

Technical Specification

Equipment Specifications for Walk in Freezer (40 Cum)

Clause	Description	Sub-clause	Technical Particulars
1	Description of Function and capacity	1.1	Walk in Freezer Rooms are required to store for long term duration of large quantity of vaccines at a temperature between (-) 25 deg to (-) 15 deg C. when measured under any loading condition between empty and full and over the full ambient temperature range of the required temperature zone
		1.2	Typical gross internal volume should be 40 cum
2	Operational Requirements	2.1	To be constructed of prefabricated, modular complete with floor and ceiling panels, mounted on a flat, solid concrete base.
		2.2	The cold room should be equipped with two completely independent refrigeration systems. One of these will remain as standby.
		2.3	Each refrigeration system must be provided with it respective separate : <ul style="list-style-type: none"> • condensing unit, • evaporator unit, • refrigeration unit, • electronic controls, • pipe work and • other necessary control instrumentation, to ensure proper operation of each respective refrigeration system.
		2.4	Provide additional control which permits simultaneous operation of both refrigeration systems in case of emergency.
		2.5	There should be manual & automatic switchover to the standby system by thermostatic or electrical control.
		2.6	There should be programmable automatic operational duty cycle for the switch over to the standby refrigeration system.
		2.7	Depending upon the internal room layout and the room location, refrigeration units may be one of the following types: <ul style="list-style-type: none"> • Wall-mounted with the condenser unit discharging inside the building that houses the cold room (monobloc system); • Wall-mounted with weatherproof condenser units located externally as close as possible to the evaporator units (weatherproof split system);

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			<ul style="list-style-type: none"> Wall-mounted with condenser units located in a separate ventilated enclosure mounted as close as possible to the evaporator units (split system).
3. Technical Specifications			
3.1	Internal Temperature:	3.1.1	(-) 15 deg to (-) 25 deg C adjustable (i) during 43 deg C continuous ambient (ii) 32 deg continuous ambient (iii) 45/05 deg C day/night cycling temperatures
3.2	Panels:	3.2.1	wall and roof panel skins can be made from stainless steel of Grade 304
		3.2.2	Outer and inner Panels: Powder coated, made of galvanized steel panels, double wall having minimum thickness 22 SWG each.
		3.2.3	Panels must be fully insulated and without internal structural members or stiffeners between the skins.
		3.2.4	Tongued and grooved joints between panels must be designed to minimize cold-bridging.
		3.2.5	Gaskets must be resistant to damage from oil, fats, water and detergents.
		3.2.6	After assembly, all joints must be mastic sealed on the interior side to ensure air-tightness.
		3.2.7	Roof panels with an overall length of 6 metres or less must be self-supporting.
		3.2.8	Modular panel-Easily assembled and dissembled.
		3.2.9	Double action cam-lock assembly/panel interlocking, for perfect seal.
		3.2.10	No screws or panel cover strips.
		3.2.11	Have airtight seals between condensing unit and wall.
		3.2.12	Have airtight seals around all pipe and cable penetrations through wall and/or roof panels.
		3.2.13	The room should be fitted with a pressure release vent which should open and allows enough outside air to enter and rebalance any pressure difference.
3.3	Insulation	3.3.1	CFC-Free Urethane foam or extruded polystyrene foam core bonded sandwiched between two galvanized steel sheets.
		3.3.2	Minimum thickness: 100 mm
		3.3.3	Density: not less than 40 kg/m ³
		3.3.4	Thermal conductivity of 0.17 w/m2k or better for hot zone climate.
		3.3.5	Thermal insulation foaming agents: Any gas complying with limitations and deadlines set by the Montreal Protocol on the elimination of ozone-depleting chemicals.
3.4	Flooring:	3.4.1	Base - 1st layer: 75 mm thick cement concrete (dimensions suitable to the size of cold room);

Clause	Description	Sub-clause	Technical Particulars
		3.4.2	2nd layer of specified insulation as specified in para 3.3 <ul style="list-style-type: none"> Extruded polystyrene slabs laid with the joints staggered to achieve a 'U' value of 0.17 W/m.K or better. 250 micron polythene vapor barrier. Reinforced granolithic concrete topping trowel led smooth.
		3.4.3	3rd layer of 6mm (minimum) non-slip finish Aluminium checker plate.
		3.4.4	The floor should be capable to support load of 1500 kg/m ² .
		3.4.5	Concrete floors must be designed and constructed to allow Shallow ramped access entry to the cold room or freezer room.
		3.5	Door
		3.5.2	Plastic curtains on the door way.
		3.5.3	Door should be flush type with kick plate at bottom and fitted with door closer.
		5.4	Examination Window (View port).
		3.5.5	Seal closer mechanism which cushions the closing movement of the door, shuts the door silently and keeps it seal-closed preventing loss of cooling.
		3.5.6	An incandescent vapour-proof light mounted on the interior of the vaccine chamber.
		3.5.7	Dimensions: 34" to 40" (W) x72" to 80" (H).
		3.5.8	Additional alarm switch to be fitted inside the cold room close to the door latch.
3.6	Lighting	3.6.1	Internal ceiling-mounted low energy fluorescent or LED luminaries with an external switch with pilot light.
		3.6.2	The external light and light switch must be fixed to the wall of the cold room enclosure near to the entrance door.
		3.6.3	The minimum illumination level on the vertical face of the lowest shelves must be 150 lux.
		3.6.4	The lighting should be evenly distributed inside the cold room.
3.7	Refrigeration System:	3.7.1	Dual Refrigeration system (100% standby)
		3.7.2	The refrigeration system should have 5.5 to 6.0 KW compressor for 40 Cum Walk-in-Freezers.
		3.7.3	Cooled refrigeration units, preferably Mono-block type.
		3.7.4	Automating defrosting (electric or hot gas)
		3.7.5	CFC-free refrigerant.
		3.7.6	Tropicalized units suitable for ambient temperature up to 45 deg C.

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		3.7.7	In case of a split system, the condensing Unit should be mounted in a weather proof enclosure with proper canopy so as to get protection from rain and hard weather and prevent any vandalism or injury to people upon accidental access.
		3.7.8	Condensing unit (s) to comprise compressor with: (a) Forced air condenser, (b) Oil level glass, (c) Oil separator, (d) liquid receiver to carry full charge, (e) Filter/dryer with flare connections, (f) Isolating stop valves. (g) Fixed high and low pressure dial gauges. (h) Fitted with high and low pressure cut-outs, (i) Time-operated electric defrost control (j) It should have run hour meter. (k) Where cold climate freeze prevention is specified provide a low temperature protection system to prevent the temperature of the cold room dropping below +2°C under low ambient conditions.
3.8	Evaporator:	3.8.1	Evaporators to be forced air, wall or - ceiling-mounted units with a condenser unit discharging inside the building that houses the cold room.
		3.8.2	There must be a timer operated electric defrosting system and a condensate drip tray and drain connection.
		3.8.3	Size and position the evaporator units so that the plume of discharged air at a temperature below +2°C does not reach areas where vaccine is stored. If necessary provide a removable mesh cage or deflector shield around the evaporator so as to maintain the safe storage zone.
4.	Temperature Control , monitoring & Recording:		
4.1	Temperature Control	4.1.1	Room temperature must be controlled by a thermostat within the tolerances specified.
		4.1.2	The thermostat must be calibrated to ITS-90 and be accurate to ± 0.5°C or better.
		4.1.3	All parts of the room designated for vaccine storage must remain between (-) 15°C to (-) 25°C when measured under any loading condition between empty and full and over the full ambient temperature range of the required temperature zone.
		4.1.4	The control supply relay carrying the compressor running current should be rated twice the running current, or provide additional contactor to be provided in the control circuit to sustain the running current, without causing overheating of the control boards.

Clause	Description	Sub-clause	Technical Particulars
4.2	Temperature Monitoring and recording	4.2.1	Provide a digital temperature recording system with display controlling indicating logging facility : for example • _A programmable electronic temperature and event data logger system with minimum 10000 data storage capacity, auto-dialler complying with PQS E006/TR03 linked to the alarm system.
		4.2.2	Wall mounted seven days graphic temperature recorder not using thermal paper.
		4.2.3	Provide a backup gas or vapour pressure dial thermometer complying with PQS E006/TH02, mounted on the wall of the cold room in an accessible position.
4.3	Alarm & Buzzer	4.3.1	Provide a mains-operated audible and visible loud alarm with battery backup and automatic recharge, which is triggered in the event of mains failure or when the cold room temperatures are outside set limits.
		4.3.2	In case of a triggered event, the acoustic alarm unit must comply as per specification WHO/PQS/E06/AL01-01 or with E006/TR03
		4.3.3	Alarm sounders are to be located adjacent to the cold room.
		4.3.4	Buzzer system : Visual indicator along with buzzer alarm system should be provided to alert the user in the following events : (a) Power failure alarm (b) High pressure (dirty condenser) alarm (c) Open door alarm (d) Probe failure alarm
		4.3.5	It should have back-up battery for control its panel
5.0	Storage Condition	5.1	Storage conditions to be maintained at (-) 20 deg C \pm 5 deg C continuously, control by thermostat on each cold room.
6.0	Shelves	6.1	Cold room(s) to be fitted with locally made/manufactured, running height adjustable perforated shelves (slotted shelves will be preferred)
		6.2	600 mm wide at 600 mm spacing;
		6.3	Four shelves above the ground all around the wall and intermediate shelves should be placed suitably.
		6.4	The total area covered by shelves should be at least 42% of the ground area.
		6.5	There should be a minimum 900 mm distance in between two intermediate racks, to facilitate the movement of men and material.
		6.6	The final drawing of the room with shelves will have to be got approved from the authorities after placement of NOA.
		6.7	The material of the shelves should be non corrosive 304 grade stainless steel to take load of at least 0.075kg/cm ² .
		6.8	The top face of the lowest shelf must be mounted 200 mm

Clause	Description	Sub-clause	Technical Particulars
			above the floor.
		6.9	Shelving must be washable.
7.0	System Configuration Accessories, spares and consumables	7.1	Recommended Spare parts kit for maintenance, repairs and replacement should be quoted. The quote should include the following components in each kit: (a) Evaporator/condenser fan motor; (b) Compressor; (c) capacitor; (d) contactor; (e) auxiliary relay; (f) defrost timer; (g) dual pressure switch; (h) thermostat; (i) drier; (j) control switch; (k) fuse, (l) automatic transformer; (m) high pressure switch and any other recommended item.
8.0	Environmental factors	8.1	The unit shall be capable of operating continuously in ambient temperature of 5 to 45°C and relative humidity of 95%
9.0	Installation:	9.1	Complete installation, testing and commissioning is to be done by the supplier inclusive of: (a) Installation of stabilizer, (b) Drainage system (c) Assembly of the panels (d) Refrigerator units, (e) Data logger (f) Adequate smoke evacuation system, Generator, including all civil, electrical as per CPCB. (g) All other related work required for installation as per WHO PQS and guidelines. (ii) Separate earthing must be provided respectively for Genset and WIC
10.0	Power Supply	10.1	Power input: 220-240V/ 50 Hz AC Single phase or 380-400V AC 50 Hz, three phase.
		10.2	Fitted with ISI marked, 15 ampere, Indian M-plugs and sockets.
		10.3	Diesel Generating set of 15 KVA should be supplied as per specifications enclosed (ANNEXURE-1)
		10.4	Suitable automatic voltage regulator/stabilizer meeting IS 9815, IEC 60335-1 & IEC 60364-1 specifications should be supplied.
		10.5	Broad Specifications are as enclosed (ANNEXURE-2):
		10.6	Voltage regulator should have capacity to take load of both refrigeration units (main as well as standby).

Clause	Description	Sub-clause	Technical Particulars
11	Standards, Safety and Training	11.1	Electrical and refrigeration components and the panels should have:
		11.2	National or international approvals like UL, IEC 60335 -1 2006
		11.3	Safety of household & similar electrical appliances. / IEC 60364-1,/ ISO 20282-1:2006
		11.4	Ease of operation of every day products ,/ Electrical safety rating: meet IEC 60335-1, IEC 60364-1- Voltage, frequency & phasing: single phase, three-phase - voltage stabilizers and surge protections.
		11.5	All operational and maintenance training by trained personal of manufacturer to the end users after successful installation and commissioning.
12	Warranty:	12.1	Provide commitment for Comprehensive warranty for 5 years including consumables.
		12.2	Provide commitment and quote for Comprehensive Maintenance Contract (CMC) for 2 years after the 5 years under and
		12.3	Guarantee for availability of spares for 10 years after warrantee.
13	After Sales Service:	13.1	Should have local / regional authorized service facility.
		13.2	The service provider should have the necessary equipments and spares recommended by the manufacturer to carry out preventive maintenance and repair as per guidelines provided in the service/maintenance manual.
14	On-site maintenance:	14.1	All minor repairs should be attended to and completed within 24 hours of the intimation.
		14.2	Any major break down (e.g. compressor failure, gas leakage, control paned burn-out) must be attended to and put back into functional condition within seven days following first intimation.
		14.3	If both refrigeration system have failed, at least one refrigeration system must be repaired or replaced within 24 hrs.
15.0	Documentation: Certification and Manuals	15.1	Test certificate of inspection should be submitted along with the techno-commercial bid for: (a) Cool down time, (b) Running test and (c) Hold over time, as per WHO quality Assurance Protocol WHO/PQS/E001/CR-FR01-VP2 of any capacity from an independent laboratory approved /recognized by WHO/UNICEF/National Accreditation board/STQC lab is essential.
		15.2	Separate Certificate of inspection for tendered item from an independent laboratory approved/recognized by WHO/UNICEF/National Accreditation Board/ STQC

Clause	Description	Sub-clause	Technical Particulars
			Labs or third party inspection agency as mentioned in the NOA is essential and is required to be submitted at the time of delivery.
		15.3	List of important spare parts, and accessories with their part number and costing.
16	Installation instructions:	16.1	Provide a comprehensive, illustrated (including all wiring diagrams) with step-by-step installation manual suitable for use by the installer, covering the unpacking, assembly, testing and commissioning of all the system components, including safe working procedures to be observed.
		16.2	The manual must be supplied in triplicate - one copy for the employer, one for the installer and one for the maintenance contractor.
17	Service instructions:	17.1	Provide a comprehensive, illustrated service and workshop manual, suitable for use by the maintenance contractor, covering all the system components, including safe working procedures to be observed.
		17.2	The manual must be supplied in duplicate - one copy for the employer and one for the maintenance contractor.
18	User instructions:	18.1	Provide a comprehensive, illustrated maintenance manual suitable for the user and covering all aspects of safe operation and routine non-specialist maintenance of the cold room.
		18.2	The manual must be supplied in duplicate - one copy for the employer and one for the maintenance contractor.
		18.3	Log book with instruction for daily, weekly, monthly and quarterly maintenance checklist.
19.0	Post commissioning certifications:	19.1	Test certificate of inspection for all test, as per WHO quality Assurance Protocol WHO/PQS/E001/CR-FR01-VP2 of installed cold room from an independent laboratory approved /recognized by WHO/UNICEF/National Accreditation board/STQC lab or third party inspection agency specified in the NOA after installation and commissioning of cold room to be submitted along with Final Acceptance Certificate.

ANNEXURE-1

Diesel Generating set

1 Description of Function and capacity

- 1.1 The cold room are typically connected to a standby DG set as a power backup.
- 1.2 It should be automatically switched ON as soon as there is grid power failure and switched OFF as soon as the grid power is returned back.
- 1.3 The capacity of the DG set should be as per the para no. 6.2 of technical specifications of WIC

2 Detailed Specification for alternator, diesel engine and Automatic Mains Failure (AMF) control panels :

2.1 Alternator :

2.1.1 The Alternator shall be self excited and self regulated of specified KVA rating in single/three phase at 240/415 Volt, 50 Hz, 1500 RPM and 0.8 power factor (PF) and shall conform to IS:13364 (Part 1):1992 (reaffirmed 2003) . The alternators shall be of brush less type with VG-1 Grade or better grade of voltage regulation.

2.1.2 The alternators shall be screen-protected drip proof with Minimum IP-21 degree of protection as per IS:4691/85. The class of insulation of the Alternator would be 'H'. The rated voltage of Alternator will be 240V for single phase & 415 V for three phase.

2.2 Diesel Engine (Naturally Aspirated):

2.2.1 Diesel Engine shall be air or water cooled as specified, electric start developing required B.H.P at 1500 RPM with Class A-2 Governing or better for alternator to deliver specified continuous KVA output at 0.8 pf LAG at NTP conditions (all rating shall be tested at 0.8 PF lag). The Diesel Engine should be capable of providing 10% overload for one hour for every 11 hours continuous running at full load.

2.2.2 Naturally aspirated engines of rating upto and including 20 KW shall be ISI MARKED as per IS:10001/1981 (re-affirmed 2006).

2.2.3 The specific fuel consumption of engine shall be as per IS specification.

2.2.4 The Diesel Engine shall be complete with the following accessories:

2.2.4.1 Fuel tank with capacity for 72 hours continuous running at full load.

2.2.4.2 Engine instrument Panel consisting of starting switch with Key, Lube Oil temperature and pressure gauges, (water temperature gauge in case of water cooled engines), RPM indicator and hour meter.

2.2.4.3 Safety controls to shut down the engine in the event of low lube oil pressure or high cylinder head temperature in case of air-cooled engines or high water temperature in case of water-cooled engines.

2.2.4.4 Radiators in case of water-cooled engines.

2.2.4.5 Exhaust silencer of Residential type.

2.2.4.6 12V starting system complete with starter motor, charging alternator and Cut-out.

2.2.4.7 Lead Acid Battery or semi maintenance free battery of suitable ratings with connecting cables and the battery/ies shall conform to relevant IS Specification (define IS no.) .

2.2.4.8 Standard set of tools required for service and maintenance of the DG set shall be provided to the consignees along with each DG set.

3 AMF Control Panel :

- 3.1 Automatic mains failure (AMF) control panel, shall start up the DG set and take the load in case of the mains failure without requiring any human intervention.
- 3.2 Similarly on return of mains supply, the AMF control unit shall transfer the load back to mains supply and switch off the DG set automatically.
- 3.3 The AMF panel shall be enclosed with the IP-53 degree of protection conforming to IS/IEC 60947 (Pt-1)/2004, fabricated from minimum 1.5 mm thick steel sheet duly pre-treated and aesthetically finished.
- 3.4 The AMF Control Panel shall have the following components :
 - 3.4.1 Microprocessor based relay with composite meter for digital display / components :
 - 3.4.1.1 Generator voltage/AC Mains voltage.
 - 3.4.1.2 Generator Current.
 - 3.4.1.3 Power Factor.
 - 3.4.1.4 Frequency
 - 3.4.1.5 Energy
 - 3.4.1.6 Three attempts engine start/engine cranking relay.
 - 3.4.1.7 On -delay timer for load change over
 - 3.4.1.8 On-delay timer for engine shut off
 - 3.4.1.9 Over current relay.
 - 3.4.1.10 Mode selector switch for setting the panel on any one position such as off or auto or manual or test.
 - 3.4.1.11 Engine On-Off switch (Push button type)
 - 3.4.1.12 MCCB of suitable rating shall be provided.
 - 3.4.1.13 Rectangular aluminium bus bars (one number for each phase, neutral and Earthing terminal) of adequate ratings duly colour coded with heat shrinkable PVC sleeves.
 - 4.3.1.14 Two contactors of suitable rating (one for DG set & one for AC mains) with over load relay.
 - 4.3.1.15 Under-voltage relay for mains.
 - 4.3.1.16 Battery charger complete with voltage regulator, float or booster selector switch, on-off switch, voltmeter and ammeter for charging the battery from mains. (This will be in addition to the battery charging alternator fitted on the engine).

5 Instrument & Control Fuses.

- 5.1 Five number indicating lamps to indicate 'mains ON', 'load on mains', 'set running', 'load on set' and 'battery charger on'.
- 5.2 Audio visual alarm for:
 - 'Low lubricating oil pressure',
 - 'High water temperature'(for water cooled),
 - 'High cylinder head temperature'(for air cooled)
- 5.3 Start failure' and 'DG over load'.
- 5.4 Any other switch, instrument, relay or contactor etc. essential for smooth and trouble free functioning of DG set with AMF panel. (To be specified by the tenderers in their offer with complete details of the item).

6 Type test certificate

- 7 Supplier shall furnish complete & satisfactory Type Test Certificate (TTC) for engines, alternators complete with enclosure to be used by them for EACH rating of DG sets clearly indicating make, model and ratings of the DG sets tested at the time of registration and pre-dispatch inspection.
- 7.1 The TTC of three phase alternators shall cover 'unbalanced load test' as per cl.24 of IS:13364(part-1 or part-2)/1992 as applicable. However all the engine models /ratings shall need relevant certifications as per norms.
- 7.2 Either of the following types of TTC shall be acceptable:
- 7.3 Type Test Certificate issued by recognized Government Lab. irrespective of whether engines and alternators were tested at firm's lab or some other lab, but witnessed by Government representative.
- 7.4 Type Test Certificate issued by BIS, irrespective of engines and alternators were tested at firm's lab or some other lab, but witnessed by BIS/ Government representative.
- 7.5 Type Test Certificate issued by DQA on basis of test conducted at manufacturer's lab in presence of DQA officers.
- 7.6 The testing of diesel generating sets, for all ratings, shall be done at 0.8 PF
- 7.7 Testing shall be done at continuous power output for each rating.
- 7.8 Necessary gauge/meters shall be fitted to indicate (a) the quantity of fuel left in the fuel tank, and (b) hours of DG set operation.
- 8 DG Sets shall be provided with integrated acoustic enclosure which shall conform to norms of Central Pollution Control Board (CPCB).
- 8.1 The acoustic enclosure offered shall conform to the drawings type approved by Govt lab, for

conformity to noise norms. This aspect shall also be verified at the time of inspection.

- 8.2 DG sets shall meet the requirements of Environmental(Protection) Rules 1986 as laid down by Min. of Environment & Forests read with GSR 371 (E) dated 17.5.2002, GSR 520(E) dated 01.7.2003 and No.448 (E)dated 12.07.2004 in respect of noise and emission norms. DG sets shall also meet all other statutory requirements as notified by Govt. from time to time.
- 9 Supplier shall furnish following documents issued by a Govt authorized agency at the time of registration and pre-dispatch inspection:
 - 9.1 Type approval certificate (TAC) for emission norms for each model/family of Engine.
 - 9.2 TAC from for noise level norms EACH model of DG set.
 - 9.3 COP for each model of DG set and engine used in DG set.
- 10 Scope of supply shall include supply and commissioning of the complete DG set at the consignee's end but shall exclude installation and erection.
- 11 Documentation :
 - 11.1 User's manual,
 - 11.2 Service manual
 - 11.3 List of minimum spares
 - 11.4 Installation instruction
- 12 Warrantee:
 - 12.1 Provide 2 years of warrantee.
 - 12.2 Guarantee for availability of spares for 10 years after warrantee.

ANNEXURE-2

Servo Voltage Stabilizer

1. Description and capacity of Equipment:

- 1.1 Voltage stabilization and surge protection is required for protecting the refrigeration units against any short or long voltage fluctuations. .
- 1.2 The stabilizer should meet the requirements of the different electrical components of the cold room.
- 1.3 Capacity as per para 6.3 of specifications of cold room.
- 1.4 All the components used in the assembly of line voltage correctors shall conform to relevant IS specification (specify IS no.) .
- 1.5 Tenderers shall indicate make and specification of main components in their offer.
- 1.6 Servo Motor operated line voltage corrector is a safety/difficult item. As such the firm registered with NSIC are required to get their capacity assessment report from the concerned DQA.

2 Specification :

2.1 Servo Motor operated automatic line voltage correctors (LVC), copper wound Indoor type, continuous duty, conforming to IS: 9815(Pt.1)/1994 (Reaffirmed 2004) suitable for phase Voltage of 160-260 Volts.

2.2 Three phase line voltage correctors shall comprise of three single phase line voltage correctors, conforming to IS: 9815 (Pt.1)/1994 (Reaffirmed 2004), connected in star and enclosed in a single enclosure with common control panel and shall be suitable for unbalance input voltage.

2.3 Rated output voltage shall be 240V for single phase LVC and 415V for three phase LCV respectively.

3 Documentation :

3.1 User's manual,

3.2 Service manual

3.3 List of minimum spares

3.4 Installation instruction

4. Warrantee:

4.1 Provide 2 years of warrantee.

4.2 Guarantee for availability of spares for 10 years after warrantee.

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