

NATIONAL CENTRE FOR COLD-CHAIN DEVELOPMENT

APPENDIX 1 - COMPONENT DATASHEETS

(For reference see Guidelines & minimum System Standards)

**(RELATING TO COMPONENTS SUPPORTED BY
CENTRALLY SPONSORED SCHEMES)**

USE WHEN SUBMITTING COLD-CHAIN PROJECT PROPOSALS

DECEMBER 2014

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FORM 1: IDENTIFICATION OF THE APPLICANT

Explanations of the datasheets are provided in the NCCD System Guidelines. All applicants shall fill 'Form 1' for each project submitted for appraisal. Apart from this, relevant datasheet for individual components to be filled by beneficiary seeking subsidy.

A: Identification of the Applicant

Name of Promoter (s)			
Name of Commercial Entity/ Enterprise			
Type of Commercial Entity (Proprietorship/Partnership / Pvt. Ltd / Ltd / PSU/ State Undertaking)			
Postal address of Entity			
	Tel / Fax	Mob. No	E-mail
Present activity in brief			
Name of Contact Person		Phone:	
		Mobile No:	
		Email:	

B: Project Milestone

Date for application for subsidy		
Date of Project Start		
Amount of Bank Loan Sanction		
Date of Bank Loan Sanction		
Last Approval/Inspection Status		
Name of Approving Body		
PAN Number registered with bank.		
If Project Commissioned	Date of completion certificate	Issuing Authority

C: Project Identification: Pre-Cooler/ Cold storage / Pack-House / Reefer Vehicles / Retail Shops

Name of Project			
Type of Project (please tick)	New Project	Expansion	Modernisation
Location of Project (complete address)	Address		Village/Town
	District		State
Manpower Employed (on rolls/on contract)			
What Business model is used (rental, captive, part of supply chain service, mixed)			
Years in business			
Components of Project submitted (please tick) Check list for individual Data sheets submitted	Integrated pack house		
	Pre-cooling unit		
	Cold Room (Staging)		
	Cold Storage Unit Type 1		
	Cold Storage Unit Type 2		
	CA Generator		
	Specialised CA Door		
	CA Tent		
	Programmed Logic Control Systems		
	Dock Leveller System		
	WDRA-NWR Equipment		
	Specialised Packaging		
	High Reach MHE		
	Modernisation of Refrigeration		
	Modernisation of Insulation		
	Reefer Container Units		
	Advanced Grader system		
	Stacking System		
	Retail Shelf / Cabinet		
	Alternate Energy Option		
Refrigerated Transport Vehicle			
Ripening Facility			
Others (please name)			
Type of Products to be handled (Frozen, Chill, Mild-chill)	Temperature Zones		
	< -18°C	0-10°C	10-20°C

Fill up relevant data sheet for each project component.

INTEGRATED PACK-HOUSE

#	Component: Integrated Pack house	Description <i>(refer sample sheet)</i>
1	Pack house Handling capacity (MT/day)	
2	Products to be handled	
3	Area of the pack house (m ²)	
4	Receiving Area (L x W x H) m	
5	Dimension of the building (L x W x H) m	
6	Handling Area (L x W x H) m	
7	Roof Details	
8	Outer walls and Flooring Details	
9	Lighting - Internal and External (Type, Numbers and wattage)	
10	Door/ Window Details	
11	Pest control Details	
12	Fumigation Details	

#	Component: Integrated Pack house	Description (refer sample sheet)
13	De-sapping tables	
14	Mechanised Conveyor system & capacity (tons/hour)	
15	Washing and Drying machinery (if used)	
16	Power generating unit (kVA)	
17	Inclusion of Pre-cooling chamber in pack-house (Y/N)	
18	Inclusion of staging cold-room in pack-house (Y/N)	
19	Layout Drawing	

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

PRE-COOLING UNIT

#	Component: Pre-cooling unit	Description (refer sample sheet)
1	Produce to be pre-cooled	
2	Unit Package load	
3	Pre-cooler volumetric capacity(m ³)	
4	Cooling System used	
5	Temperature (°C) and RH levels (%)	
6	Pull down time (batch time)	
7	No of batches planned in a day	
8	Refrigeration Load (kW)	
9	Insulating material used-along with thickness and U-value.	
10	Evaporator/Chiller make	
11	Air flow (cum/hr) & static pressure (kPa)	
12	No of evaporator fans and motor power(kW)	
13	Water pump capacity (m ³)	

#	Component: Pre-cooling unit	Description (refer sample sheet)
14	Motor rating (kW)	
15	Make of condensing unit	
16	Refrigeration of condensing Unit (kW)	
17	Condensing unit type	
18	Door details-dimensions, insulation material and thickness of door.	
19	Controls Used	
20	Refrigerant used	
21	Total connected Power (kW)	
22	Power generating unit (kVA)	
23	Layout Drawing	

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

COLD ROOM (Staging)

#	Component: Staging Cold Room	Description (refer sample sheet)
1	Products to be stored	
2	Temperature (°C) and RH levels (%)	
3	Staging cold room dimension (L x B x H) m	
4	Insulation used-Type, thickness and 'U' value	
5	Refrigeration Load (kW)	
6	Evaporator/Air-cooler make	
7	Evaporator construction details	
8	Air flow (cum/hr)	
9	No of fans	
10	Make of condensing unit	
11	Refrigeration of condensing unit (kW)	
12	Door details- dimensions, insulation material and thickness of the door.	
13	Controls Used	

#	Component: Staging Cold Room	Description <i>(refer sample sheet)</i>
14	Refrigerant used	
15	Total connected Power (kW)	
16	Layout Drawing	

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

COLD STORAGE UNITS

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

i) 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					

ii) Handling Area

Details	Dimensions	Temp °C
Describe Handling, receiving area (covered, open shed)		
Describe Loading / Unloading platform		

iii) Facility covered Areas

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

iv) 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	

v) 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/(m ² K)}				
Thermal diffusivity (m ² / 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				

vi) 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 { $W/(m^2K)$ }	
Thickness of Insulation (mm)	
Type of skin	
Provision of Strip curtains/Air curtains - nos and dimensions (W x H) m.	
Internal Emergency Door release	

vii) Heat Load Estimation Inputs

Product wise Storage condition: Storage temperature in °C: Relative humidity in %: Air circulation rate in CMH:	
Loading Period (days/weeks)	
Maximum storage period (weeks/months)	
Product loading temperature (°C)	
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 (°C)	
CO ₂ Concentration Control (PPM)	
Number of Fresh air changes per day	
Brief Description of Fresh Air Ventilation system	
Explain heat recovery system, if used	

viii) 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 Refurbishment Load (kW)			

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

ix) 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

x) 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:		

xi) 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

xii) 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

xiii) Pressure Vessels

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

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

xiv) 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.

xv) 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)	

xvi) 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.

xvii) Safety Provisions :

Include Machine room ventilation system for self-containing

	Yes / No
Fire Fighting equipment installed as per Fire safety standards of State Fire Department	
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)	

xviii) 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	

xix) 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)		

xx) 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.

Data Sheet for Cold Storage Type 2: (refer sample sheet)

i) Commodity Storage Requirements

Description	Details
Type of Commodities/ Produce	
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					
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.)					
Stacking system used					
Total Heat Load calculated per chamber group (kW)					
Total Refrigeration capacity per chamber group (kW)					

iii) Enclosed Ante Room & Handling Area

Details	Information	Temp °C
Ante room/Handling Area (L x W x H)m		
Refrigeration Load (kW)		
Number of Access Doors		
Dock Leveller system		

iv) Facility Covered Areas

Cold Storage Area and height	
Ante room 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)	
External walls/Internal walls/Partition walls of cold chambers	
Roof/Ceiling construction	

Lighting fixtures in cold chambers	
External/compound areas	
Others	

vi) Insulation and Vapour Barrier

Type of Insulation	Wall	Ceiling / Roof	Floor
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/(m ² K)}			
Thermal diffusivity (m ² /sec)			
Vapour barrier specification			
Specification on Cladding			
Locking/Fixing & Sealing System in case of Metal Skin composite Panels			

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					
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					
2					
3					
4					
5					
6					
7					
8					

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)
9					
10					
11					
12					

ix) Heat Load Estimation Inputs

Product Storage condition	
Storage temperature in °C:	
Relative humidity required in %:	
Air circulation rate in CMH:	
Daily Door Opening	
Estimated mass of products to be loaded and unloaded daily (MT)	
Ante Room area conditions (°C)	
Special Provisions (describe)	

x) Fresh Air / Ventilation System

Number of Fresh air changes	
Brief Description of Fresh Air Ventilation system	
CO ₂ Concentration Control Range (PPM)	
Monitoring & Control Instrument	
Explain heat recovery system, if used.	

xi) Heat Load Calculation of Cooling System - Summary

Ambient Conditions	
Dry Bulb temperature (Summer)	

Building external dimensions:	mtrs
Total Capacity of the storage:	cubic mtrs
Number of the chambers :	nos

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)	
Product Load (kW)	
Internal Load (kW)	Lighting load
	Occupancy load
Infiltration Load (kW)	
Ventilation/ Fresh Air Refurbishment Load (kW)	
Equipment Load - Evap. Fan motors, MHE etc. (kW)	
Total Load of Ante-room	

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

Multipliers (Safety Factor)	
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Total Refrigeration Load	Peak Period(kW)	Holding Period(kW)

Cooling System Design Detail

xii) Cooling System Configuration: Mechanical Refrigeration (describe)

Type of Refrigerant	
Total refrigeration system capacity (kW)	
Type of System	

Type of compressors	
Type of capacity controls used	
Specify Unloading steps in percentage	
Type of condensers	
Cooling Towers (if applicable)	
Type of Evaporators/ Air cooler	
Type of defrosting system	
Humidification System & Control	

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 (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)	

xix) Material Handling procedure

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

Procedure	Brief Description

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	
Refrigerant Leak detections 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)	
Natural Lighting for general areas	
VFD / Electronic Technology for fans / compressors	
Refrigerant Controls and Automation	
Air Purger	
Power Factor Controller	
Energy recovery	

PLC Control & Data Acquisition	
Any other Components	

xxii) 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)		

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	

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.

CA GENERATOR

#	Component: CA Generator	Description (refer sample sheet)
A	Nitrogen Generator	
1	Make and Model number	
2	Type	
3	Capacity of each Generator (m ³ /hour)	
4	Total volume of chamber(m ³)	
5	Free Volume (m ³)	
6	Pull down time (hours)	
7	Nitrogen Buffer Tank capacity	
8	Capacity of breather bags	
9	Power Consumption (kW)	
B	CO₂ Absorber	
10	Make and Model Number.	
11	Product Stored	
12	Capacity of Absorber (kgs)	
13	Pull down time (hours)	
14	Power Consumption (kW)	

#	Component: CA Generator	Description (refer sample sheet)
15	Control Valves	
C	PLC Control System	
16	Sensors and Analyser	
D	Safety O ₂ monitors	
E	Other fittings (description)	
17	Gas tight Fittings	
18	Pressure relief valves	

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

SPECIALISED CA DOORS

#	Component: CA Door	Description (refer sample sheet)
1	Name of Manufacturer	
2	Size of the door-(Height, Width, Leaf Thickness)	
3	Insulation material- thickness along with its 'U-value'	
4	Sealing type	
5	Sighting ports	
6	Emergency Door release fitted(Y/N)	

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

CA TENT

#	Component: CA Tents	Description (refer sample sheet)
1	Name of Manufacturer	
2	Material Used (describe)	
3	Number of layers /thickness	
4	Dimensions	
5	Capacity of Gas Cylinder/CA generator	
6	Air sealing mechanism (describe)	
7	Atmosphere control & analysis system	
8	Pressure relief valve	
9	Piping connections	
10	Number of Air Sampling lines	
11	Internal fan/Blower rating	

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

PROGRAMMED LOGIC CONTROLS

#	Component: Programmed Logic Controls	Description <i>(refer sample sheet)</i>
A	Design & Construction	
1	Name of Provider	
2	Processor system	
3	Number of Input (IU)/ Number of Output (OU)	
4	Type of Report generation	
B	Refrigeration Plant Controls	Refrigeration Control included: Yes/No
5	Compressor	
6	Compressor rack control	
7	Condenser fans	
8	Evaporator fans	
9	Water Circulation pump	
10	Liquid ammonia circulation pump	
11	Defrost control	
12	Liquid Level Controls	

#	Component: Programmed Logic Controls	Description (refer sample sheet)
13	Describe Control of level switches, valves, relays, breakers.	
14	Any Others	
C	Room Parameter Controls	(Yes/No)/Describe the controls of room parameters.
15	Temperature	
16	Relative Humidity	
17	CO ₂ ,O ₂ ,Ethylene levels	
18	Any Others	
D	Plant Safety Operation	(Yes/No) - Describe configuration.
19	Compressor protection	
20	Evaporator fan control	
21	High condensing pressure alert	
22	Minimum and maximum temperature alarm	
23	Back up pressure probe	
24	Discharge temperature monitoring	

#	Component: Programmed Logic Controls	Description <i>(refer sample sheet)</i>
25	Protection against low suction super heat	
26	Any others	

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

DOCKS LEVELER SYSTEM

#	Component: Dock Leveller System	Description <i>(refer sample sheet)</i>
A	DOCK LEVELERS	
1	Name of Manufacturer	
2	Type of operation	
3	Ramp-Platform Material	
4	Number of cylinders	
5	Platform size (W x L) metres.	
6	Max vertical Lift up & down in mm	
7	Load capacity (tons)	
8	Plinth height of facility (metres)	
9	Control Panel	
10	Standard safety provisions	
11	Emergency stop switch	
12	Dock pit dimensions (metres)	

#	Component: Dock Leveller System	Description (refer sample sheet)
13	Power consumption (k W)	
B	DOCK DOORS	
14	Manufacturer and model	
15	Dimension of Door opening	
16	Loading area temperature (°C)	
17	Insulation-material, thickness and U value.	
18	Safety Provision	
C	DOCK SHELTER	
19	Name of Manufacturer and model	
20	Dimensions	
21	Sealing Material & type	
22	Bumper	
23	Safety Provision	

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

WDRA-NWR EQUIPMENT

#	Component: WDRA-NWR Equipment	Description <i>(refer sample sheet)</i>
1	Computer Type / Quantity	
2	Printer type	
3	Type of produce	
4	AMC	
5	WDRA accreditation	
6	Storage capacity (m ³)	

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

SPECIALISED PACKAGING

#	Component: Specialised Packaging	Details (refer sample sheet)
1	Name of Manufacturer	
2	Feed line	
3	Sorting Grading unit	
4	Weighing Machine	
5	Final Packaging	
6	Traceability system	
7	Labelling System, printing system.	
8	Throughput capacity	
9	Total Power consumption (kW)	

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

HIGH REACH MHE

#	Component: High Reach MHE	Description (refer sample sheet)
1	Name of Manufacturer	
2	Attach specifications	
3	Safe Working load	
4	Maximum Reach	
5	Mast height (metres)	
6	Turning Radius (metres)	
7	Battery capacity (Amp-hour)	
8	Backup battery (Amp-hour)	
9	Capacity of Battery Chargers (nos & kVA)	
10	Safety Protection (describe)	

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

MODERNISATION OF REFRIGERATION

Data Sheet: Compressor (refer sample data sheet)

#	Component: Compressor (For Existing and New)	Description (Old)	Description (New)
1	Name of Manufacturer		
2	Type of Compressor		
3	Refrigerant		
4	Operating Parameters Suction Temp (°C)/Cond. Temp (°C)		
5	Refrigeration capacity (kW)		
6	Power Consumption (kW)		
7	Coefficient of Performance		
8	Capacity control		
9	Motor Rating (kW)		
10	Safety cut outs & Gauges		
11	Total Refrigeration load of facility (kW)		

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

Data Sheet: Evaporator (refer sample data sheet)

#	Component: Evaporator	Description (Old)	Description (New)
1	Name of Manufacturer		
2	Model number		
3	Refrigerant		
4	Refrigeration system		
5	Type of Evaporator		
6	Capacity (k W) and delta temp (°C)		
7	Room temperature (°C)		
8	Air flow (cum/hr)		

#	Component: Evaporator	Description (Old)	Description (New)
9	Volume of chamber (m ³)		
10	External Static Pressure (Pa)		
11	Power consumption (kW)		
Valves, Controls and Instrumentation			
12	Control Valves		
13	Expansion valve		
14	Room temperature and RH monitoring		
15	Monitoring and Control		

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

MODERNISATION OF INSULATION (*refer sample datasheet*)

#	Component: Insulation	Description (Old)	Description (New)
1	Name of Manufacturer		
2	Total wall/ceiling/partition areas (m ²)		
3	Floor area (m ²)		
4	Insulating material and thickness		
5	U value {W/(m ² K)}		
6	Density (kg/m ³)		
7	Thermal diffusivity (m ² /h)		
8	Type of vapour barrier and thickness		
9	Type of skin (if applicable)		
10	Joint type		
11	Fire resistance characteristic		
12	Substrate Used (if applicable)		
13	Adhesive to fix with substrate		

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

REEFER CONTAINER

#	Component: Reefer Container	Description (refer sample datasheet)
1	Container dimensions	
2	Insulation details-thermal conductivity and thickness	
3	Tare weight (Kgs)	
4	Gross weight (Kgs)	
5	Temperature recording type	
6	GPS System	
7	Refrigeration capacity(kW)	
8	Refrigerant used	
9	Fresh air exchange	
10	Diesel/electric auto-switching	
11	Air flow cum/hr (CFM)	
12	Temperature control precision +/- °C	
13	Name of Manufacturer	
14	Year of manufacture	
15	Any design enhancement	

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

ADVANCED GRADER

#	Component: Advanced Grader	Description (<i>Refer sample datasheet</i>)
1	Produce	
2	Weight Sorting / Grading	
3	Colour Sorting / Grading	
4	Optical/Acoustic Diameter Grading	
5	IQS (Intelligent quality Sorting/Grading)	
6	Safety Precautions	
7	Output capacity (units/hr or tons/hr)	
8	Power consumption (kW)	
9	Name of manufacturer	
10	Year of manufacture	

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

STACKING SYSTEM

#	Component: Stacking System	Description (<i>Refer sample datasheet</i>)
A	Bins	
1	Name of Manufacturer	
2	Material of construction	
3	Load capacity (kgs)	
4	Storage volume (L x B x H)	
5	Stacking Height (metres)	
B	Pallets	
1	Material & working load (kgs/tons)	
2	Dimensions (L x B x H) mtrs	
3	No of cartons per pallet	
4	Type of access	
C	Racking System	
1	Name of Manufacturer	
2	Type of racking system	

#	Component: Stacking System	Description (Refer sample datasheet)
3	Design Overview of rack	
4	Material of construction	
5	No of tiers	
6	Net storage capacity (MT)	
7	Load bearing weight per position	

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

RETAIL SHELF

#	Component: Retail Shelf	Description (Refer sample datasheet)
1	Name of Manufacturer	
2	Type	
3	Produce to be handled	
4	Capacity (m ³)	
5	Dimension -floor area and height	
6	Electronics used (describe)	
7	Temperature Range	
8	RH control	
9	Lighting system (kW)	
10	Total Refrigeration capacity (kW)	
11	Refrigerant used	
12	Energy consumption (kW)	
13	Years in business in food retail	

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

ALTERNATE ENERGY OPTIONS

Solar Photo Voltaic

#	Component: Solar Photo Voltaic (SPV)	Description (Refer sample datasheet)
1	Name of Manufacturer	
2	Make and model no.	
3	Total shadow free area (m ²), total area occupied by PV panels (m ²)	
4	Total Load to be energized (kW and describe)	
5	Storage battery capacity (Ah)	
6	Battery Backup (hours)	
7	Grid interactive	
8	Energy generation (kWh)	
9	Grid Electricity Availability (hours)	
10	Total SPV Capacity (kW)	
11	Power of single PV panel (Watt) and total number of panels installed.	
12	Total array size (kW)	

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

Solar Thermal

#	Component: Solar Thermal	Description (refer sample data sheet)
1	Name of Manufacturer	
2	Make and Model No.	
3	Type of System	
4	Capacity (litres/day)	
5	Type of Tank Material and thickness	
6	Insulation material and thickness (mm)	
7	Heat Exchanger Available	
8	Total number of collector panels	
9	Dimension per collector panel (l x w)	
10	Total Area Covered (m ²) by collectors	
11	Open Loop/Closed Loop System	

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

Thermal Banks

#	Component: Thermal Banks	Description (refer sample data sheet)
1	Name of System provider	
2	Describe system design	
3	PCM material	
4	Phase change temperature (°C) and latent energy (kW)	
5	Application - describe use planned.	
6	Backup period (hours)	
7	Mass of PCM (kgs or tons)	
8	Total Thermal Energy Bank (kW)	
9	PCM encapsulation	
10	Time to fully Charge the PCM	
11	External energy input (describe and specifications)	

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

Vapour Absorption

#	Component: Vapour Absorption	Description <i>(refer sample datasheets)</i>
1	Name of Manufacturer	
2	Make and Model No.	
3	Capacity (kW)	
4	Refrigerant used	
5	Absorbent used	
6	Temperature of Chilled water (°C)	
7	Temperature of hot water (°C)	
8	Temperature of condensate (°C)	
9	Describe Heat Source & heat energy (kW)	
10	Inlet/outlet Pressure drop (kPa)	
11	Electrical Consumption	
12	Type of vapor absorption machine.	
13	System use (describe total load required and application of this system)	

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

REFRIGERATED TRANSPORT

#	Component: Refrigerated Transport	Description <i>(refer sample datasheets)</i>
A	Truck Details	
1	Chassis number	
2	Make and Engine Model	
3	Engine power (kW)	
4	Rated payload – carrying capacity of vehicle (tons)	
5	Outer dimensions of vehicle (L x B x H) m	
6	Cabin details	
7	Total number of tyres	
B	Insulated Container	
8	Manufacturer name	
9	Insulating material and cladding (thickness and U value)	
10	Internal / External Dimension of insulated box	
11	Flooring details	
12	Weight (kgs) of insulating box	
C	Refrigeration Unit	
13	Maker and Model number	
14	Refrigerant used	
15	Refrigeration capacity (kW)	
16	Defrosting system	
17	Air flow (cum/hr) and pattern	
18	Total power consumption (kW)	
19	Diesel/ electric auto-switching used	

#	Component: Refrigerated Transport	Description <i>(refer sample datasheets)</i>
D	Data logging / GPS	
20	Data loggers (nos and type)	
21	GPS (Maker and model)	

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

RIPENING CHAMBERS

#	Component: Ripening Chamber	Description <i>(refer sample datasheets)</i>
A	Capacity Details	
1	Holding Capacity (MT)	
2	Room Volume (m ³)	
3	Room Size (L x B x H) in meters	
4	Number of ripening rooms	
5	Peak ambient temperature	
B	Pallets	
6	Size (L x B x H) in mm	
7	Size of crate/box (mm)	
8	Crates/boxes per pallet	
9	Pallets in each chamber	
10	No. of tiers	
11	Pallet Lifting System	
C	Ripening Parameters	
12	Ripening room temp (°C)	
13	Relative Humidity (%)	
14	CO ₂ concentration (PPM)	
15	Ethylene concentration (PPM)	
16	Product incoming temp (°C)	
17	Pull down period (hours)	
18	Air flow (CMH)	
D	Insulation details	
19	Walls, ceiling and partition (material, U-value & thickness)	
20	Floor-Type (material, U-value and thickness of insulation)	
21	Exterior wall construction (material and type)	
E	Doors	
22	Size of door (L x W) mm	

#	Component: Ripening Chamber	Description (refer sample datasheets)
23	Type of door used	
24	Number of doors	
25	Emergency measures (alarm, exit system)	
26	Gasket	
F	Refrigeration load	
27	Estimated refrigeration load per chamber	
28	Total refrigeration load (k W)	
G	Refrigeration system	
29	Refrigerant used	
30	Refrigeration system	
31	Refrigeration capacity (kW)	
32	COP of refrigeration system	
33	Evaporator and condenser details	
34	Air flow(CFM)	
35	Static pressure(Pa) & fan rating (kW)	
36	Manufacturer name	
J	Ripening system	
37	Ethylene applicator (Maker name)	
38	Number of cylinders and capacity per cylinder	
39	Portable or Centralized	
40	Type of controller and Ethylene ppm range	
41	CO ₂ exhaust system	
42	Humidifier system details	
K	Others	
43	Lighting load (kW)	
44	Refrigeration load (kW)	
45	Total facility power consumption (kW)	

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

DOCUMENTS FOR REFERENCE

Various codes and Standards of measures are listed for reference here

Electrical: Bureau of Indian Standards (BIS)

#	Title	Reference
1.	PVC Insulated cables (light duty) for working voltage up to 1100 volts	IS 694-1977 Part I & II
2.	PVC Insulated cables (heavy duty) for working voltage up to 1100 volts	IS 1554-1976 Part-I
3.	PVC Insulated cables for voltage 3.3 KV to 11 KV	IS 1554-1976 Part-II
4.	Specification of Polyurethane insulated PVC sheeted heavy duty electrical cables, voltage not exceeding 1100 V	IS 5959-1970 Part-I
5.	Specification of Polyurethane insulated PVC sheeted heavy duty electrical cables, voltage 3.3 KV to 11 KV	IS 5959-1970 Part-II
6.	Guide for making of insulated conductors	IS 5578-1970
7.	Code of practice for installation and maintenance of paper insulated power cables	IS 1255-1967
8.	Code of practice for earthing	IS 3043-1966
9.	Guide of practice for installation and maintenance of induction motors	IS 5216-1969
10.	Code of practice for installation and maintenance of AC induction motor starters	IS 5214-1969
11.	Code of practice for installation and maintenance of AC induction motors	IS 900-1965
12.	Code of practice for installation and maintenance of switchgears	IS 372-1975
13.	Code of practice for installation and maintenance of transformers	IS 1886-1967
14.	Code of practice for electrical wiring installation, voltage not exceeding 650V	IS 732-1963
15.	Code of practice for electrical wiring installation (system voltage exceeding 650V)	IS 2274-1963
16.	Guide for testing three-phase induction Motor	IS 4029-1967
17.	Three Phase induction Motors	IS 325
18.	Electrical measuring instruments and there accessories	IS 248
19.	Current transformers	IS 2705
20.	Dimensions of slide rails of electric motors	IS 2968
21.	Flexible Steel conduits for electric wiring	IS 3480
22.	Air-Break Switches	IS 4064
23.	Motor Starters for voltage not exceeding 1000 Volts	IS 8544
24.	Conduits for electrical installation	IS 9537
25.	Selection, installation & maintenance of Transformers	IS 10028
26.	Selection, installation & maintenance of switch gear & control gear	IS 10118
27.	National Electrical Codes	SP: 30

Mechanical: Bureau of Indian Standards (BIS)

#	Title	Reference
1.	Safety codes for Mechanical Refrigeration	IS 660
2.	Code of practice for thermal insulation of cold storages	IS 661
3.	Code of practice for application of polyurethane insulation by in-situ pouring method	IS 13205
4.	Rigid phenolic foams for thermal insulation	IS 13204
5.	Application for spray applied insulation code of practice – Polyurethane / Poly-isocyanurate	IS 12432 Part-III
6.	Specifications for preformed rigid polyurethane (PUR) and poly isocyanurate (PIR) foams for thermal insulation	IS 12436
7.	Expanded polystyrene for thermal insulation	IS 4671
8.	Code for practice for fire safety of industrial buildings: General Storage and warehousing including cold storage	IS 3594
9.	Anhydrous ammonia	IS 662
10.	Industrial Bitumen	IS 702
11.	Gunmetal gate, globe and check valve for general purpose	IS 778
12.	Ball Valves including floats for water supply purposes	IS 1703
13.	Mild Steel Tubes, tubular and other wrought steel pipes fittings	IS 1239
14.	Steel Plates for pressure vessels used at moderate and low temperature	IS 2041
15.	Color code for identification of pipe lines	IS 2379
16.	V-belts for industrial purposes	IS 2494
17.	Hot dip galvanizing of iron and steel	IS 2629
18.	Code for unfired pressure vessels	IS 2825
19.	Glossary of terms for safety and relief valves	IS 3233
20.	Steel for pressure vessels and welded structures	IS 3503
21.	Steel tubes for mechanical and general engineering purposes	IS 3601
22.	Steel for general structural purposes	IS 2062
23.	Steel tubes for structural purposes	IS 1161
24.	Specifications for steel doors, windows and ventilators	IS 1038
25.	Code of practice for design loads (other than earthquake) for building and structures	IS 875 Part I to V
26.	Criteria for earthquake resistant design of Structures	IS 1893
27.	Specifications for cold formed light gauge structural steel sections	IS 811
28.	Code of practice for use of Steel Tubes in general building construction	IS 806
29.	Code of practice for use of cold form light gauge steel structural members in general building construction	IS 801
30.	Code of practice for general construction in steel	IS 800
31.	Glossary of terms used in refrigeration and air-conditioning	IS 3615
32.	Pressure and vacuum gauges	IS 3624
33.	Safety Codes for scaffolds and ladders	IS 3696
34.	Formed ends for tanks and pressure vessels	IS 4049
35.	Shell an tube type heat exchangers	IS 4503
36.	Code of safety for ammonia	IS 4544
37.	Expanded polystyrene for thermal insulation purposes	IS 4671
38.	Hot-dip Zinc coating on steel tubes	IS 4736
39.	Units and symbol for refrigeration	IS 4831
40.	HDPE pipes for potable water supplies, sewage and industrial effluents	IS 4984
41.	Gauge glasses	IS 5428

#	Title	Reference
42.	Specification for sprayed aluminum and zinc coating on iron and steel surfaces	IS 5905
43.	Steel Pipe flanges	IS 6392
44.	Injection molded HDPE fittings for portable water supplies	IS 8008
45.	Vertical steel ladders	IS 8172
46.	Treatment of water for industrial cooling systems	IS 8188
47.	Nominal sizes of valves	IS 9520
48.	Selection, use and maintenance of respiratory protective devices	IS 9623
49.	Polythene floats for ball valves	IS 9762
50.	General purpose ball valves	IS 9890
51.	SI units	IS 10005
52.	Recommendations for general pipeline welding	IS 10234
53.	Ammonia valves	IS 11132
54.	Finned type heat exchanger for room air conditioner	IS 11329
55.	Refrigeration oil separators	IS 11330
56.	MS tubes for vertical condenser	BS 3059
57.	Specification for metal air duct	IS 655
58.	Specification for galvanized steel sheet	IS 227
59.	Specifications for Performed Rigid Polyurethane	IS 12436 -1988
60.	Glossary of Terms used in Refrigeration& Air conditioning	IS 3615: 2007
61.	Code of Practice for Fire Safety of Ware housing including cold storages	As per Relevant IS specification
62.	Food Hygiene – General Principle – Code of Practice	IS 2491-1998
63.	Self-blasted lamps for general lighting service	IS 15111 Part 1 and 2

Publication by International Societies and Associations in relation to Building works

#	Title	Reference
1.	Building Code	IBC 2006
2.	Design Code	AISC 2005
3.	Tolerance Code	MBMA 2002
4.	Purlin Code	AISI 2001
5.	Welding Code	ANS 2006
6.	Wind Load & Seismic Load	IS 875 & IS A893-2002&Relevant Codes



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