

**TRIAL REPORT – DA NO. (      KW)**  
**INS**

1. **Trials Presented by / Authority.**

- (a) Presented by :
- (b) Trials date :
- (c) Reference :
- (d) File Reference :

2. **Test Equipment Used.**

- (a) Power Quality Analyser Fluke - 435
- (b) 500V Megger
- (c) Tong Tester
- (d) Switchboard Panel Mounted meters

3. **Protective Devices.**

- (a) Over Voltage Trip : 10%
- (b) Reverse Power Relay :
- (c) Under Voltage Relay : 15%

4. **Paralleling Trials.**

- (a) Attended Paralleling :
- (b) Unattended paralleling :

5. **Observations.**

- (a) Governor droop :
- (b) Governor checks :
- (c) AVR checks :
- (d) 'M' load trials :

6. **Parameters of the Generating Set.**

(a) **Engine.**

- (i) Engine :
- (ii) Type :
- (iii) Maker's Name/ Serial No. :
- (iv) Speed (r.p.m) :

(b) **Alternator.**

- (i) Maker's Name :
- (ii) Maker's Type/Serial No. :
- (iii) Full Load Output (KW) :
- (iv) Volts :
- (v) Amps : \_\_\_\_\_ Amps (At Unity PF)
- (vi) Speed (r.p.m.) :

(c) **Governor.**

- (i) Maker's Name :
- (ii) Maker's Serial No. :
- (iii) Type :

(d) **Automatic Voltage Regulator.**

- (i) Maker's Name :
- (ii) Type / Serial No. :

(e) **Generator Supply Breaker.**

- (i) Maker's Name :
- (ii) Capacity :
- (iii) Maker's Type/Serial No. :

7. **Parameters – Recorded.**

(a) **Insulation Resistance.**

- (i) Cold - MΩ.
- (ii) Hot - MΩ.

(b) **Temperature Rise.**

- (i) Ambient temperature at start - \_\_\_\_ °C.
- (ii) Temperature rise after two hours of running at full load (kW) - \_\_\_\_ °C.
- (iii) Cooler (water cooled) – effective.

(c) **SPM Readings.**

Load	DE (dbi= )	color	NDE (dbi= )	color	Remarks
0%	dbm/dbc=		dbm/dbc=		
100%	dbm/dbc=		dbm/dbc=		

(d) **Speed Control Tests**(Graphs to be enclosed).

(i) **Steady State Tests** : (Set frequency to Nominal value at 50 % load – 50 HZ)

Load	Initial Speed (Hz)	Final Speed (Hz)	Governor Droop (at 100% load change)	Permitted limits of Droop
50	--	Set rated frequency – 50 Hz ( <b>N</b> )	$\frac{(N_1-N_2)}{N} \times 100$ $N=(\frac{N_1+N_2}{2})$	- Between 0.875% to 1%(for electronics Governor)
0 - 25			<b>NA</b>	- Between 3.5% to 4% (Mechanical Governor)
25 - 50				- Upto 3% (onboard ships where AVR compounding circuit is permanently ON).
50- 75				
75-100				
100-0	<b>(N2)</b>	<b>(N1)</b>	%	

(ii) **Transient Tests** : (Refer enclosed graph) These tests are carried out by loading the generator at \_\_\_\_\_ power factor, nominal speed of \_\_\_\_\_ rpm and nominal Frequency - 50 Hz.

Load %		Initial Speed (Hz)	Momentary Speed (Hz)	Final Speed (Hz)	% Peak= ( <u>Initial - momentary</u> ) Nominal		Time of recovery to within ±0.2 % (Electronic) ± 1 % (mechanical) of final value (Sec) (mechanical)	
Initial	To				Observed	Permitted limits	Observed	Permitted Limits
0	25					3.0 (WJFAC)  3.5 (M/L) Non weapon platform  1.5 (L) 2.5 (M) Weapon platform		2
25	50							
50	75							
75	100							
100	75							
75	50							
50	25							
25	0							
<b><u>For Machines Installed with Turbo-Charged Diesel Engines</u></b>								
<b><u>Mechanical Governor</u></b>								
0	70					10%		<b>No Limit</b>
100	0					10%		<b>No Limit</b>
<b><u>Electronic Governor</u></b>								
0	70					05%		5
100	0					05%		5

For All Machines other than Turbo-Charged Diesel Engines								
Mechanical Governor								
0	100					10%		2
100	0					10%		2
Electronic Governor								
0	100					05%		2
100	0					05%		2

**Note:**

(aa) (\*) - 1.5% (for Electronic Governors) and 2.5 % (Mechanical Governors). However, recovery of speed has to be within 0.2% for Electronic Governors and 1% for Mechanical Governors in not more than 02 Sec from the instant of load change.

(ab) In case of water based load tank transient loading to be done from 0-25 % and 25-0%, 0-70% and 100-0% for turbo charged engines and 0-100% & 100-0% for all machines other than turbo charged engines. i.e.-0 to 100% 'Throw ON' – Not applicable for Turbo supercharge engine.(0 to 70 % permitted)

(iii) **Governor Range**(This is undertaken by varying the frequency using the frequency control knob / lever provided for the alternator on switchboards).

Load %	Achieved frequency( $\pm$ 1% of nominal)	Permitted limits	Remarks (Sat / Unsat)
0		(49.50-50.50)/ (48.50-51.50)	
100		(49.50-50.50)/ (48.50-51.50)	

**Note:** Permitted limits for frequencies measured at 0% and 100% loads should not be less than  $\pm$  3% &  $\pm$  1% of nominal for mechanical governors and Electronic governor resp.

(iv) **Rate affected by Governor Motor**(This test is undertaken by holding the lever for frequency change in Up position or down position for durations sufficient to record graphs).

Load %	Rate Hz/Sec		Permitted limits
	UP	DOWN	
0			- Between 0.2 to 0.4 Hz/ Sec (for mechanical Governors) and 0.05 to 0.07HZ/Sec (for Electronic Governors) - For APMS Ships limits as specified in SOTRs/ GRAQs for new construction ships & technical manuals for ships in commission.
100			

(e) **Voltage Control Tests.**

(i) **Steady State Tests.**

(Set voltage to Nominal value at 50% load – 415/ 380 V)

Load %	KW	Voltage (V)		Amps	P.F.
		Observed	Permitted limits		
0					
25					
50					
75					
100					

**Note:** Permitted limits of voltage  $\pm 1\%$  of rated voltage.

(ii) **Transient Tests.** (Refer enclosed graph)

Load %		Initial Voltage (V)	Momentary Voltage (V)	Final Voltage (V)	% Peak= $\frac{\text{Initial} - \text{Momentary}}{\text{Max}}$ / Nominal		Time of recovery to within $\pm 1\%$ of final value (Sec)	
Initial	To				Observed	Permitted limits	Observed	Permitted limits
100	75					7.5		1
75	50							
50	25							
25	0							
0+M						15		
25+M								
50+M								
75+M								
85+M								

**Note:** M-Load equals application of a load equal to 50% of rated KVA at 0 – 0.4 pf lagging. Towards this starting of an induction motor could be undertaken if M-Load is not available. The motor chosen should be such that its KVA calculated based on its starting current and voltage input is equal to 50% of rated KVA of alternator. Motor should have DOL starter.

(iii) **Voltage Balance.**

Load %	Line Voltages (V)			Difference (Between Max & Min of three values)	Permitted limits (1% of the Average of three line voltages)
	R-Y	Y-B	B-R		
0				V	V
100				V	V

(iv) **Voltage Range.** (This test is undertaken by varying the voltage trimmer (Hand / Auto as applicable) from lowest limit to highest limit).

	Load %	Voltage range checked on Switchboard (V)		Remarks
		At lowest limit of trimmer	At highest limit of trimmer	
A.V.R. Trimmer	0			
	100			
Hand Regulator	0			
	100			

**Note:** Permissible Limit  $\pm 5\%$  of rated voltage (Volts)

### UNATTENDED PARALLELING TRIALS OF DAs

Combined Load (% of Combined Rated Capacities of Alternators)		kW					Amps					10% of Mean of kW Ratings of Machines A and B	10% of Mean of Amps Ratings of Machines A and B	Remarks (Sat/ Unsat)
		Combined Value	Proportionate Share	Machine A (Actual Share)	Machine B (Actual Share)	Difference Between Proportionate Share and Actual Shares of Machines A or B	Combined Value	Proportionate Share	Machine A (Actual Share)	Machine B (Actual Share)	Difference Between Proportionate Share and Actual Shares of Machines A or B			
Increasing Loads	20													
	30													
	45													
	60													
	75													
Decreasing Loads	60													
	45													
	30													
	20													

#### Note

1. The load combinations have to be initially increasing from 20% to 75% and then decreasing back to 20% as shown in the table above. The loading of alternators could be undertaken using combination of 'external Inductive-cum-Resistive Load banks and Ship's loads to achieve the requisite combined loading values.

2. Max difference between the actual kilowatt load and the proportionate share of the total kW load should not exceed ten percent of the mean of the rated kW outputs of both generators. A similar limit would apply to the kVA ratings.