



A4 - 12

PURCHASE SPECIFICATION FOR
0.12 μ F SNUBBER CAPACITOR
GROUP: TRACTION ENGINEERING

P.S NO. : PS4452717

REV. NO: 00

PAGE 01 OF 07

REVISION HISTORY SHEET

REV. NO	DATE	NATURE OF CHANGE	REASONS	PREPARED BY	APPROVED BY
00	03.02.2021	FIRST ISSUE	--	Jamuna Rani S	Agosh Chandran

THIS DOCUMENT IS A SPECIFICATION CUM DATA SHEET. VENDOR TO GIVE CONFIRMATIONS AND DATA AS REQUIRED AND SUBMIT THE SAME TO BHEL / EDN, BANGALORE. ANY DEVIATIONS TO THIS DOCUMENT TO BE BROUGHT OUT CLEARLY BY VENDOR.

REVISIONS 00 DT: 03.02.2021

APPROVED BY:

Agosh Chandran R S

PREPARED BY:

Jamuna Rani S

ISSUED BY

TRACTION ENGG

DATE

03.02.2021



A4 – 12

PURCHASE SPECIFICATION FOR
0.12 μ F SNUBBER CAPACITOR
GROUP: TRACTION ENGINEERING

P.S NO. : PS4452717

REV. NO: 00

PAGE 02 OF 07

SPECIFICATION FOR 0.12 μ F SNUBBER CAPACITOR

Brief description

Snubber circuits are energy-absorbing circuits used to suppress the voltage spikes caused by the circuit's inductance when a switch, electrical or mechanical, opens. It limits or stops (snubs) switching voltage amplitude and its rate of rise, therefore reducing power dissipation. This circuit is used in semiconductor devices for protection and performance enhancements.

The capacitor in this specification is the snubber capacitor used in IGBT propulsion systems.

1. Detailed Specification

1. Electrical Parameters	
Capacitance	0.12 μ F +/-10%
Rated Voltage	4000V
Rated DC Voltage	3000V DC
Rated RMS Voltage	1400 VAC
Rated Current	20A
Peak Current	480A
Test Voltage b/w terminals	DC 6000V/10sec
Tangent of Loss Angle	2×10^{-4}
Self-Inductance	<10nH
Voltage raise	4000V/us
Cooling	Natural Convection
2. Environment Parameters	
Minimum ambient temperature	- 40°C
Maximum ambient temperature	+70°C
Minimum casing temperature	- 40°C
Maximum casing temperature	+75°C
Storage temperature	- 40°C to +85°C
3. Technology	
Dielectric	Polypropylene film metallized, self-healing
Filling material	Resin, polyurethane dry

COPYRIGHT AND CONFIDENTIAL

The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.



A4 – 12

**PURCHASE SPECIFICATION FOR
0.12 μ F SNUBBER CAPACITOR
GROUP: TRACTION ENGINEERING**

P.S NO. : PS4452717

REV. NO: 00

PAGE 03 OF 07

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.

4. Bushing

Internal thread	M6 depth 8mm
Max. torque	6 Nm
Air distance	79 mm
Creepage distance	79 mm

5. Mechanical Parameters

Diameter	55 mm
Height	59 mm
Weight	0.1 kg
Casing material	plastic
Mounting position	every position
Clearance distance b/w terminals	≥ 60 mm
Clearance distance b/w terminals and case	≥ 40 mm
Colour	GREY RAL 7031
Shock Resistance	As per IEC 61373
Vibration	As per IEC 61373

2. Standards

Standard	Description
IEC61881-1	Rolling stock equipment – capacitors for power electronics
IEC61373	Shock and vibration test
EN50125-1	Environmental conditions
IEC61376	Creepage and clearance

3. Functional requirements

Description	Value	Unit
Operating hours	8640	hours/year
Typical load	continuous operation	
Surge current	1	times/year



A4 – 12

**PURCHASE SPECIFICATION FOR
0.12 μ F SNUBBER CAPACITOR
GROUP: TRACTION ENGINEERING**

P.S NO. : PS4452717

REV. NO: 00

PAGE 04 OF 07

4. Ambient conditions / operating conditions

Description	Value	Unit	Notes
Operating Temperature	-25..+85	°C	
Temperature distribution over the year	+75	°C	10 days/year
	+65	°C	20 days/year
	+55	°C	90 days/year
	+40	°C	100 days/year
	< +40	°C	130 days/year
Storage	-25..+70	°C	
Average year temperature	+ 40	°C	
Relative humidity	< 95	%	During app 3 - 4 months (rainy season) per year frequent condensation can occur
Altitude	<1200	m	
Pollution levels			
Operation in coastal areas			
Maximum PH	8.5		of water damp
Max. concentration of sulphate	7	mg/liter	of water damp
Max. concentration of chlorine	6	mg/liter	of water damp
Maximum conductivity	130	μ S/cm	of water damp
Operation in desert terrain			
Dust content in air	1.6	mg/m3	

5. Reliability, availability, maintainability and safety

Description	Value	Unit	Notes
Design life	30	years	Expected lifetime: 30 x 8640 = 260000 hours
Failure rate	50	FIT	
Maintenance			To be defined by supplier
Safety			The risk of explosion due to over voltage, ageing, loss or other reasons should be minimized



A4 – 12

**PURCHASE SPECIFICATION FOR
0.12 μ F SNUBBER CAPACITOR
GROUP: TRACTION ENGINEERING**

P.S NO. : PS4452717

REV. NO: 00

PAGE 05 OF 07

6. Dimensional details

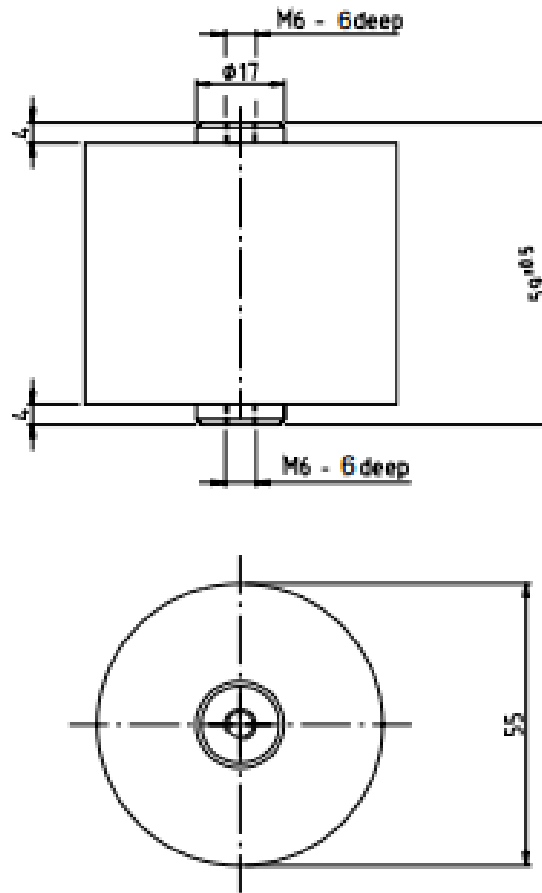


Fig 2: Dimensional Drawing

COPYRIGHT AND CONFIDENTIAL
The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED.
It must not be used directly or indirectly in anyway detrimental to the interest of the company.



PURCHASE SPECIFICATION FOR
0.12 μ F SNUBBER CAPACITOR
GROUP: TRACTION ENGINEERING

P.S NO. : PS4452717

REV. NO: 00

PAGE 06 OF 07

A4 – 12

7. Testing

List of tests to be performed on prototype as per IEC 61881 are as follows

Sl No	Test	Acceptance criteria	Type/Routine Test
1	Capacitance and Tan δ measurement	Measurements should be within the tolerances specified by the manufacturer	Type/Routine
2	Dimensional check	Dimensions to comply with the Approved drawing	Type/Routine
3	Voltage test between terminals and case	During the test neither flashover nor puncture should occur.	Type/Routine
4	Voltage test between terminals	During the test neither flashover nor puncture should occur. Capacitance measured after the test should be within the range specified	Type/Routine
5	Surge discharge test	After conducting the test capacitance to be measured and the change should be < +/-1%	Type
6	Thermal stability test and loss angle tangent measurement test	No breakdown of the capacitor should occur during the test. The capacitor losses should be measured after the test and should be within the tolerances specified by the manufacturer	Type
7	Self-healing test	Change of capacitance after the test should be < +/- 0.5%	Type
8	Resonance frequency measurement	The self-inductance measured should be within the tolerances specified by the manufacturer	Type
9	Environmental Test 1. Damp heat test 2. Change of temperature	Change of capacitance after the test should be < +/-2%	Type
10	Mechanical tests Mechanical tests of terminals 1. External inspection 2. Vibration and shocks	No mechanical damage should occur after the test.	Type
11	Endurance test	Change of capacitance after the test should be < +/-3%	Type



A4 – 12

PURCHASE SPECIFICATION FOR
0.12 μ F SNUBBER CAPACITOR
GROUP: TRACTION ENGINEERING

P.S NO. : PS4452717

REV. NO: 00

PAGE 07 OF 07

8. Rating plate

The following information shall be given on the rating plate of each capacitor unit:

1. Manufacturer
2. Identification number and manufacturing date
3. $C = \mu F$
4. Tol = %
5. UNDC or UN = V
6. $\theta \text{ min} = ^\circ C$
7. $\theta \text{ max} = ^\circ C$
8. Maximum tightening torque = Nm

9. Documentation

1. Datasheet
2. Dimensional Drawing
3. Type test Procedure, Type test Report
4. Routine test Procedure, Routine test Report

10. Acceptance

1. Routine test report to be submitted along with each delivery
2. Equipment shall be packed in a manner suitable for delivery and storage at the appointed delivery address. Transport packaging will provide adequate protection against accidental damage during normal handling. Terminals, leads, mounting brackets will be protected from mechanical damage

Notes:

1. Mounting dimensions needs to be strictly adhered as per the approved drawing submitted by the vendor
2. Supplier should try to minimize the self-inductance and series resistance to a lower value as much as possible