1	2	3	4	5
	C3/ 1.2.9 3.7(b)	Test for water tightness (Periodic test)		The regulator in switched off condition with closed covers is submerged in a bath of water for 1 hour. Before submerging ensure that regulators temperature is 10-15°C more than that of the water. Depth of submerging from the surface of the water to point(upper) of regulator should not be less than 50-55 cm. There shall not be any water appearing inside the regulator
(1)	C4/ 1.2.8 3.10	Test for the absence of design elements and assembly units with resonance frequency upto 40 Hz		The cover of the regulator is opened and the regulator is regidily fastened without shock absorbers to the platform of the vibration table. Test is carried out in the following three planes:- 1. Horizontally-with base downwards 2. Vertical-connectors . SH1 and SH2 to the right 3. Vertical-connectors SH1 and SH2 upwards , by smooth change of frequency in the following range:

Sub-range in Hz	Amplitude value Accn. g	Displacement mm
5 to 10 Hz	0.05-0.30	0.5-0.8
10 to 20 Hz	0.30-1.00	0.5-0.8
20 to 25 Hz	1.00-2.00	0.5-0.8
25 to 40 Hz	2.00	0.3

Checking is made by one of the methods either by acceleration or by displacement

During the time of passing through the range, resonance of design elements (components) and assembly units is checked. There shall be no resonance or Amplitude of oscillation of any component/assembly unit, should not exceed twice the amplitude of its fastening point

and

there shall not be any mechanical damage noticed during visual inspection.

C5/ 1.2.9 & 3.11	Test for moisture resistance	Keep the regulator in switched off condition with covers removed in a himidity chamber in the following condition: (i) RH.....93 to 97% (ii) Temp.....20 to 25 °C (iii) Duration.... 5 days Afterwards increase the RH to 98% and temp to 35°C for 3.5 hours. Remove the regulator and conduct the following tests not later than 2 to 3 minutes : (i) Repeat the IR test as per test sl.No.A4 The IR value shall not be less than 1 Megaohms (ii) Repeat the test A2(b) (iii) Repeat the test A2(c) (iv) Repeat the test A2(d) (v) Check the working capability of regulator by switching on for 5 minutes as per the mode of testing for the guaranteed operation life at the speed of generator 6500±200 rpm and load 200±10 Amps i.e. check whether voltage regulator is giving 26.5 to 28.5V at 6500±200 rpm and load 200±10 Amps (vi) Visually examine for absence of corrosion and record the affected parts if any (vii) Check the varnish has not dipped off and the paint is not peeled off. Record the result. Then keep the regulator in normal climatic condition with covers removed for 24 hours (Recovery of 24 hours) and check the regulator for following parameters:- (i) Repeat IR test as per A4, It shall not be less than 20 M Ohms (ii) Repeat electric strength test(i.e.High voltage test) as per Sl.No.A5. Record the result (iii) Visually examine whether there is any peeling of varnish/paint coatings and traces of corrosion on parts. Record the results.

(8)	C6/ 1.2.9 and 3.12	Test for cold resistance	Keep the regulator in switched off condition in cold chamber. Bring the temperature to -50±3 °C. Keep the regulator in this condition for 4 hours. After this switch on the regulator and conduct test at A2(b) for 3 minutes, at 6500±200 rpm and load 200±10A. Remove the regulator from the chamber carryout the following tests in not less than 2-3 minutes: (i) Repeat the test at test sl.No.A2(b) (ii) Repeat the test at Test Sl.No.A2(c) (iii) Repeat the test at test Sl.No.A2(d)
(6)	C7/ cl.No. 1.2.9 3.13	Test for Heat resistance	Keep the temp condition of the heat chamber at 70±3°C Place the regulator in the chamber for 16 hours at this condition while doing so, the generator, the batteries and load are to be connected to the regulator as per the connections shown in circuit diagram VR 4. Bring the speed of generator to 4150±100 rpm and adjust the load rheostat such that the load current is 200±5A. Carryout this test for 4 hours. After carrying out the above test, check the regulator for 4 hours for the following parameters : i) Freque of oscillation of generator voltate(test A2(c) ii) Check for voltage of disconnecting circuit operation (test A2(d) iii) IR test as per cl.4 IR shall not be less than 5 MΩ(Hot condition) Note: All the above checkings are to be carried out while the regulator is still in the hot chamber after 4 hours

1	2	3	4	5	6
9	C8/ 1.2.9 3.14	Test for resistance against due to hoar frost effetts		Keep the regulator in switched off condition in a cold chamber at a temp of -.20±5°C for 2 hrs. Take out the regulator from the chamber and keep it in normal climatic condition for sometime. carryout the test as per test Sl.No.A2(b) at a speed of 4150 rpm ±100 rpm and load 200±5 Amps for 4 hrs. During the course of next 3 hrs at ~~every~~ 30-60 minutes intervals check for ~~the~~ performance as per cl.A2(b) A2(c) and A2(d).	
13	C9/ 1.2.9 3.14	Test for effect of sea fog (salt corrosion)		This test shall be carried out for 28 days as per test ~~X~~ = 5 of CVRDE specn. = CVRDE/DSL/8007-1981.	

1	2	3	4	5	6
(10)	C10/ 1.2.9 3.16	Test for checking resistance against cyclic changes of temp		Maintain the temp of cold chamber at -50°C. Keep the regulator RN.10 in non working condition at this temp for 4 hrs. Suddenly transfer the voltage regulator to a hot chamber whose temp is maintained at 65°C and keep at this temp for 4 hrs. Note: Transfer time shall not exceed 2-3 mins(as per JSS) The above constitute one cycle Carryout three such cycles Remove the voltage regulator from the chamber and keep it in normal climatic condition for 4 hrs. After this carry out the following checks: i) Test as per srl No.A2(b) ii) Test as per Sl.No.A2(c) iii) Test as per Sl.No.A2(d)	
(2)	C11/ 1.2.9 3.17	Vibration resistance test		Carryout visual examination. Vibration resistance test is carried out in vertical or horizontal vibration condition alternatively in three mutually perpendicular positions in the freq range shown in table below: a) Horizontally with base downwards b) Vertical connectors SH1 and SH2 to the right c) Vertical connectors SH1 and SH2 upwards Vibration test shall be conducted with the connecting cables mounting with shock absorbers The regulator while undergoing the vibration test should be under operation with the generator speed of 4500-5000 rpm	

Frequency subrange Hz	Amplitude value	
	Accn.(g)	Displacement (mm)
From 10 to 20	1.0-2.0	2.0
Above 20 to 30	2.0-4.0	1.2
Above 30 to 40	4.0	-
Above 40 to 50	40-60	0.6
Above 50 to 60		
Above 60 to 80		
Above 80 to 100	6g	Corresponds to acceleration
Above 100 to 120		

Note : Checking is done by one of the methods: by acceleration or displacement

Testing is carried out at a smooth change of frequency to the upper one or vice-versa. The regulator while undergoing this test should be checked as under:

(i) Repeat the test at S1.A2(b)
(ii) Repeat the test at S1 A2(c).There shall not be any blowing of fuse PR 1

Duration of passing each sub-range should be sufficient for the checking of the parameters, but not less than 2 minutes.

After completion of the test the sample is removed from the test bench and the following parameters are checked :

(i) Repeat the test at S1 A2(b)
(ii) Repeat the test at S1 A2(c)
(iii) Repeat the test at S1 A2(d)

If unsuitability of any of the parameters of the regulator on each of these frequencies as well as on resonance frequencies of shock absorption is detected, additional keeping for 15 minutes is carried out and this period is counted during the vibration resistance test.

1 2 3 4 5

C12/ 1.2-9 3.18 Impact resistance test

In the presence of resonance vibrations of the regulator on the shock absorbers, acceleration(amplitude) of vibration on the stands platform in the range from 0.7 to 1.4 of resonance frequencies is allowed to be decreased by two times by comparing with table shown above.

Impaqt resistance is carried out on the impact stand.

The regulator shall be fastened on the stand on shock absorbers and is connected to the generator and storage batteries.

The test is carried out in a 'switched on' condition of regulator(speed of rotation of the armature of generator is 4500-5000 rpm) in three mutually perpendicular positions of regulator as given below :

(a) Horizontally-with base downwards
(b) Vertical-connector SH 1 and SH 2 to the right
(c) Vertical-connector SH 1 and SH 2 facing upwards.

Under the effect of impacts as per the norms of the following table given below for the period of time necessary for checking the parameters as per the test at A2(b) and A2(c).

Remove the regulator from the test stand and test for the following parameters :

(i) Repeat the test at S1 A2(b)
(ii) -do- S1 A2(c)
(iii) -do- S1 A2(d)

Table

Accn (g)	Duration of the pulse (milli seconds)	Min.No.of impacts in each plane	Max.No.of impacts per minute
15	From 10 to 15	20	80

Check that:-

(i) The voltage regulator is free from damages
(ii) The fuse PR1 has not blown out
(iii) The voltage regulator is satisfactory in test A2(b), A2(c) and A2(d).

Record the results.

(3) C13/ 1.2.9 3.9 Vibration strength test

Carryout the visual inspection. Vibration strength test is carried out in a switched ON condition of the regulator.

One sample of the regulator with shock absorbers in horizontal or vertical vibration alternatively in the three mutually perpendicular directions is mounted on the vibration machine as under :

1. Horizontally - with base downwards
2. Vertically - with connectors SH 1 and SH 2 to the right
3. Vertically- with connector SH 1 and SH 2 upwards

The sample is subjected to the test in each position by the method fixed frequency as per the norms given below:-

Fixed frequency	Amplitude Acch(g)	Amplitude Displacement (mm)	Total duration in hours
10	1.0	2.0	3.0
20	2.0	1.0	9.0
30	3.0	0.8	6.0

40 50 60	4.0	0.6 0.4 0.3	4.5
80 100 120	4.0	Corre- sponds to Accn.	1.5

Note: The checking is performed by one of the methods by acceleration or displacement.

The total vibration test duration is divided as under: 1/3 of the duration in the first position of the regulator (Horizontally with base downwards) before guaranteed operation test.

In second (middle) one third of the duration of bibration test guaranteed operation test as per test sl.No.C-17 is carried out. The regulator will be mounted in this period vertically with connectors SH 1 and SH 2 right side.

Note: When the natural frequency of the shock absorbers coincides with the fixed frequency, should be changed with the aim of coming out from resonance region of shock absorber.

Stop the test conduct the following performance checks:

i) Repeat the test A2(b)
ii) -do- A2(c)
iii) -do- A2(d)
iv) Check for any mechanical damages. There shall not be any mechanical damages

Record the Results

1	2	3	4	5
(5)	C14/ 1.2.9 & 3.20	Impabt strength test	Test	Carryout the visual inspection. There shall be no physical damages. The regulator with shock absorbers is mounted on the impact test stand. Set up the test set up for conducting guarantee operation test as per Sl No.C17. In the middle of the guarantee test conduct the impact strength test as under : Impact strength test shall be done alternatively in three mutually perpendicular positions, as given below: (i) Horizontally-with base downwards (ii) Vertically-with connectors SH 1 and SH 2 to rightside (iii) Vertically-with connectors SH 1 and SH 2 upwards The equipment shall be subjected to the effect of impacts in each position as per the norms given below: Accn — Duration of the pulse in mill seconds — Total No.of impacts — No:of impacts per minute 40g — 6 — 4000 — upto 100 Total number of impacts is distributed equally for the various positions of the regulator. After completion of the test carryout the following performance checks: (i) Repeat the test at Sl No.A2(b) (ii) -do- Sl.No.A2(c) (iii) -do- Sl No.A2(d) There shall be no mechanical damage Record the Results

1	2	3	4	5	6
11	C15/ 1.2.9 & 3.21(a)	Reduced pressure effect test of ambient air upto 460 mm of Hg	Prior to test following initial checks are done: (a) Visual inspection: There shall be no mechanical damages (b) Repeat the test at Sl No.A2(b) (c) -do- A2(c) (d) -do- A3(d) Keep the regulator in a pressure chamber whose temperature is 25±10°C. The regulator is connected to the generator and storage batteries. Pressure in the chamber is reduced to 460 mm of Hg and the regulator conditioned at this pressure for 1 hour. The generator's speed shall be 4500 to 5000 rpm and the generator is connected to a load of 25A. The regulator shall be capable of working under this presure. Record the result. Then increase the pressure smoothly to normal pressure. Take out the regulator from the chamber and carryout the following performance checks: (i) Repeat the test at Sl.No.A2(b) (ii) -do- A2(c) (iii) -do- A2(d) (iv) Carryout visual inspection for physical deterioration if any. Record the result	