HELO STARTING RECTIFIER (HSR) TRIALS

OCCASION OF TRIALS – _____

TRIALS DATE -_____

HELO STARTING RECTIFIER
LOAD TRIAL REPORT – HSR CAT ___ (28.5V DC)
SHIP – INS _____

1. **Trial Details**.

(a)	Presented by*	
(b)	Trial date*	
(c)	Occasion of current trial*	
(d)	Date of last trial carried out on*	
(e)	Proposal reference*	
(f)	File reference*	
(g)	Reference document for trial	**EED-Q-267(R4)**

2. **Test Equipment Used**.*

3. **Equipment Details**.

Rectifier		
(a)	Make and rating**	
(b)	Serial no.**	

4. **Insulation Resistance (i.a.w. NES 511(Issue 2))**.

(a)	Rectifier (>2MΩ)*	
(b)	Contactor box (>10MΩ)*	
(c)	Flexible cable (>20MΩ)*	

5. **Protection Checks**.

Ser	Protection	Calibration Date*	Calibration Certificate Provided (Yes/No)*	Tripping Value	Observed Value*	Status (Sat/ Unsat)*
(a)	Over voltage			36±1 for M/s L&T make/ 32 ±0.5 Volts at cable end within 01 sec.		
(b)	Under voltage			18 ± 0.5 Volts within 05 sec.		
(c)	Overload for setting at 1200A			125% of rated output load (1200/ 1000A Amps) of the unit with the		

	Overload for setting at 1000A			minimum time lag possible. Hand reset of the over current protection unit is to be provided.		

Note: The overvoltage trip may be set at 36± 1V with delay of 1 sec(settable) for HSR of M/s L&T make vide IHQ MoD(N)/DEE fax EE/03/5181 dated 23 Oct 19. The overvoltage trip may be set at 32±0.5V with delay of 1 sec(settable) for all other make of HSR i.a.w. EED-Q-267(R4).

6. **Instrumentation**.

Ser	Meter	Ops/ Non Ops*	Calibration Date*	Calibration Certificate Provided (Yes/ No)*	Status (Sat/ Unsat)*
(a)	Main AC input voltmeter				
(b)	DC ammeter				
(c)	DC voltmeter				

7. **Miscellaneous**.

(a)	Past history of the equipment, if any**	
(b)	Lighting and ventilation of compartment (Sat/ Unsat)*	
(c)	Cooling (Natural air/ Forced cooling)*	
(d)	Earthing of HSR and control panel (Sat/ Unsat)*	
(e)	Condition of cables (Sat/Unsat)*	
(f)	Cleanliness (Sat/ Unsat)*	
(j)	Indication lamps and switches (Sat/ Unsat)*	
(k)	Equipment tallies*	
(l)	Multi setting overload trip with suitable selection switch in the output circuit of rectifier (Available/ Not Available)*	
(m)	Provision of calibration in overload trip. (Yes/ No)*	

Note:

(i) Each setting of overload trip will correspond to the starting current envelope of a particular type of aircraft and will trip the rectifier in case of overload to preset current value.

(ii) For Para 1 to 7, following to be followed while filling the details mentioned in sub serials:-

(aa) "*" - To be checked/filled/measured by ETMA trial member.
(ab) "**" - To be provided by SS.
(ac) "***" - To be checked/ provided by Yard.

8. **Steady State Test (With Resistive load)**.

Nominal voltage : **28.5 Volts**

Load (Amps)	Voltage at Cable End		Amps
	Observed	Permissible Limits	
0 - 200		28.5 ± 0.5 V and 18 V DC for compressor washing	
0 - 400			
0 - 800			
0 - 1000			
0 - 1200			

9. **Transient Test (With Resistive load)**.

Load (Amps)	Transient Voltage	Final Voltage		Recovery Time for Voltage Drop Below 18V/ 21V for Not More than 15ms		Recovery Time for Restoration to Voltage Between 22-29V in 100ms		Ripple (Max 1 Volt) (Sat/ Unsat)	Voltage Modulation (2%)	Remarks
	Cable End	Cable End	Permissible at Cable End	Recorded	Permissible	Recorded	Permissible			
0-200			NA		NA	NA	NA			
0-400			NA		NA	NA	NA			
0-800			22-29V		Less than 15ms if dropped below 21V		100ms			
0-1000			22-29V		Less than 15ms if dropped below 18V		100ms			
0-1200			22-29V		Should not drop below 18V		NA			

Note:

(a) Permissible Limits for Transients – Voltage should not drop below 18 V (for not more than 15ms) on application of 1000 A and not below 21 V on application of 800 A (for not more than 15ms) vide EED 'Q' 267 (R4) & IHQ MoD(N) fax EE/03/5181 dated 18 Feb 13 and be restored to a voltage between 22 V to 29 V in 100ms}. Final Voltage should not drop below 18V on application of 1200 A vide IHQ/MoD(N) policy letter EE/03/5181 dated 09 Jul 19.

(b) No permissible limits and checks at transient load regimes of 0-200, 0-400 mentioned in EED-Q 267 R(4), however in order to ascertain performance in step wise manner, the load is increased gradually. Also, as per EED (page 39, test ii – transient voltage test is at cable end only)

(c) The trials are to undertaken on **Dynamic load banks (2000A)** only. Though the starting current envelope are different for different helicopters, the starting rectifier will be tested for the helicopter starting current envelope as given below: -

(i) Peak starting current : 1200 Amps for 5 Sec.
(ii) 1st stage starting current : 850 amps for 10 Sec.
(iii) 2nd stage starting current : 300 amps for 15 Sec.
(iv) 3rd stage starting current : 200 amps for 30 Sec.
(v) Total starting period/cut off period: 25 to 60 seconds.

(d) Till such time dynamic load banks are not available, load trials of HSR be progressed using static load bank i.a.w. IHQ/MoD(N) policy letter EE/03/5181 dated 09 Jul 19.

(e) All the new induction HSRs are to be compliant to Category 'A' and till such time upgradation of HSRs is completed, guidelines mentioned vide IHQ/MoD(N) policy letter EE/03/5181/ Policy/ L-107 dated 11 Sep 17 for Cat 'B', 'C' & 'D' HSRs may be adhered for undertaking load trials.

(f) Trials to be undertaken with **20 M cable** only.

10. **Recommendations**. Following recommended: -

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Trial Team Member Trial Officer