

“Technical Specification of ISO certified Bulk Milk Chilling Units of  
10000LTR Capacity”

Submitted by

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This chapter deals with the detailed specifications of items proposed in the scope of supply.

[FUNCTIONAL REQUIREMENTS](#)

The Bulk cooling units shall be used to cool raw milk at the village level co-operative milk societies from the ambient temperature to 4 degree centigrade in conformity to specified ISO 5708 2A II standard.

The cooling tank shall be used for immediately cooling the milk after milking so as to conserve the quality of milk and check the growth of microorganisms. It is intended for daily collection of milk. It is a hygienic container built to sanitary standards, which

besides cooling also serves as buffer storage prior to transfer of milk for onwards transportation for further processing.

Two milking system has been configured such that volume of each milking is as under:

- i) Milking in the morning (up to 10 AM) - 50 %
- ii) Milking in the evening - 50 %

The agitator provided in the cooling tank works intermittently and at a very gentle speed to avoid damage to the fat globules of milk. The agitator works only at temperatures below 20-25 ° C so as to conserve butter fat structure.

#### TECHNICAL DATA

The bulk cooling tanks are built to ISO 5708 standard with categorization under Type 2AII.

#### A) BULK MILK COOLER AT DCS- CAPACITY 500L TO 10000L BULK MILK STORAGE TANK AND REFRIGERATION CONTROL PANEL

##### 1.0 Bulk Milk Cooler with Cover and Standard Accessories

##### 1.1 Horizontal rectangular tank of capacity 300L 500L, 1000L & 2000L shall be supplied. (OPEN TYPE)



Tank inner, outer, bottom dimpled jacket and top open able cover shall be fabricated from Stainless Steel AISI 304 material and welded with TIG process. The inner shell and all other product contact surface shall be polished up to minimum 150 grits. The outer and inner surface shall be polished with circle finish.

The tank shall be complete with following:

- Top un-insulated cover with locking arrangement, inspection window, provision for agitator mounting and specially configured milk inlet. The top cover shall be hinged with a rugged arrangement comprising oil filled cylinders and

mechanical springs to facilitate complete opening of tank cover for inspection and tank cleaning. A proper lifting handle in SS 304 construction is provided.

- Milk inlet complete with specially designed funnel terminating in no foam inlet arrangement with SS fine wire mesh.
- Outlets complete with specially designed lockable butter fly valve size 51mm and terminating in proper end connection with blank union.
- The insulation of the tank shall be done by injection, in situ, of high-density (minimum 40 kg/m<sup>3</sup>, CFC free and environmental friendly) polyurethane foam without having any imperfection and hygroscopicity. The efficiency of insulation is confirmed as per the requirement of ISO 5708 2A II (latest version) when the refrigeration unit is not working.

Ball feet specially made to prevent tempering, which could result in erratic measurement.

Agitator in SS 304 construction complete with direct mount specially designed motor. The agitator is designed for producing uniform distribution of fat in milk.

## 1.2 Bulk Milk Storage Tank

Horizontal Closed Cylindrical tank of capacity 3000L, 5000L & 10000L shall be supplied.



Tank inner, outer, bottom dimpled jacket shall be fabricated from Stainless Steel AISI 304 material and welded with TIG process. The inner shell and all other product contact surface shall be polished up to minimum 150 grit finish.

The tank shall be complete with following:

- Top manhole cover with locking arrangement for inspection in SS 304 construction is provided.
- Milk inlet complete with specially designed no foam inlet arrangement for easy cleaning.
- Outlet complete with specially designed lockable butter fly valve size 51mm and terminating in proper end connection & blank union.

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- The insulation of the tank shall be done by injection, in situ, of high-density (minimum 40 kg/m<sup>3</sup>, CFC free and environmental friendly) polyurethane foam without having any imperfection and hygroscopicity. The efficiency of insulation is confirmed as per the requirement of ISO 5708 2A II (latest version) when the refrigeration unit is not working.
- Ball feet specially made to prevent tempering, which could result in erratic measurement.
- Agitator in SS 304 construction complete with direct mount specially designed motor. The agitator is designed for producing uniform distribution of fat in milk.

## 2.0 Refrigeration Unit

The refrigeration system is designed for operation on R404A for Reciprocating/ scroll compressors. The condensing units shall meet the latest safety standards.

The refrigeration system is designed with Single condensing unit for cap: 500L & 1000L & twin condensing units for Cap: 2000L, 3000L, 5000L & 10000L. The total evaporator circuit is divided in two segments and each segment is connected to an independent condensing unit in case of twin condensing unit. The condensing units shall operate on single phase for BMC Cap: 0.5KL, 1KL & 2KL and three-phase electric supply for capacity 3KL, 5KL & 10KL and each condensing unit shall comprise of the following:

- 2.1 **Compressor** - Hermetically sealed reciprocating/Scroll compressor complete with drive motor. The motor is fully enclosed suitable for specified electrical supply. It is confirmed that the hermetic is provided with thermister temperature sensor for protection against excess heating due to over loading and short-circuiting.

We shall also given optional to supply Scroll Condensing unit for the better efficiency and lower power consumption.

- 2.2 **Condenser** - Air-cooled, screen protected compact condenser unit comprising of finned condenser coils in several rows. Condenser fans of reputed make are fitted for the duty. The air circulation fans shall be induced draft type that will ensure blowing the air from inside to outside thereby making the system suitable for dusty and dry areas.

- 2.3 **Receiver** - A suitable size liquid receiver is included in the circuit of each condensing unit that would hold the refrigerant during maintenance and otherwise during the pump down cycle at the end of operation.

- 2.4 **Thermostatic Expansion Valve** - A thermostatic expansion valve shall be maximum operating pressure (MOP) type to ensure optimum quantity of refrigerant to the evaporator. It shall be ECTL make with suitably sized orifice if ECTL condensing units are considered and Danfoss Make if Danfoss condensing units are considered.

- 2.5 **Evaporator** - The evaporator shall be dimpled pressed plate jacket put at the bottom plate of the inner tank. The total evaporator area is divided and separated in to two sections and each section shall be operated by one condensing unit. All connecting

pipes terminating outside the tank are of stainless steel construction. **Our evaporator plate is laser welded for all capacity bulk milk cooling tank.**

**2.6 Refrigerant Pipes & Fittings and Controls** – Compressors are provided with isolation valves to ease the maintenance. Copper/SS tubing for refrigerant shall be properly laid to facilitate attending the leakage if occurred during operation without dismantling the total system. All pipes are properly clamped on fixed support and sponge insulated for protection.

### **3.0 ELECTRICAL CONTROL PANEL**

Two control panels namely

- 1) Refrigeration control panel
- 2) Milk tank control panel are included in the scope.

Refrigeration control panel and milk tank control panels and the main control panel shall be conforming to following specifications:

#### **3.1 Refrigeration Control Panel:**

One number control panel in dust and vermin proof design in stainless steel enclosure suitable for mounting on the wall is included. The panel is pre wired to terminal connections and shall comprise of the following:

- In coming MCB to receive power from main control panel (In stabilizer)
- Line voltage controller to guard the compressor against voltage supply fluctuation

Sequential controller with timer delay arrangement to avoid surge on power supply

- Selector switch for auto/manual mode of operation
- One number Switchgear i.e. contactors and overload relay for the motor of compressor, condenser and agitator.

#### **3.2 Milk Tank Control Panel**

This panel shall be mounted on the bulk milk storage tank together with refrigeration control panel. It is a pre manufactured control panel in SS 304 construction in dust and vermin proof design comprising the following:

- Digital Temperature Indicator and display range (0 to 100 Deg. C)
- Selector facility for selecting operation of agitator and compressors on auto or manual arrangement.

#### **3.3 Cables & Electrical Switch Gears**

The electrical switchgears as required are included in the control panels mentioned above. All power and control cabling between Main Control Panel, Refrigeration Panel and milk panel shall be flexible un-armoured, wherever laid through conduits. The conduits shall be heavy duty PVC type.

### 3.4 Tool Box and Operation Manual

A GI Sheet toolbox containing one set of all necessary tools required for regular maintenance of the unit shall be supplied along with the BMC.

Two set of operation & maintenance manual in Hindi and English containing complete details of starting, putting off, critical checks and day-to-day maintenance of the complete system shall be supplied. The manual shall also have the required electrical circuit diagrams.

### Power Connection Require.

**40 K.W / 50 H.P**

### ANNEXURE - II TECHNICAL DATASHEET FOR BMC

Sr.		10000L
No.	Description	(Three Phase)
		Closed Type
A.	MILK TANK	
1	Capacity - Rated /Gross	10000/11000 Ltr.
2	Make and model	AVIVA-10 KL
3	Material used for construction (SS304/316)	AISI-304
4	Shape	Horizontal/Cylindrical
	Orientation	Closed Type
5	Overall dimensions (without CDU) (LXWXH)	4134x2300x2732
6	Weight (with CDU)	1225 Kg
7	No. and RPM of agitators	2 no. /25
8	CIP facility	Using Spray Ball (facilities for cleaning in place shall be provided which include CIP spray balls & SS Piping from balance tank through milk pump to BMC and back to balance tank.)
9	Thickness of Inner shell	2.0mm
10	Thickness of outer shell	1.6mm
11	Insulation:	
	Type	In-situ injected PUF

	Thickness	50 mm
	Density	40Kg/m <sup>3</sup>
	Efficiency	As per standard
12	Facility to measure milk volume	SS Dip stick with calibrated chart / Load Cell
<b>B</b>	<b>Refrigeration unit(Emerson)*</b>	
1	Make of compressor	Emerson/DANFOS
	Type of compressor	Hermetically sealed Scroll
	Model of compressor	ZB48KQ x 4/MLZ
	Size of compressor	5.5 TR x 4
3	Make of condenser	Emerson/Shree/VINAYAK
	Type of condenser	Air cooled
3	No. of compressor	Four
4	Cooling capacity of compressor at 0 deg evaporating and 50deg condensing temp.(Kcal/Hr)	12583 X 4
5	Number of fans	8
6	Receiver size & capacity	6 Kg. X 4
7	Thermostatic Exp. Valve	Danfoss/Emerson, MOP/Renutrol
8	Overall Dimension of cond. unit (mm)	1358W x 770L x 742 H
9	Type of refrigerant	R404a/ R22
<b>C</b>	<b>DESIGN PARAMETERS</b>	
1	Ambient temp. considered for design	43°C
2	Maximum cooling time for	
	All Milking	3.0 hrs
	Second Milking	1.5 hrs
3	Temperature range considered for	
	All Milking	35 to 4°C
	Second Milking	10 to 4°C
4	Safe Operating Temp	50°C
<b>E</b>	<b>ELECTRICALS</b>	
1	Connected load	

	Compressors (EMERSON-Scroll)	5.2 KW x 4
	Condenser fans	180W x 8
	Agitator(s)	230W x 2
	Milk Pump	2238W

### ANNEXURE – III

#### BATTERY LIMITS AND EXCLUSIONS BATTERY LIMITS

RAW MILK - At maximum temperature of 35°C shall be made available at the Balance tank by Society.

ELECTRICAL POWER – Three Phase Stabilized electrical powers including earthing shall be made available at the incoming feeder of Main Control Panel.

CHILLED MILK – 'Aviva' shall the chilled milk at the outlet of bulk milk cooler at 4 deg. C temperatures. Client/Union will connect the milk pump and hose pipe available on the Road Milk Tanker to the outlet of bulk cooling tank and unload milk.

CIP – Client/Union shall provide CIP solution at the CIP Solution at the balance tank in case of Close Type BMC.

#### EXCLUSIONS:-

- All types of civil works including grouting of skid and level floor with drains, grouting of supports, etc. The site preparation is excluded from our scope.
- Milk Unloading hose and the Road Milk Tanker pump with its electrical connection cable and starter is excluded. 'Aviva' would provide a socket at a convenient point to enable connecting the power supply for the tanker unloading pump.
- Main Control Panel with Servo Voltage stabilizer and Dg set are not included in scope of supply.
- Only first charge of refrigerant R - 22 and oil for cooling tank is included in our scope. Any additional charge of oil and refrigerant if subsequently required shall be provided by Client.





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- The HT & LT power cables are excluded from the scope of supply.
- All types of consumables process water, electrical power; raw milk, etc. shall be arranged by client.
- Approval of local statutory authorities including NOC from GEB. 'Aviva' shall provide all necessary documentation as may be required.
- Any other item not specified in our offer.

Yours truly,

For, Aviva Equipments Pvt. Ltd.



Bharat Shah  
Managing Director