Pressure Vessel for sCO2

The pressure vessel is expected to store liquid CO2 at a maximum pressure of 100 bar and at a minimum temperature of 5^0 C. The purpose of this vessel is expected to act a **phase separator** to be able to supply liquid CO2 to the downstream pump. it can expect a maximum withdrawal liquid flowrate of 0.05kg/s while there might be a 30% volume fraction of uncondensed vapour of CO2 might exist in the feed line. The unit is intended to supply only liquid CO2 to the downstream high pressure pump while the input to the unit is coming from a condenser. The output line shall be from the bottom of the vessel. The unit is expected to have a rupture disc for burst protection and a self-regulating valve for maintaining the pressure within 100bar. It should have the provision for venting CO2 out during the restart operation for depressurizing the system. The unit shall have digital level sensor whose output should be monitored through the system. The vessel should also have the pressure and temperature sensors embedded in it whose output also must be data logged. The vessel should have proper insulation to minimize the losses to ambient. The maximum ambient temperature expected is 42^0 C. The make shall be of SS316L material complying with ASME codes of standard pressure vessel manufacturing.

System Requirements

Parameter	
Pressure	100 bar
Temperature	Min of 5 deg C
Equipment Make	SS316 L
Pressure Sensor	In-built range 150 bar
Pressure Safety Valve	100 bar capacity
Temperature	RTD $\pm$ 0.1 deg C accuracy
Liquid Level	Digital with RS232/485 connection
Self-Regulating Valve	Made of SS316Lbody for maximum of 300 bar pressure
Vapour volume	Maximum 30% of the liquid volume
Total Vessel Capacity	To be designed as a phase separator by Vendor
Inlet Feed line	1” inch BSP (above the liquid level)
Output Line	1” inch BSP (from the bottom)
Drain Line	1” inch BSP
Insulation	Outer walls to be covered to maintain temperature 5 deg C
Sight Glass	No
Wall Thickness	Meeting ASME codes

Liquid Residence Time	15 mins
Withdrawal liquid rate	0.05 kg/s
Fluid Properties	Use Refprop of NIST database (https://www.nist.gov/srd/refprop)

Electrical Requirement

Voltage	220 to 240 V
Current	15 amps / 3 Phase supply

General conditions:

1. Please quote for 6 months warranty against manufacturing defect and also one year optional additional warranty.
2. Must provide Hydro Pressure test report before delivery.
3. Must provide commissioning support at IIT Madras.