

Reference Data Sheet for Cold Storage Type 2 as per NCCD Guidelines:

i) Commodity Storage Requirements

Description	Details
Type of Commodities/ Produce	Provide name of the produce types to be stored
Total number of Chambers	

ii) Chamber Sizing and Information

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

Details	Chambers Group 1	Chambers Group 2	Chambers Group 3	Chambers Group 4	Chambers Group 5
Storage Condition Temp. & Relative Humidity	0 to 2 °C 90 - 95% RH	0 to 2 °C 95 - 100% RH	0 to 2 °C 65 - 75% RH	4 to 5 °C 90 - 95% RH	10 to 12 °C 85 - 90% RH
Product types					
Number of chambers per group					
Dimensions of chambers in each group (L x W x H)m					
Storage Capacity of Each chamber group (cubic metres)					
Storage units (Pallets, bulk bins, cartons, etc.)	Pallets	Bins	Bins	Pallets	
Stacking system used	Nil	Nil	Overstack bin	Racking	
Total Heat Load calculated per chamber group (kW)					
Total Refrigeration capacity per chamber group (kW)					

Figures / data are as examples for user Each chamber is a common temperature zone

iii) Enclosed Ante Room & Handling Area

Details	Information	Temp °C
Ante room/Handling Area (L x W x H)m	Refrigeration kW Load	Temperature maintained in °C in ante room and handling area.
Refrigeration Load	Provide the refrigeration load in kW.	
Number of Access Doors	List number and dimension of main doors to ante room enclosure.	
Dock Leveller system	Provide the details of protected loading unloading platforms if used.	

iv) Facility Covered Areas

Cold Storage Area and height	Total floor area in m ² (sum of all storage chambers internal area.)
Ante room area	Total floor area in m ² of ante room (handling area).
Receiving room area and height	
Machine room area and height	
Generator room area	
Admin Block area and height	

v) Building & Construction Details

Type of building construction (load bearing construction)	Specify whether building is with RCC civil construction or pre-engineered structural steel construction with insulated panels.
External walls/Internal walls/Partition walls of cold chambers	Specify whether the walls are constructed with civil works with insulation slabs fixed in the walls or pre-insulated composite panels used.
Roof/Ceiling construction	Describe external roof construction and installation method of

	ceiling insulation.
Lighting fixtures in cold chambers	List use of special lights and fixtures with weather protection.

External/compound areas	Describe construction of external and compound areas including parking area provided.
Others	Describe if chamber are divided into vertical temperature zones (RCC floors, insulated vertically or common.)

vi) Insulation and Vapour Barrier

Type of Insulation	Wall	Ceiling / Roof	Floor
Specification of insulation material	Describe the type of material used for insulation of walls/ceiling, partition and floor.		
Specification of composite panels	Describe the type of composite insulated panels used for insulation of walls and ceilings.		
Relevant IS Code	State applicable IS Codes applicable for the specification of the below characteristics of the insulation material used.		
Thermal Conductivity (k-value) at +10°C (mean temperature)	Indicate the heat transfer ability of the product in W/m.K at 10 °C mean temperature		
U-value	Provide the U-value of the insulation		
Thermal diffusivity (m ² /sec)	Indicate the heat transfer ability relative to the storage of thermal energy.		
Vapour barrier specification	Describe the type of material and the thickness of the vapour barrier used.		
Specification on Cladding	Describe external finish / cladding material if any.		
Locking/Fixing & Sealing System in case of Metal Skin composite Panels	Cam lock system for discontinuous panels / Tongue and Groove joints for continuous composite panels (Single or double).		

vii) Storage Chamber insulation & details:

Chamber number	Ceiling thickness (mm)	External wall thickness(mm)	Internal wall thickness(mm)	Floor insulation thickness(mm)	Internal Dimensions (L x B x H) m
1	150 mm	150 mm	80 mm	100 mm	
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

Total volume of all chambers (cubic metres)	
Total Transmission load of chambers (kW)	

viii) Cold Store Doors & Air/Strip barrier or curtain

Chamber number	Number of Doors	Door Opening (w x h) m	Thickness(mm) & 'U-value'	Strip curtain or air curtain	Opens to (ante-room or outside)
1	1	2.7 x 4.0	100 mm, 0.4	Strip	Ante-room
2					
3					
4					
5					

Figures/data are as example for user

ix) Heat Load Estimation Inputs

Product Storage condition	List storage temperature in °C, relative humidity required in %, Air circulation rate in CMH.
Daily Door Opening	Estimated number of times and period doors opened for daily operations.
Estimated mass of products to be loaded and unloaded daily	Provide the rate in MT per day. Assume that product is within 5° C of storage temperature.
Ante Room area conditions	Temperature to be maintained in °C.
Special Provisions	Describe other conditions maintained for improving the quality of the stored products (humidity, CO ₂ level, CA system, etc.)

x) Fresh Air / Ventilation System

Fresh air changes	Provide number of air changes per day considered in a cold room.
Brief Description of Fresh Air Ventilation system	Capacity of Fresh Air Fans for Replenishment of fresh air into each of the cold chambers.
CO ₂ Concentration Control Range	Recommended range of CO ₂ concentration maintained in PPM.
Monitoring & Control Instrument	Describe the monitoring and control instrument used.
Explain heat recovery system, if used.	Description of heat recovery system, recommended efficacy, type of system, cross heat exchange, if used.

xi) Heat Load Calculation of Cooling System – Summary

Ambient Conditions Dry Bulb temperature (Summer)	Peak conditions based on summer
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Building dimensions: Total Capacity of the storage: Number of the chambers :	Specify the dimensions of the building, total capacity of storage and number of chambers.
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Note: Please attach additional heat load estimation for, as applicable depending upon, different group of commodity planned.

Refrigeration Peak Load in kW(for storage chambers)		
Transmission Load (kW)	Heat transferred through walls , ceiling and floor due to difference in outside and inside temperature	
Product Load (kW)	Heat transferred from the product due to difference in product incoming temperature and storage room temperature.	
Internal Load (kW)	Lighting load	Internal heat generated due to lights in the cold room.
	Occupancy load	Heat transferred due to human activity within the cold room.
Infiltration Load (kW)	Heat transferred from outside air during door opening (use ante-room temperature when opening into enclosed ante-room.)	
Ventilation/ Fresh Air (kW) Refurbishment Load	Heat transferred through fresh air entering the cold room.	
Equipment Load – Evap. Fan motors, MHE etc. (kW)	Total Heat transferred from various above sources in a day	
Total Load for Ante-room	Consider similar calculations with outside ambient.	

Compressor Operation Hours/Day	Pull Down Period	Indicates compressor running hrs. during pull down time of the product in a day
	Holding period	Indicates compressor running hrs after the product reached the room storage temperature.
	Defrosting Period	Duration of Defrosting in a day.

Multiplier (Safety Factor)	Please state the multiplier used
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Total Refrigeration Description	Peak Period(kW)	Holding Period(kW)

Cooling System Design Detail

xii) Cooling System Configuration: Mechanical Refrigeration

Type of Refrigerant	Provide technical name of the refrigerant.
Total refrigeration system capacity	Provide the total refrigeration capacity in kW.
Type of System	Direct Expansion/ Gravity Feed/ Overfeed/ Secondary pump.
Type of compressors	Reciprocating/Screw/Scroll.
Type of capacity controls used	Step less/ step in / Auto unloading of cylinders.
Specify Unloading steps in percentage	Screw Compressor from 10 to 100% Reciprocating from 25 to 100%.
Type of condensers	Atmospheric/ Evaporative/water cooled/Air cooled.
Cooling Towers (if applicable)	Natural draft/ Induced Draft.
Type of Evaporators/ Air cooler	Ceiling or Floor mounted - Induced draft/ Forced Draft / Dual discharge.
Type of defrosting system	Air/ Water / Electric/ Hot gas.
Humidification System & Control	Specify the method of humidification equipment used.

Refrigeration Equipment Details

xiii) Compressor/ Rack Detail

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

xiv) Condenser Details

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

xv) Cooling Tower Details (if applicable)

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

xvi) Pressure Vessels

Description	Type Horizontal or 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.

xvii) Evaporators /Air Cooling Units (ACU)

ACU Type, Make & Model	Nos.	Operating Parameters Evap. (SST) & TD* (°C)	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) °C & 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.

xviii) Electrical Installation:

Total Connected load	Specifies the total connected electrical power in kW.
Estimated power requirement at Peak Load Period	Provide the maximum power consumed during peak demand in kW.
Estimated power requirement at Holding Load Period	List the power consumed during holding period in kW.
Estimated power requirement at Lean Load Period	List the power consumed during lean periods in kW.
Capacity of Transformer	Provide the rated capacity of the transformer in kVA.
Size of Capacitor	Provide the Size of capacitor bank for power factor correction & their operation.
Make & Capacity of standby D.G. Sets	Provide the make and rated Capacity of the Generator in kVA.

xix) Material Handling procedure

Procedure	Brief Description
Material Handling Procedures & Equipment	Describe the details of product movement inside the cold storage and equipment used.
Capacity of mechanised belt conveyor if any -Rating of motor	Electric motor capacity in kW connected for lifts / hoists / conveyors etc.
Any other device please specify	

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

xx) Safety Provisions : Mandatory

Include Machine room ventilation system for self-containing

	Yes / No
Fire Fighting equipment as per Fire safety standards of State Fire Department installed	All Fire -fighting equipment complied as per state Fire- fighting department
Refrigerant Leak detections system	Specify the use of leak detection system
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 installed (describe)	

xxi) Energy Saving Equipment & Measures

Details of Energy Saving devices	Brief Description and Savings
Light Fixtures (Internal / External)	Provide type of light fixtures-CFL/LED numbers and wattage.
Natural Lighting for general areas	List the provision for natural lighting is included.
VFD / Electronic Technology for fans / compressors	Control of fan motors speed using variable frequency drives or by electronic technology in 2 steps fan for evaporators.
Refrigerant Controls and Automation	List the automation controls used to save energy for optimizing the performance of the refrigeration system.
Air Purger	Provide the type and operation of air purger.
Power Factor Controller	Measure of efficient use of electrical power in the connected system.
Energy recovery	List use of energy recovery for ventilation system.
PLC Control & Data Acquisition	Automation for monitoring and control of the parameters and Refrigeration plant.
Any other components	List use of water treatment for recycling of water and rainwater harvesting etc.

xxii) Estimated Performance Parameters of Proposed Cold Store

Parameters	Peak Period	Holding Period
Coefficient Of Performance (COP) of the Cold Store Unit	Specify COP of the cold storage during peak and holding periods.	
Power Consumption (kWh/Day)	Specify power consumption during peak and holding period.	
Prevailing Electricity costs	Specify prevailing electricity costs in Rs/kWh.	

xxiii) 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)	
CA technology(if any)	
Others	

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

All mandatory rules & regulations (BIS, ISO, IS etc.) relevant to the item must be complied with