Moving repository system is an innovative space saving storage system with boltless units mounted on mobile undercarriage, thereby eliminating un-productive aisles. This system is suitable for storing lighter loads. This system is for manual picking of products following the “man-to-goods” principles, i.e. goods which are easily handle & lifted by man are stored in these systems.

**Introduction**

Boltless mobile system has to be with the prominent characteristics of rapid assembly, flexibility to adjust levels without any additional tools.

**Design**

Design is to be done as per following guidelines or codes

SEMA - Code of practice for the design of Mobile Systems

SEMA - Code of practice for the design of High and Low Rise Static steel system

BS: 5950 (V): 1998 – Code of practice for design of cold formed thin gauge sections

FEM 10.2.06 – Code of practice for design of hand loaded static steel system.

**Raw Material**

Load bearing members & accessories are to be made up of relevant high strength steel & the different types of materials used are

|  |  |  |  |
| --- | --- | --- | --- |
| **Steel Type** | **Minimum guaranteed yield strength** | **Applicable standards** | **Component Usage** |
| Galvanized | 210 Mpa | IS:277 D | G50 Upright, Shelf Panel,  G50 inner cladding, |
| Galvanized | 255 Mpa | ASTM A 653M SS GRADE 37 (CLASS 1) | Shelf Clip, Cladding clamp |
| HR | 255 Mpa | IS: 5986 - Fe 410 / Equivalent  (or) IS:2062 - E 250/ Equivalent JIS 3101: SS 400 EN 10025 : S 235 | Undercarriage ‘C’ Channels |
| CR | 210 Mpa | IS:513 D JIS ; G3141 | Peripheral Claddings, Top panel |
| SG 500 | 500 Mpa | IS 1865: 1991 | Stepped wheel, Plain wheel |

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

Boltless superstructure should use NO bolts for assembly of panels, panel stiffeners, back tie, fixed dividers. Fasteners are to be used in understructure assembly & cladding assembly. All these fasteners should be of Grade 8.8. All fasteners are to be with galvanized finish to suit industrial atmosphere.

**Fasteners**

**Surface Finish**

For long life and protection from corrosion, All Powder coated components are to be given a thorough anti-rust treatment. The dry film thickness (DFT) after powder coating should be average 35 microns.

All powder coated components are subjected to be an elaborate 4 step, six zone anti corrosion treatment, viz. De-greasing as per IS 6005:1970, rinsing, phospating as per IS 3618:1966 and RO water rinsing.

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

**Assembly & Installation**

Rails are to be installed initially then understructures are installed over the rails. Then boltless superstructure is to be installed on the undercarriages. Following this, periphery claddings are to be installed. No welding will be carried out at site.

**Undercarriage - Movable**

Movable undercarriage is to be the basic sub assembly of the system which carries the entire pay load & super structure weight. It is to be provided with high strength, high precision cast iron wheels which runs on the rails. Drive unit is to be connected to the undercarriage via sprocket & chain assembly. Undercarriage is to be made up of ‘C’ Profiles which are assembled together to provide rigid base for the system.

Anti-tipping elements are to be incorporated in the undercarriage, to provide redundant safety to the operator.

**Rail Assembly**

Rails are to be the critical member which ensures less effort for the operator by spreading the total load to the ground uniformly.

Rails is to be made up of 25x16mm rectangular bars, which enable the undercarriage to move in a guided path & anti-tilt assembly also takes support from rail assembly. Rails are to be used for uniform distribution of loads to the ground so that the user will feel same effort throughout the length of the rails. Rails are to be leveled using shims to maintain uniform level throughout the length. Rails are to be grouted with the ground using shell expansion anchor bolts. There are to be ‘12’ bolts per meter length of rail. It is provided with slope plates at both sides to avoid hindrance to people who are walking at the system.

**Drive unit Assembly**

Drive unit assembly is to be a mechanism that transfers the driving force to wheel. The rotation of hand-wheels by the operator is to be transferred to the wheel through the chain mechanism by proper reduction that will reduce the efforts of the operator. Drive unit is to be provided with innovative handle mechanism which will always in downwards position, to improve the overall aesthetics of the system & hassle free operation. Effort reduction ration should be 1:2.29 (34Teeth : 14Teeth).

Material of handle should be ABS (Acrylonitrile Butadiene Styrene) Plastic.

Upright is to be roll-formed construction made up of single piece having slots at 25mm pitch. It should enable the operator to utilize the System optimally to suit the changing SKU sizes. Uprights are to be inserted & bolted to the undercarriage.

**Upright**

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

**Bracing**

Bracing type is to be battened type. Bracing is to be a formed single piece section which connects two vertical uprights & makes a frame.

Bracings are to be the key members in maintaining the system stability. These are to be hooked into upright & two plastic rivet pins used for fastening.

**Shelf Panel**

Shelf panels are to be the load carrying members which are hooked into the uprights via shelf clips. ‘4’ nos of clips are to be used per panel.

Panel levels should be adjusted in the pitch of 25mm.

It is to be a roll-formed section with 14 bends. There should be slots for mounting dividers at the pitch of 50mm.

**Shelf Clip**

Shelf panels are to be mounted on the upright using this clip. While changing the levels of panels, these clips can be shifted into the next slot in upright without any additional tools.

**Front Box Cladding (FBC) Assembly**

Front box cladding is to be the cladding on the drive handle side. It is to be an assembly of either single / ‘3’ pieces / ‘6’ pieces together to form a front fascia. These claddings are to prevent un-authorized access of material from front side & also pilferage. Claddings are to offer good aesthetics to the system.

**Rear Box Cladding (RBC) Assembly**

Rear box cladding is to be the cladding on the side opposite to drive handle side. It should comprise either single / ‘3’ pieces / ‘6’ pieces together to form a rear fascia. It should prevent un-authorized access of material from rear side.

**End Box Cladding (EBC) Assembly**

End box cladding is to be provided at the extreme sides ( i.e. Sides of the SFF (Single Faced Fixed) unit & SFM (Single Faced Movable) Unit) of the block. It should prevent the access of material from outside and improves the overall aesthetics.

Locking stiffener is to be a mechanism used to lock the overall block. Once the aisle is closed & locking stiffener is locked, the system should become a block and no access to material is possible. This should give access control to the material in the system. Lock comes with ‘2’ keys.

**Locking Stiffener**

**Label Holder**

List of items stored in a bay should be inserted into this label holder. Label should be inserted from top of the holder. One label holder is to be provided to SF / DF unit. Acrylic material is to be used for this.