STATEMENT OF TECHNICAL REQUIREMENTS FOR 60 KVA STATIC CONVERTER

1. **Functionality**. Used to provide 115 V, 60 Hz, three phase AC power from a bank of 180 lead-acid cells or from a diesel generator in a submarine. Its nominal power is set at 60 KVA.

2. **Major Functional Acceptance Criterion**.

Criterion	Acceptance Level
Input voltage under stable conditions	270 volt DC ≤ Input Voltage ≤ 504 Volts DC. Voltage ripple: 780Hz with max peak to peak amplitude of 33 V into resistive load.
Transient input voltage	Input voltage(V_i) ±15% with time to recover to Input voltage(V_i) ≤ 2 sec
To deliver a balanced three phase voltage with isolated neutral	On voltage (V_{on}) adjustable from 111 to 119 Volt AC. Output voltage (V_o) = V_{on} ± 1 %. Frequency adjustable from 58.5 to 61.5 Hz. Output frequency (f_o) = frequency (set) ±0.5 %. Change in voltage (ΔV) between phases ≤ 2% of output voltage (V_o).
Supply Power	Output Power (P_o) = 60 KVA
Permit Overloads	1.25 times Nominal power (Pn) for 10 minutes. 1.5 times Nominal power (Pn) for 1 minute. 2 times Nominal power (Pn) for 10 seconds.
Permit variations in load	For variations of 0.25 Nominal power (Pn) x power factor (cos Ø) =0.4 Change in voltage (ΔV) ≤ 10% with recovery time less than equal to 1.5 sec. For variations of 0.35 nominal power(P_n)

	Change in frequency$(\Delta f) \leq 4\%$ with recovery time less than equal to 2 sec.
Permit out-of-balance load between phases	0.75 times in three phase+ 0.25 times in single phase Change in voltage(ΔV) between phases $\leq 2\%$ of output voltage(V_o).
Limit Inrush current Measurements are to be performed with input voltages of 270V DC and 504 V DC	Input current (I_{in}) < 1.5 times nominal input current(I).
Limit output short-circuit current	Short circuit current (I_{sc}) should be in between 2 times to 3 times of nominal input current(I_n) for 100 ms then the converter stops.
Provide electrical galvanic insulation between input and output	Insulation resistance (Ri) greater than 100 mega ohm at 500 volts.
Efficiency	Efficiency (n) is greater than 90% at nominal power(P_n) [power factor $(\cos \emptyset = 0.8)$] . Efficiency is greater than 75 % for Power greater than [Nominal power(P_n)/4] $(\cos \emptyset = 0.8)$
Withstand polarity inversion at the input	No destruction

3. **Shock Acceptance Criterion.** Should withstand shock in accordance with IEC 60068-2-27 ; 15g/11 ms (direction : longitudinal and radial)

4. **Acoustic Discretion.** Noise & Vibration test in accordance with document SEFC

17-50-04, the equipment being considered Class A .

5. **Overall Dimension Not on Exceeding Basis.** Height = 650 mm ; Width = 850 mm ; Depth = 700 mm

6. **Overall Weight** .Weight ≤ 200 kg

STATEMENT OF TECHNICAL REQUIREMENT FOR 5 KVA STATIC CONVERTER

1.   **Functionality**. Used to provide115V, 400 Hz, three phase AC power from the dc supply taken from a bank of 180 lead-acid cells or from a diesel generator in a submarine. Its nominal power is set at 5 KVA.

2.   **Major Functional Acceptance Criterion**.

Criterion	Acceptance Level
Input voltage under stable conditions	270 volt DC ≤ Input Voltage ≤ 504 Volts DC. Voltage ripple: 780Hz with max peak to peak amplitude of 33 V into resistive load.
Transient input voltage	Input voltage(V_i) ±15% with time to recover to Input voltage(V_i) ≤ 2 sec
To deliver a balanced three phase voltage with isolated neutral	On voltage (V_{on}) adjustable from 111 to 119 Volt AC. Output voltage (V_o) = V_{on} ± 1 %. Frequency adjustable from 397 to 403 Hz. Output frequency (f_o) = frequency (set) ±0.5 %. Change in voltage (ΔV) between phases ≤ 2% of output voltage (V_o).
Supply Power	Output Power (P_o) = 5 KVA
Permit Overloads	1.1 times Nominal power (Pn) for 60 minutes. 1.25 times Nominal power (Pn) for 10 minutes. 1.5 times Nominal power (Pn) for 1 minute. 2 times Nominal power (Pn) for 10 seconds.
Permit variations in load	For variations of 0.25 Nominal power (Pn) x power factor (cos Ø) =0.4 Change in voltage (ΔV) ≤ 10% with recovery time less than equal to 1.5 sec.

	For variations of 0.35 nominal power(P_n)
	Change in frequency(Δf) ≤ 4% with recovery time less than equal to 2 sec.
Permit out-of-balance load between phases	Apply a load of 0.8 In (cos $\varnothing$ =0.8)to a single phase
	Change in voltage(ΔV) between phases ≤ 2% of output voltage(V_o).
Limit Inrush current	Input current (I_{in}) < 1.5 times nominal input current(I).
Limit output short-circuit current	Short circuit current (I_{sc}) should be in between 3 times to 4 times of nominal input current(I_n) for 100 ms+-10 then the converter stops.
Provide electrical galvanic insulation between input and output	Insulation resistance (R_i) greater than 100 mega ohm at 500 volts DC.
Efficiency	Efficiency (n) is greater than 90% at nominal power(P_n) [power factor (cos $\varnothing$ = 0.8)] . Efficiency is greater than 75 % for Power greater than [Nominal power(P_n)/4] and Power greater than (cos $\varnothing$ = 0.8) [Nominal power(P_n)/2]
Withstand polarity inversion at the input	No destruction

3. **Shock Acceptance Criterion.** Should withstand shock -in accordance with IEC 60068-2-27 ; 15g/11 ms (direction: longitudinal and radial)

4. **Acoustic Discretion.** Noise & Vibration test in accordance with document SEFC 17-50-04, the equipment being considered Class A.

5. **Overall Dimension Not on Exceeding Basis.** Height = 400 mm; Width = 450 mm; Depth = 450mm.

6. **Overall Weight.** Weight ≤ 70 kg.