**MIDH OPERATIONAL GUIDELINES- ANNEXURE-V (C6) & ANNEXURE-VII (B1, B2)**

**Data Sheet for Cold Storage Type 1: (refer sample sheet)**

1. **Cold Store Chamber Sizing and Capacity**

- Please enclose Sketch with Plan layout and sections showing the storage chamber

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Details** | **Chamber 1** | **Chamber 2** | **Chamber 3** | **Chamber 4** | **Chamber 5** |
| Temp. Zone & Relative Humidity conditions |  |  |  |  |  |
| Name of Produce |  |  |  |  |  |
| Number of platform per  chamber |  |  |  |  |  |
| Type of platform used |  |  |  |  |  |
| Dimensions of CS chambers in each group (L x W x H) m |  |  |  |  |  |
| Storage Capacity of each chamber in tons |  |  |  |  |  |
| Storage unit used (Bags, crates, carton, bulk heap, etc.) |  |  |  |  |  |
| Total number of storage unit |  |  |  |  |  |
| Weight per storage unit |  |  |  |  |  |
| Heat load per chamber (kW) |  |  |  |  |  |
| Any other information |  | | | | |

1. **Handling Area**

|  |  |  |
| --- | --- | --- |
| **Details** | **Dimensions** | **Temp OC** |
| Describe Handling, receiving area (covered, open shed) |  |  |
| Describe Loading / Unloading platform |  |  |

1. **Facility covered Areas**

|  |  |
| --- | --- |
| Cold Storage Area and height |  |
| Machine room area/ height |  |
| Generator room area / height |  |
| Admin Block area / height |  |

1. **Building & Construction Details**

|  |  |
| --- | --- |
| Type of building construction |  |
| External walls/Internal walls  /Partition walls of cold chambers |  |
| Specification of Roof/Ceiling |  |
| Lighting fixtures in cold chambers |  |
| Specification in process/External/ compound areas |  |
| Others |  |

1. **Insulation and Vapour Barrier**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Type of Insulation** | **Wall** | | **Ceiling / Roof** | **Floor** |
| **External** | **Internal** |
| Specification of insulation material |  |  |  |  |
| Specification of composite panels |  |  |  |  |
| Relevant IS Code |  |  |  |  |
| Thermal Conductivity (k-value) at  +10°C (mean temperature) in W/m.K |  |  |  |  |
| U-value {W/(m2K)} |  |  |  |  |
| Thermal diffusivity (m2/ sec) |  |  |  |  |
| Vapour barrier specification |  |  |  |  |
| Total Insulation thickness and number  of layers |  |  |  |  |
| Specification on Cladding |  |  |  |  |
| Locking/Fixing & Sealing System in case of Metal Skin composite Panels |  |  |  |  |

1. **Cold Store Doors & Air / Strip barriers or curtains**

|  |  |
| --- | --- |
| **Description** | **Details** |
| No. of doors per chamber |  |
| Type hinged / sliding/ Rolling |  |

|  |  |
| --- | --- |
| Size of door opening (W x H). |  |
| Insulation Material-Type and U value { W/(m2K)} |  |
| Thickness of Insulation (mm) |  |
| Type of skin |  |
| Provision of Strip curtains/Air curtains – nos and dimensions (W x H) m. |  |
| Internal Emergency Door release |  |

1. **Heat Load Estimation Inputs**

|  |  |
| --- | --- |
| Product wise Storage condition: Storage temperature in oC: Relative humidity in %:  Air circulation rate in CMH: |  |
| Loading Period (days/weeks) |  |
| Maximum storage period (weeks/months) |  |
| Product loading temperature (OC) |  |
| Loading rate per day (MT/day) |  |
| Pull down rate (hours) |  |
| Estimated Daily unloading rate  from each cold chamber (MT/day) |  |

|  |  |
| --- | --- |
| Ante Room cum staging area conditions (OC) |  |
| CO2 Concentration Control (PPM) |  |
| Number of Fresh air changes per  day |  |
| Brief Description of Fresh Air Ventilation system |  |
| Explain heat recovery system, if used |  |

1. **Heat Load Calculation of Cooling System – Summary**

|  |  |
| --- | --- |
| Ambient Conditions  Dry Bulb temperature (Summer) |  |

|  |  |
| --- | --- |
| Building dimensions:  Total Capacity of the storage: Number of the chambers |  |

Note: Please attach additional heat load estimation for, as applicable depending upon, different group of commodity planned.

|  |  |  |  |
| --- | --- | --- | --- |
| Refrigeration Load | | During Loading (kW) | During Holding (kW) |
| Transmission Load (kW) | |  |  |
| Product Load (kW) | |  |  |
| Internal Load (kW) | Lighting load |  |  |
| Occupancy load |  |  |
| Infiltration Load (kW) | |  |  |
| Ventilation/ Fresh Air (kW) Refurbishment Load | |  |  |

|  |  |  |
| --- | --- | --- |
| Refrigeration Load | During Loading (kW) | During Holding (kW) |
|  |  |  |
| Equipment Load – Evap. Fan motors, MHE etc. (kW) |  |  |

|  |  |  |
| --- | --- | --- |
| Compressor Operation Hours/Day | Pull Down Period |  |
| Holding period |  |
| Defrosting Period |  |

|  |  |  |
| --- | --- | --- |
| Total Refrigeration Description(kWh) | Peak Period(kWh) | Holding Period(kWh) |
|  |  |  |

Cooling System Design Detail

1. **Cooling System Configuration: Mechanical Refrigeration**

|  |  |
| --- | --- |
| Type of Refrigerant |  |
| Total refrigeration system capacity (kW) |  |
| Type of System |  |
| Type of compressor |  |
| Type of capacity control |  |
| Specify Unloading steps in percentage |  |
| Type of condenser |  |

|  |  |
| --- | --- |
| Cooling Towers (if applicable) |  |
| Type of Evaporators/ Air cooler |  |
| Type of defrosting |  |
| Humidification System & Control |  |

Refrigeration Equipment Details

1. **Compressor/ Rack Detail**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Compressor/ Racks Type,  Make & Model | Qty. | Comp. RPM | Operating Parameters SST. / Cond.  Temp (OC) | Refrigeration Capacity (kW) | Power Consumption (kW) | Total connected Motor  (kW) | Remarks Working  /Standby |
|  |  |  |  |  | Full load:  Part load: |  |  |

1. **Condenser Details**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Condenser Type, Make & Model | Qty. | Operating Parameters Condensing Temp.(CT)  WBT, water in/out temp(OC) | Condenser Heat Rejection Capacity  (kW) | Electric Fan  /Pump Motor Rating (kW) | Total Electric Power (kW) | Remarks Working  /Standby |
|  |  |  |  |  |  |  |

1. **Cooling Tower Details ( if applicable)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Cooling Tower Type, Make & Model | Qty | Operating Parameters DB & WB Water Temp,  in/out (OC) | Cooling Tower Capacity (kW) | Fan & Pump Capacity (CMH/LPS) &  Motor (kW) | Total Electric Power  (kW) | Remarks Working  /Standby |
|  |  |  |  |  |  |  |

1. **Pressure Vessels**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Description** | **Type Horizontal**  **Vertical** | **Refrigerant** | **Operating Temp &**  **Pressure** | **Construction Shell, Dish Ends**  **& Nozzles** | **Total Refrigeration**  **load** | **Holding Volume** |
| Low Pressure |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| High Pressure |  |  |  |  |  |  |

Note: The design and testing of the pressure vessel should comply with ASME Sec VIII Div 1.

1. **Evaporators /Air Cooling Units (ACU)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ACU Type, Make & Model | Nos. | Operating Parameters Evap. (SST)  & TD\* (OC) | Cooling Capacity (kW) | Air Flow (CMH) &  Face Velocity (m/s) | Material of Coil Tubes & Fins | Fin pitch (mm) | Total Fan Electric Power (kW) |
|  |  |  |  |  |  |  |  |

\*TD – Temperature difference between Evap. (SST) OC & Return Air (at coil inlet).

Note: Please attach Detailed Technical Performance Data Sheets of each equipment namely Compressors, Condensers, Cooling Towers, Air Cooling Units giving General Layout and Dimensions duly Certified by the respective equipment manufacturers with reference to the Relevant Codes & Standards.

1. **Electrical Installation:**

|  |  |
| --- | --- |
| Total Connected load (kW) |  |
| Estimated power requirement at Peak Load Period (kW) |  |
| Estimated power requirement at Holding Load Period (kW) |  |
| Estimated power requirement at Lean Load Period (kW) |  |
| Capacity of Transformer (kVA) |  |
| Size of Capacitor |  |
| Make & Capacity of standby D.G. Sets (nos and kVA) |  |

1. **Material Handling procedure**

|  |  |
| --- | --- |
| **Procedure** | **Brief Description** |
| Material Handling Procedures & Equipment |  |
| Capacity of mechanised belt conveyor (kW) if any-Rating of motor |  |
| Any other device please specify |  |

Attach a Plan & Layout of the proposed Cold Store unit approved by a Registered Architect.

1. **Safety Provisions :**

Include Machine room ventilation system for self-containing

|  |  |
| --- | --- |
| Fire Fighting equipment installed as per Fire safety standards of State Fire Department | Yes / No |
|  |
| Handling measures for Refrigerants & Leaks installed. |  |
| Safety devices – LP/HP cut outs, safety valves, shut off valves etc. installed |  |
| Emergency lighting in Cold chambers & other areas installed |  |
| Lightening arrestors installed |  |
| Any other safety provisions (describe) |  |

1. **Energy Saving Equipment & Measures**

|  |  |
| --- | --- |
| **Details of Energy Saving devices** | **Brief Description and Savings** |
| Light Fixtures |  |
| Natural Lighting for general areas |  |
| VFD / Electronic Technology for fans  / compressors |  |
| Refrigerant Controls and Automation |  |
| Air Purger |  |
| Power Factor Controller |  |
| Energy recovery |  |

|  |  |
| --- | --- |
| **Details of Energy Saving devices** | **Brief Description and Savings** |
| PLC Control & Data Acquisition |  |
| Any other Components |  |

1. **Estimated Performance Parameters of Proposed Cold Store**

|  |  |  |
| --- | --- | --- |
| **Parameters** | **Peak Period** | **Holding Period** |
| Coefficient Of Performance (COP) of the Cold Store Unit |  |  |
| Power Consumption (kWh/Day) |  |  |
| Prevailing Electricity costs (Rs/kWh) |  |  |

1. **Brief description of any other technologies or infrastructure used**

|  |  |
| --- | --- |
| Reefer trucks operated (if any) |  |
| Specialised packaging lines (if any) |  |
| PLC Automation (if any) |  |
| Dock Levellers systems (if any) |  |
| Alternate energy options (if any) |  |
| Modern Pack-house (if any) |  |
| Others |  |

*Project declares compliance with all mandatory codes and regulations are complied with*

Append details in separate data sheets for ‘add-on components’ if also applying for these components.