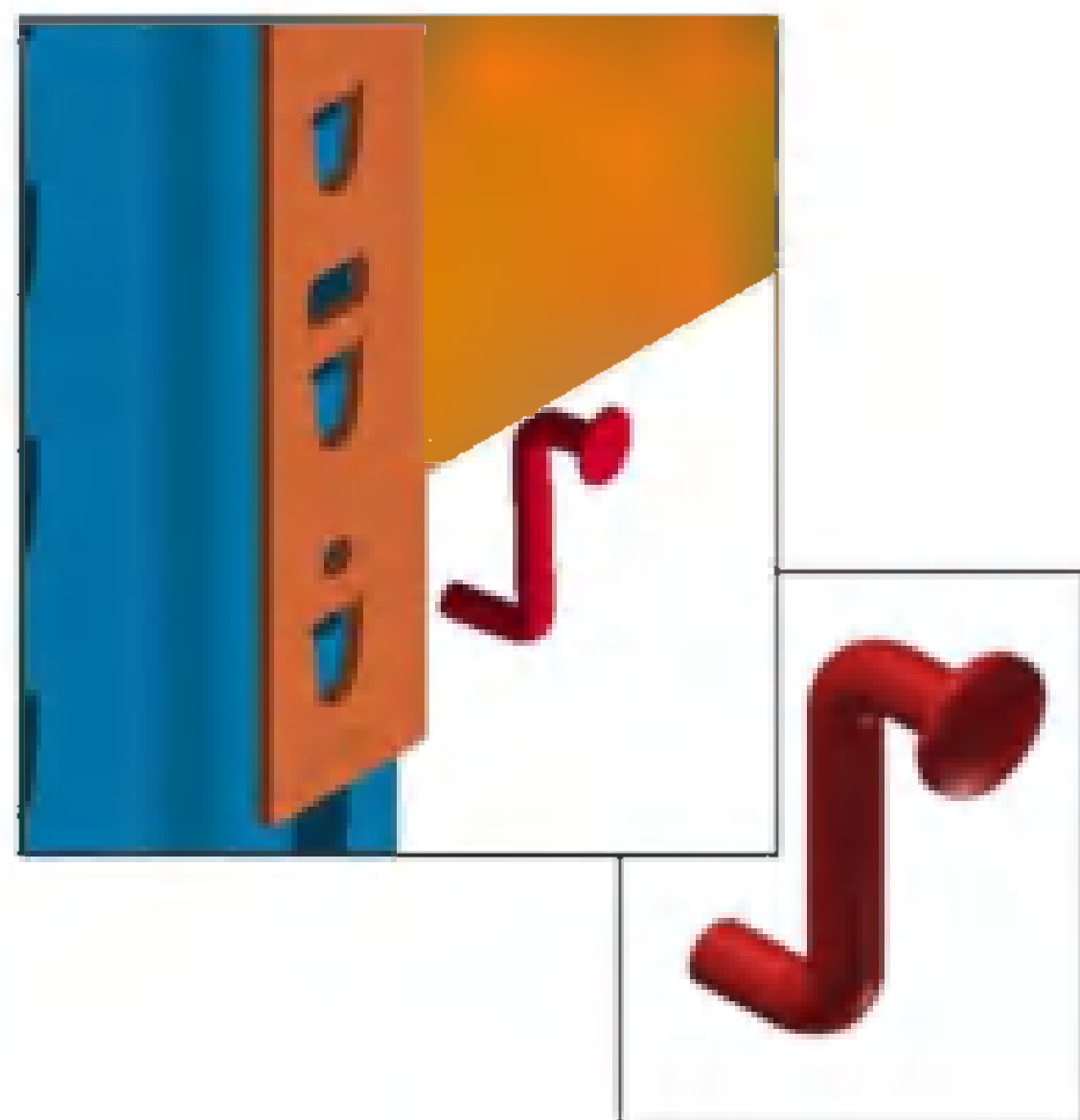
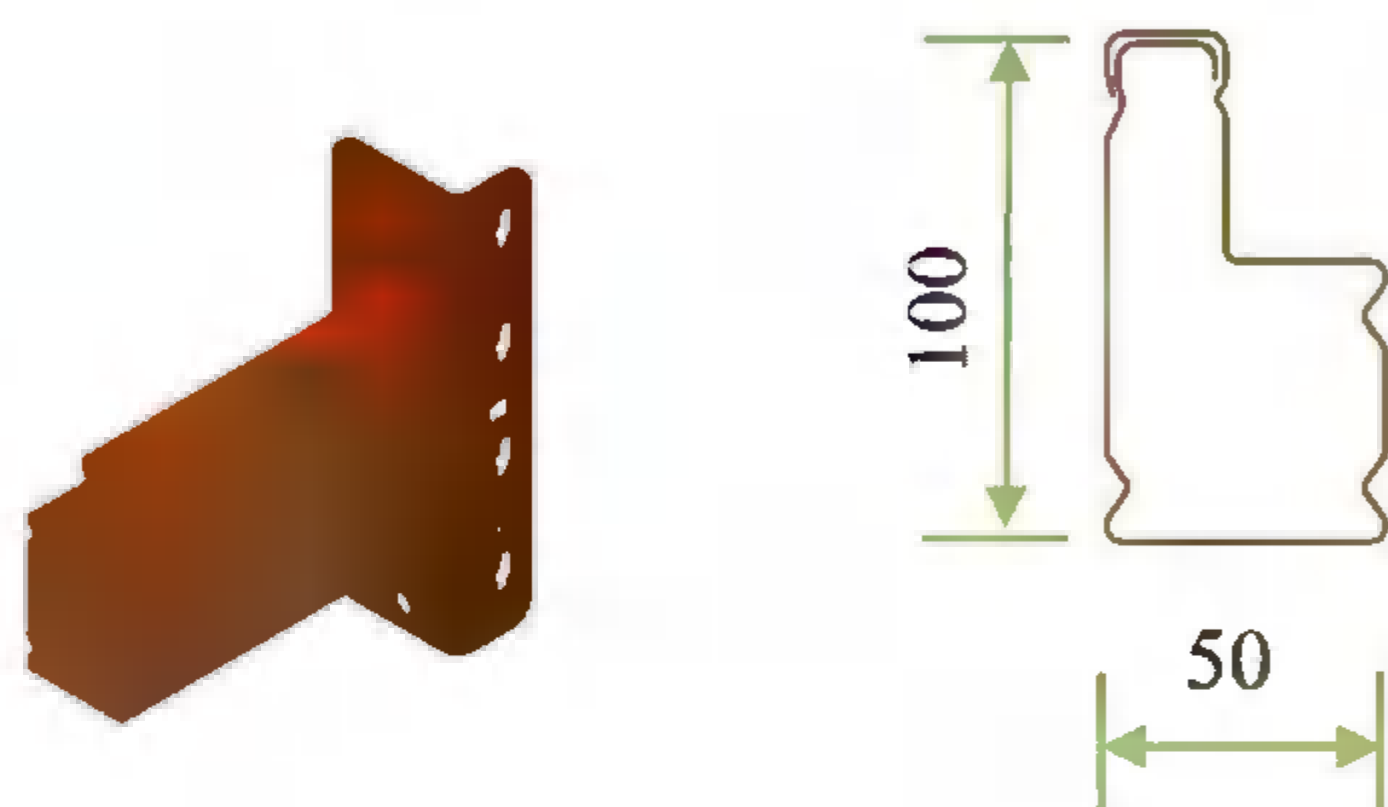




# Beam – Step Beam

Beams are of L type construction with twin top. Better strength for beams, since it is closed profile, unlike open profiles which tend to buckle for heavy loads or for longer beam lengths. Step is 28 mm width and 20mm depth provision for accommodating decking panel/Mesh ensuring smooth decking surface and also safety to operators.

Beam locks by locking pins or locking clips ensure that beams are engaged with uprights precisely and prevent any accidental beam dislodgement due to handling equipment.



Type of Profile	Box – Twin top
Height	100 mm
Width	50
Step Depth	20 mm
Type of Lip connector	4 Lip
Mfg. process	Roll Forming & Welding
Locking mechanism	Z shaped locking pin
Surface Finish	Powder Coated
color	Orange (RAL 2004)

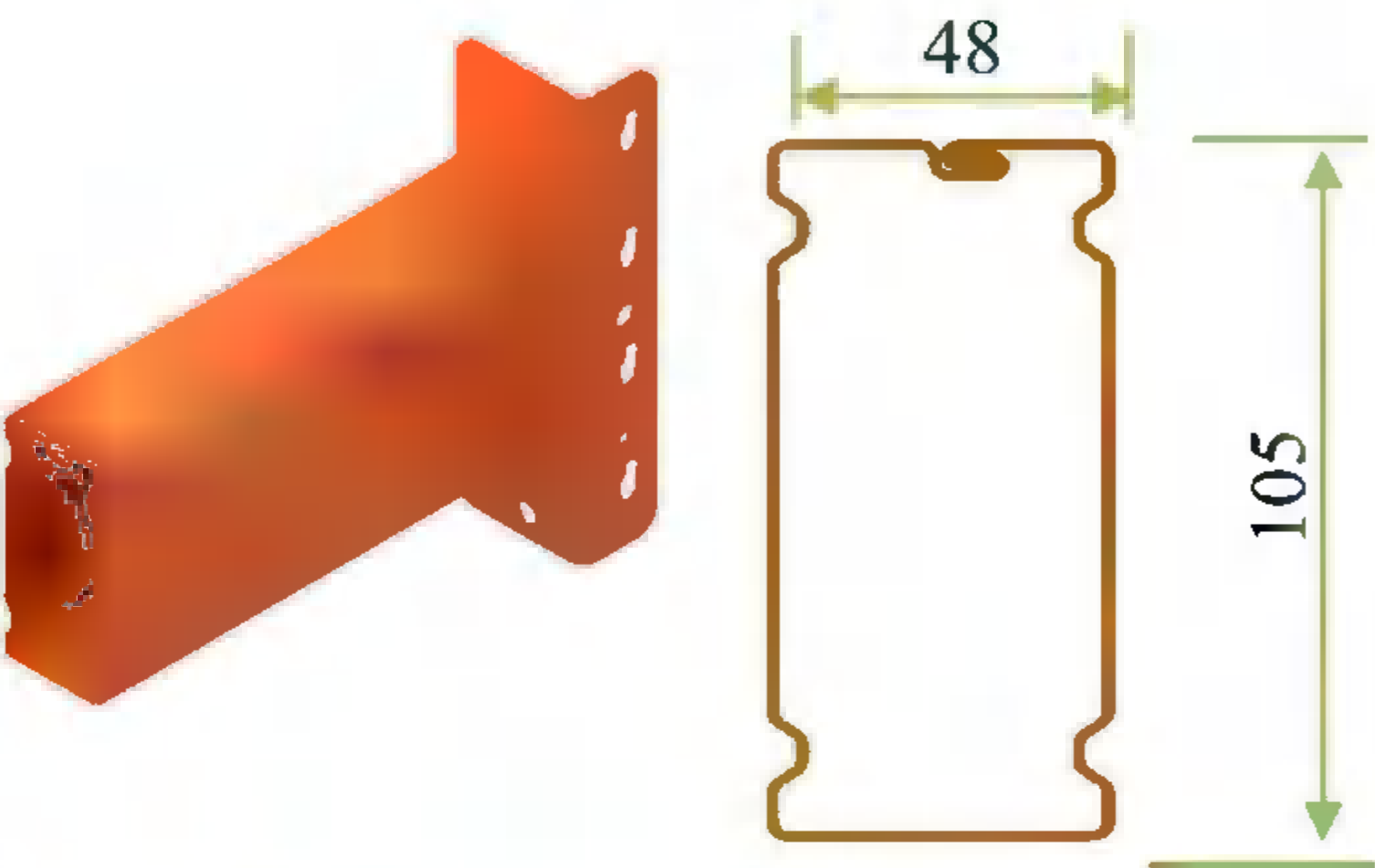
**Note-** These above mentioned three type of Step Beams have to be used in the shelving system of below rooms (Depending upon load per level, suitable beam has to be selected).

1. Non-Stock Room
2. Canteen
3. Quality Room
4. Testing Room
5. Substation Room (ERS)
6. Bogie Shop Tool Room
7. Bogie Shop Material Section 1
8. Bogie Shop Material Section 2

Beam – HEM+

Beams are box profiles adequately designed to ensure strength and stability. The pallet resting face of the beam is 48mm to offer adequate support to the pallet.

The beams are welded with lip connectors on either end. The beams are hooked on to the upright with the help of these lip connectors. The lip connectors are provided with locking pins that would prevent accidental dislodgement of the beam during operation. To prevent the removal of locking pins from the end connector and to identify the locking pin removal after site handover by pasting the tamper evident beam locking pin sticker.



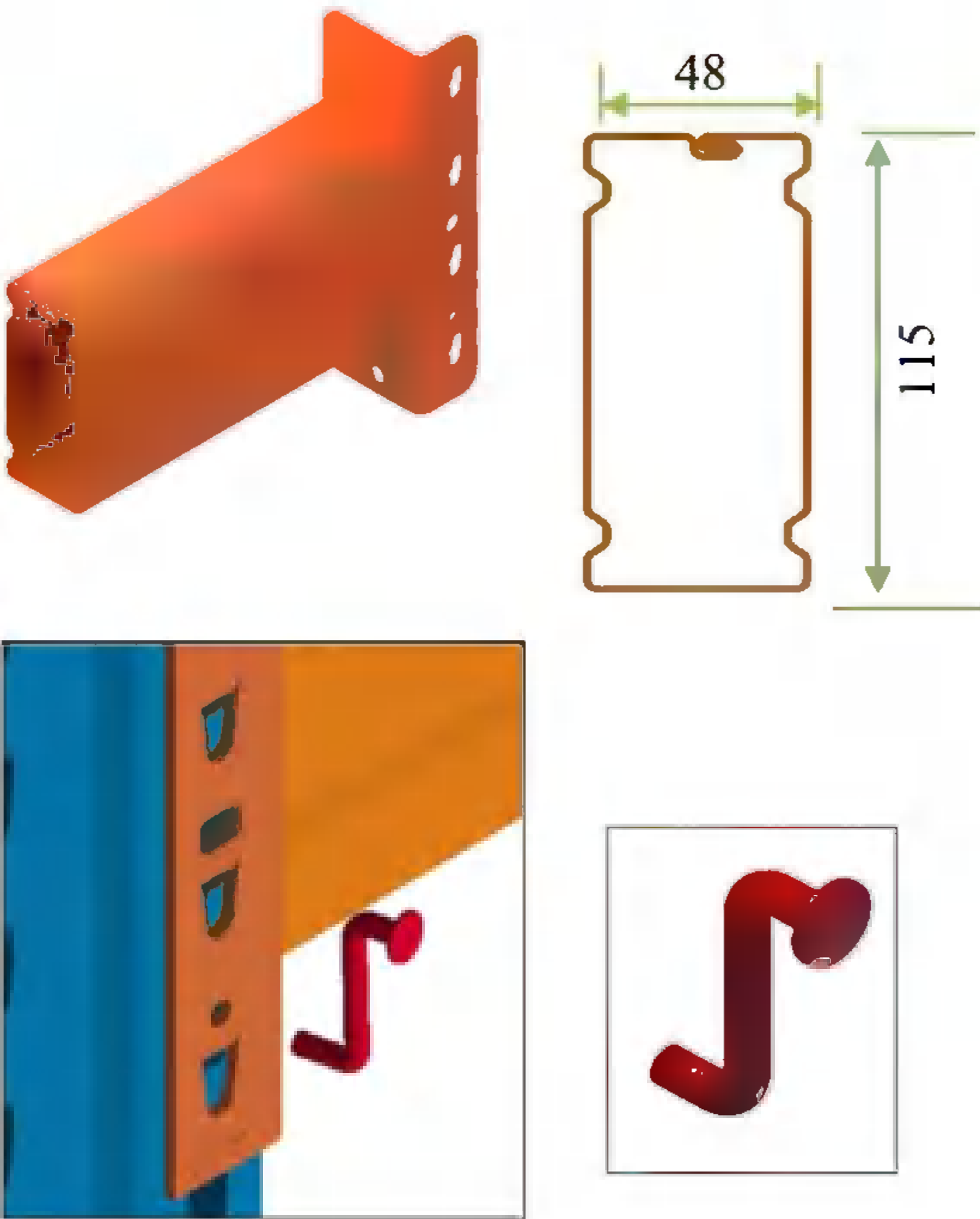
Type of Profile	HEM+
Width	48
Height	105
Connector type	4 Lip
Mfg. process	Roll Forming & Welding for connection
No of Bend	20
Locking mechanism	Z shaped locking pin
Surface Finish	Powder Coated
Color	Orange (RAL 2004)



Beam – HEM+

Beams are box profiles adequately designed to ensure strength and stability. The pallet resting face of the beam is 48mm to offer adequate support to the pallet.

The beams are welded with lip connectors on either end. The beams are hooked on to the upright with the help of these lip connectors. The lip connectors are provided with locking pins that would prevent accidental dislodgement of the beam during operation. To prevent the removal of locking pins from the end connector and to identify the locking pin removal after site handover by pasting the tamper evident beam locking pin sticker.



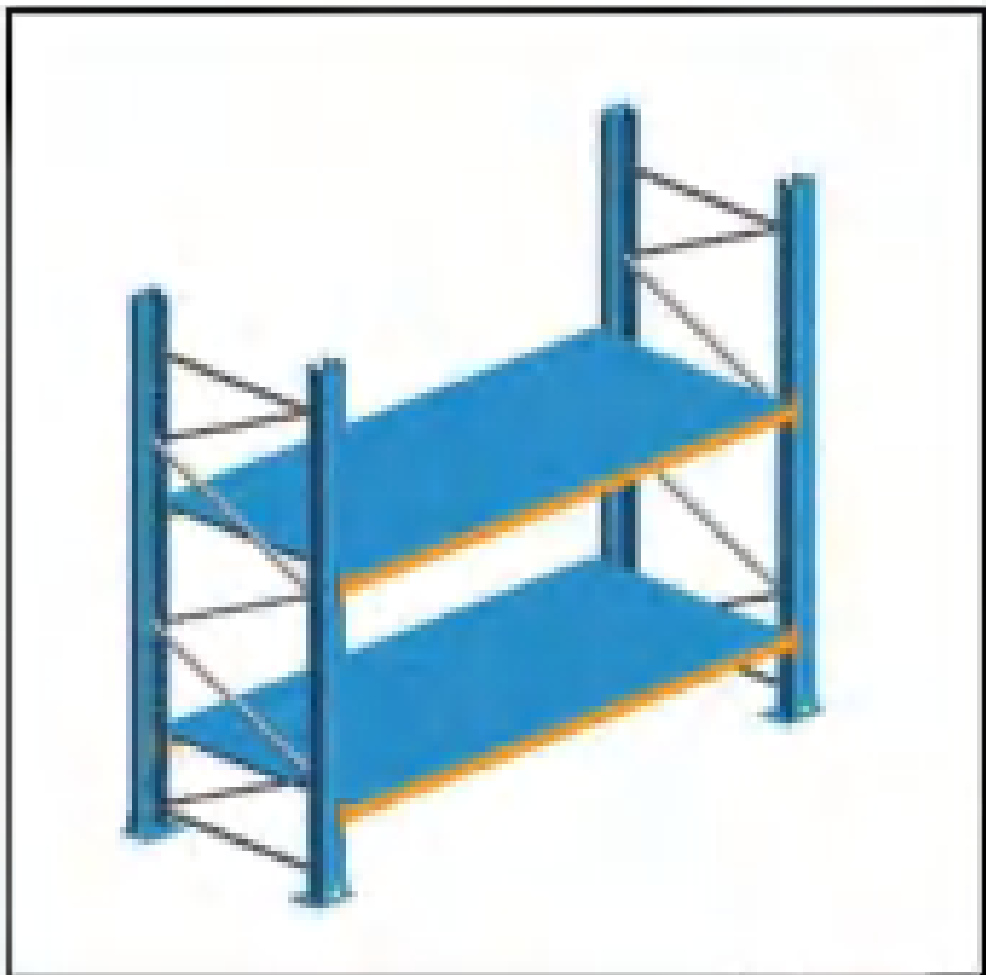
Type of Profile	HEM+
Width	48
Height	115
Connector type	4 Lip
Mfg. process	Roll Forming & Welding for connection
No of Bend	20
Locking mechanism	Z shaped locking pin
Surface Finish	Powder Coated
Color	Orange (RAL 2004)

**Note- These above mentioned two type of HEM+ Beams have to be used in the shelving system of below rooms (Depending upon load per level, suitable beam has to be selected).**

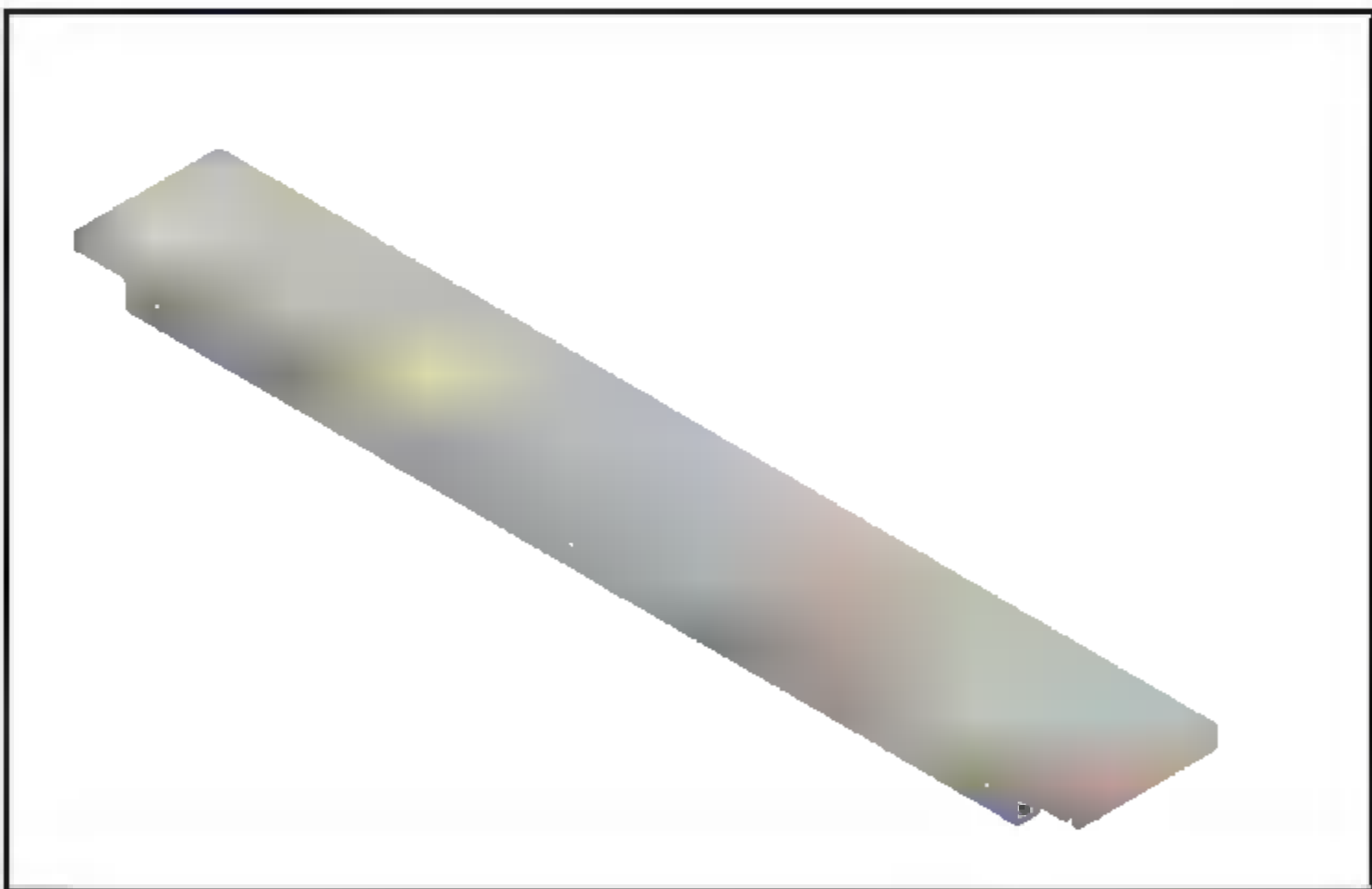
- 1. Tool Room
- 2. MTS Room

6 Bend decking panel

6 Bend decking panels are formed sections having 6 bends. Both ends of the panel have notches facilitating the seating of panel on the beam.



Widths	150/ 200/ 300mm
Height	30mm
No of bend	6
Mfg. process	Press formed/Roll forming
Connectivity	Interconnected
Surface finish	Galvanized
Color	Galvanized



**Note-** These type of decking panels have to be used in the shelving system of below rooms (Depending upon load per level, suitable panel has to be selected).

- 1. Non-Stock Room
- 2. Canteen
- 3. Quality Room
- 4. Testing Room
- 5. Substation Room (ERS)
- 6. Bogie Shop Tool Room
- 7. Bogie Shop Material Section 1
- 8. Bogie Shop Material Section 2

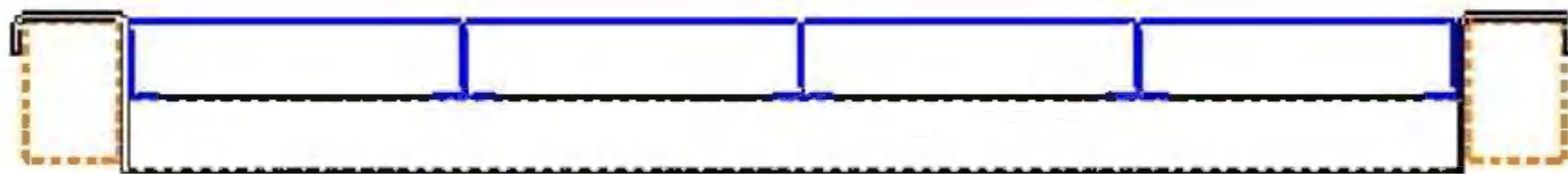
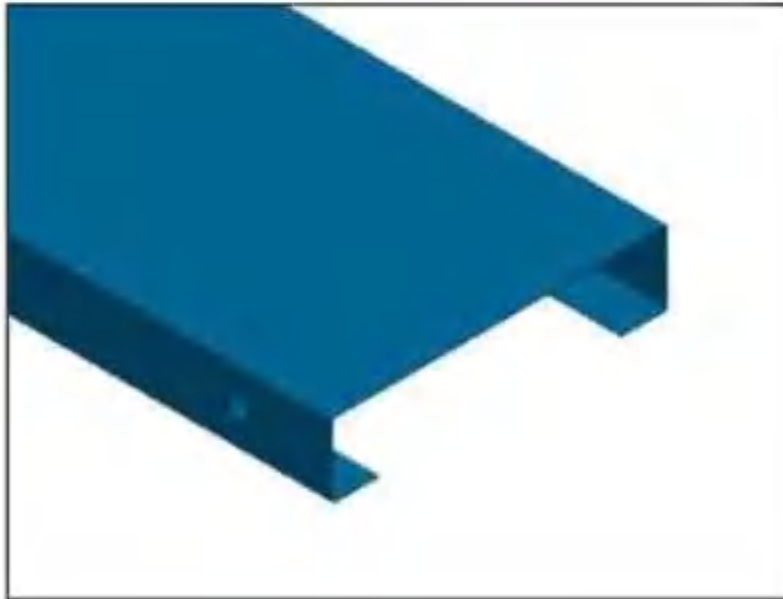


4 Bend decking

4 Bend decking panels are formed sections that have 4 bends. It is supported by Welded type PSB at bottom. The PSB is supported on the beam & the panels are supported on the PSB.



Width	91,200 mm
Height	42mm
No of bend	4
Sharp edges	No sharp edges in loading side
Mfg process	Press formed/Roll forming
Connectivity	Interconnected
Support	Welded PSB at bottom
Surface finish	Galvanized



Panel support bar (PSB)

**Note-** These type of decking panels have to be used in the shelving system of below rooms (Depending upon load per level, suitable panel has to be selected).

- 1. Tool Room
- 2. MTS Room