

43-05 Uninterruptible Power Supplies (UPS)

Date: 26 Jun 2024 Version: 9

Unit of Measure: Nr

Summary					
Frequencies	Tasks				
6M (Months) 240 mins	21 4 5 6 7 8 9 10 11 12 13 14 15 16 17 19 20				
0U (Unspecified)	1 2 3				
Annual Timing	480 mins				

Introduction

The frequency of uninterruptible power supplies (UPS) maintenance should be agreed with the client, however a minimum frequency of at least six months is recommended. It is emphasised that this is specialist equipment which should be maintained strictly in accordance with the manufacturer's instructions.

As this equipment is for use in emergencies, check with the client that it is safe to proceed with maintenance.

The task 'User checks of electrical equipment' is applicable to small, plug-in desktop UPS.

Please refer to the overarching introduction (SFG 00-01) to make sure you are of the correct skill level as indicated within the task schedule to carry out the described works. Ensure you have read and understood the manufacturer's recommendations, carried out risk assessment(s) on each item of plant to identify the correct frequency of maintenance, identified all safety procedures that need to be applied and recorded in order to carry out the work in a safe and reliable manner.

If this asset (item of equipment / system) is within the warranty or guarantee period, it is essential that you maintain it in full accordance with the specific manufacturer's or installer's maintenance requirements. If you are in any doubt about the maintenance requirements or the warranty or guarantee period please contact the manufacturer, installer or their representative to seek clarity.

Notes:

Safety notice: The UK's Health and Safety Executive (HSE) has recognised that inadequate maintenance of industrial UPS systems may lead to unplanned shutdowns or dangerous occurrences such as localised fires. The major risk factors include outdated firmware and the failure of UPS components such as capacitors, batteries and static power switches. HSE investigations have revealed that in all incidents the manufacturer's operating and maintenance instructions were either inadequate or out of date and did not provide sufficient information to allow the continued safe and reliable operation of the industrial UPS systems prior to the incident. It is therefore essential that maintenance personnel ensure they have access to the latest revision of maintenance information from the original equipment manufacturer (OEM), which in all cases should take precedence over this schedule.

Generally the tasks detailed in this maintenance schedule are for UPS systems greater than 10Kva. Often the smaller UPS systems have little other maintenance than that the batteries are to be replaced. The manufacturer's recommendations will help evaluate the correct maintenance regime required for the particular UPS system.

Display Order	Tasks						
	Criticality:	Red	Frequency: 0U	Skill Set:	User		
1	Action: The user should check the following: 1 Is the equipment known to be faulty or operates incorrectly? 2 Disconnect the equipment, by switching off and/or unplugging equipment. 3 Is a valid label attached? If no or FAIL, refer equipment to duty holder.						

01 02								
1 continued	Notes:	4.2 Flex, 4.3 Envi misu 4.4 Exte wher 4.5 Plug scret 4.6 Look disco	/cable - che ronment - c ise. nsions and n being use s, sockets, ws/pins, an c for a 'T' or connects equ s found to b abelled to ic	eck for damage check that the l adapters - cled. fused conne ad broken and r test button c uipment. Res be damaged of dentify it is no	ge or splits in a environment theck the plug ction unit or side loose casing on RCD device et after test. For faulty it should be used, respectively.	the cable, twist is suitable for and sockets, milar - checks. Description: Press before the common the commo	sting or repairs r the equipment length of cable for heat dama e use to check iiately removed	scorching or burns. s with adhesive tape. nt and look for signs of e. Reels should be uncoiled ge, loose or bent c RCD trips and d from use, reported to the Equipment Register
		al Inspection o	of in-servi					
	Criticality:	Red		Frequency	r: 0U		Skill Set:	Competent Person
2	Action:	of the full wirin 1 The frequence the follow 1.1 Envi 1.2 Type 1.3 Cone 1.4 User 2 Before period been any 3 Consider 4 Perform to the first of the election of the following of the follo	ng installation and installation and installation are remarked and frequentiation, suitable feedback arforming the loss of perscheduling the Formal actrical equipate the duty harate task) environmer the fuse to a	on is subject ld be confirm emperature, of ency of use. ability and age and the result his task, informance, regrequipment of Visual Inspectoment fails the holder and equas it may be avoid the equavoid the equal to the confirmance of the con	to routine inspect of routine inspect following a dirt, moisture, the of equipments of previous of the user the disability or function in accordence Formal Visuuipment user. It dangerous to hecessary to lipment being	t. inspections. it the equipment of the current of the current of the current of the equipment of the equipm	sting. risk assessment ather, etc.). ent will be out juipment. building users rent regulation label and remorn the Combination in the combination as been repair	ns. Note the results. nove from use immediately, ned Inspection and Testing t in the OFF position or red or replaced.
	Notes:	 1 The demarcation line between Periodic Inspection and Testing (for the full wiring installation) and Inservice Inspection and Testing of electrical equipment is considered to be the nearest point of isolation to the electrical equipment. This may be an isolator, a spur, a 3-pin plug, a fused disconnect unit or similar. 2 All testing and documentation must be performed in accordance with the current regulations. 						
	Combined I	nenaction and	Tosting of	f in-sorvice o	loctrical onu	inmont		
	Criticality:	nspection and Red	resting of	Frequency	•	ipment	Skill Set:	Competent Person
	Action:	This task invo	: erforming th	al inspection, ne Combined	an electrical t	d Testing, info	ctional check.	These should be carried hat the equipment will be
3		2 Use the of the testin 3 Consider	current risk g regime. scheduling	assessment,	previous test	results and us	building users	o adjust the frequency of

electrical test or functional check as it may be dangerous to do so. Remove from use immediately,

5 If the equipment has passed the Formal Visual Inspection, perform the electrical test and functional

6 If the equipment fails the electrical test or the functional check, remove from use immediately, label

label and notify the duty holder and equipment user.

check in accordance with current regulations and note the results.

3 continued	Notes:	7 In some er remove the 1 All testing standards. 2 Care must 3 Where speuser or ma 4 When disc	be taken to avoid damage	ecessary to lock to ment being used to be performed in ge to the equipm ment is being test for correct, safe ting electrical territal	until it has been repair accordance with curre ent. ted, it may be necessa operation and testing o minations, all works mu	red or replaced. ent regulations and ry to consult the equipment of the equipment.	
	Camanal						
	General Criticality:	Amber	Frequency:	6M	Skill Set:	Electrical	
4	Action:	1 Check load	d does not exceed rating cator lamps, meters and	of equipment.	OKIII OCI.	Licentical	
	Notes:						
	Cubicle						
	Criticality:	Amber	Frequency:	6M	Skill Set:	Electrical	
5	Action: 1 Check condition and clean. 2 Check airflow in and around the equipment. Replace air filters if fitted in compliance with manufacturers information. 3 Check integrity of doors and panels, including locks. 4 Check for ease of operation of switches, isolators and circuit breakers. 5 Check condition of contactors - see schedule series 44 Power Supplies.						
	Notes:	All dirt and fore	ign bodies should be ren	noved.			
	Fuses and	MCBs					
6	Criticality: Action: Notes:	Amber	Frequency: ect rating of fuses and se		Skill Set:	Electrical	
	Polovo con	tootoro and wiri	na				
	Relays, con	ntactors and wiri	ng		Q1 111 Q 4		
	Criticality	Amher	Frequency	6M	Skill Sot.	Flectrical	
7	Criticality:	Amber	Frequency:		Skill Set:	Electrical	
7	Action:	Check for burn	marks and tightness of c		Skill Set:	Electrical	
7			marks and tightness of c		Skill Set:	Electrical	
7	Action: Notes: Earthing	Check for burn Replace as nec	marks and tightness of cessary.	connections.			
7	Action: Notes:	Check for burn	marks and tightness of c	connections.	Skill Set:	Electrical	
7 8	Action: Notes: Earthing	Check for burn Replace as nec	marks and tightness of cessary.	connections.	Skill Set:	Electrical	
7 8	Action: Notes: Earthing Criticality:	Check for burn Replace as nec Amber Ensure all sub-	marks and tightness of cessary. Frequency:	connections. 6M al components m	Skill Set: ounted are adequately	Electrical earthed.	
7 8	Action: Notes: Earthing Criticality: Action:	Check for burn Replace as nec Amber Ensure all sub-	marks and tightness of consessary. Frequency: assemblies with electrical	connections. 6M al components m	Skill Set: ounted are adequately	Electrical earthed.	
8	Action: Notes: Earthing Criticality: Action: Notes:	Check for burn Replace as nec Amber Ensure all sub-	marks and tightness of consessary. Frequency: assemblies with electrical	6M al components m	Skill Set: ounted are adequately	Electrical earthed.	
7 8	Action: Notes: Earthing Criticality: Action: Notes: Rectifier	Check for burn Replace as nec Amber Ensure all sub- Where star was	marks and tightness of concessary. Frequency: assemblies with electrical shers are used for earth of	6M al components m connections mak	Skill Set: ounted are adequately e sure earth connectio Skill Set:	Electrical earthed. n is good. Electrical	
7 8 9	Action: Notes: Earthing Criticality: Action: Notes: Rectifier Criticality:	Check for burn Replace as nec Amber Ensure all sub- Where star was Amber Switch on and of	researy. Frequency: assemblies with electricathers are used for earth of the property: Frequency:	6M connections mak 6M connections mak	Skill Set: ounted are adequately e sure earth connection Skill Set: pattery charge voltage I	Electrical earthed. n is good. Electrical	
7 8 9	Action: Notes: Earthing Criticality: Action: Notes: Rectifier Criticality: Action:	Check for burn Replace as nec Amber Ensure all sub- Where star was Amber Switch on and of Check and reco	Frequency: Frequency: assemblies with electrical shers are used for earth of the properties of the content of	6M connections mak 6M connections mak	Skill Set: ounted are adequately e sure earth connection Skill Set: pattery charge voltage I	Electrical earthed. n is good. Electrical	
789	Action: Notes: Earthing Criticality: Action: Notes: Rectifier Criticality: Action: Notes:	Check for burn Replace as nec Amber Ensure all sub- Where star was Amber Switch on and of Check and reco	Frequency: Frequency: assemblies with electrical shers are used for earth of the properties of the content of	6M al components m connections mak 6M rge voltage and b	Skill Set: ounted are adequately e sure earth connection Skill Set: pattery charge voltage I	Electrical earthed. n is good. Electrical	
7 8 9	Action: Notes: Earthing Criticality: Action: Notes: Rectifier Criticality: Action: Notes: Rectifier Criticality:	Check for burn Replace as nec Amber Ensure all sub- Where star was Amber Switch on and of Check and reco	Frequency: check battery trickle character calibration of all meters.	6M al components m connections mak 6M rge voltage and b ers on the equipm	Skill Set: ounted are adequately e sure earth connection Skill Set: cattery charge voltage Inent. Skill Set:	Electrical earthed. n is good. Electrical evel.	
7 8 9	Action: Notes: Earthing Criticality: Action: Notes: Rectifier Criticality: Action: Notes: Rectifier ala	Check for burn Replace as nec Amber Ensure all sub- Where star was Amber Switch on and of Check and reco	Frequency: assemblies with electrical shers are used for earth of the production of all meters and calibration of all meters.	6M al components m connections mak 6M rge voltage and b ers on the equipm 6M ut' voltages of all	Skill Set: ounted are adequately e sure earth connection Skill Set: pattery charge voltage I ment. Skill Set: alarm relays.	Electrical earthed. n is good. Electrical evel.	

10 continued		interrogation.						
	Rectifier way	veform						
	Criticality:	Amber	Frequency:	6M	Skill Set:	Electrical		
11	Action:	Check and record	d.					
• •	Notes:	Most UPS system	ns now have the facility	to interrogat	e via software and use this	for such diagnostic		
	interrogation.							
	Inverter							
	Criticality:	Amber	Frequency:	6M	Skill Set:	Electrical		
12	Action: 1 Switch on and check the Inverter Control Unit control voltage. 2 When operating correctly, check and record the output voltage and frequency. 3 Compare with voltages recorded on test certificate. 4 Record the results and report any significant differences. 5 Check and record the calibration of all meters.							
	Notes:							
	Inverter alar			CM	CL:III Car	Floatrical		
13	Criticality:	Amber	Frequency:	ЫVI	Skill Set:	Electrical		
13	Action:	Check for correct	t operation and check 'p	oick-up' and 'o	drop-out' voltages of all AC	and DC alarm relays.		
	Notes:							
	Inverter wav							
11	Criticality:	Amber	Frequency:	6M	Skill Set:	Electrical		
14	Action:	Check and record	d the output waveform.					
	Notes:							
	Static power	rswitch						
45	Criticality:	Amber	Frequency:	6M	Skill Set:	Electrical		
10	Action: Check operation with both rectifier and inverter switched on.							
	Notes:							
	Output							
	Criticality:	Amber	Frequency:	6M	Skill Set:	Electrical		
16	Action:		supply and check oper		pass voltage and frequenc	y. Check load transfer.		
	Notes:							
	UPS							
	Criticality:	Amber	Frequency:	6M	Skill Set:	Electrical		
17	Action:	2 If a generator restoration of	of power via the genera	em, mains fa tor and batter	ilure check should simulate y is recharging normally or vithin acceptable UPS limit	n generator supply. The		
	Notes:	1 As prescribe 2 Suitable and 3 Above two c	ed by the Original Equip I sufficient Risk Assess combined with experien	oment Manufa ment ce indicatively				

18	Batteries				
19	Lead acid be Criticality: Action: Notes:	Amber Check condition	Frequency: 6M n. 3-03 Batteries - Lead Acid - Unsealed.	Skill Set:	Electrical
20	Other types Criticality: Action: Notes:		Frequency: 6M and report to client if replacement is requieries in accordance with current regulations		Electrical
	UPS test Criticality: Action:	•	Frequency: 6M ns failure check to simulate loss of mains a ns and resetting of alarms.	Skill Set:	Electrical support the load including
21	pack from this test the mplete a recharging of the shods:				

Legislation, Regulations and Guidance

http://knowledge.bsigroup.com/products/requirements-for-electrical-installations-iet-wiring-regulations-3/standard BS 7671:2018+A2:2022 Requirements for Electrical Installations. IET Wiring Regulations (BSI)

http://knowledge.bsigroup.com/products/requirements-for-electrical-installations-iet-wiring-regulations-3/standard Corrigendum to BS 7671:2018+A2:2022 Requirements for Electrical Installations. IET Wiring Regulations (BSI)

http://www.hse.gov.uk/safetybulletins/ups-systems-industrial-maintenance.htm

HSE Safety Notice - Maintenance of industrial uninterruptible power supply (UPS) systems

http://shop.theiet.org/code-of-practice-for-in-service-inspection-and-testing-of-electrical-equipment-5 th-edition and the strong code of the st

IET Code of Practice for in-service inspection and testing of electrical equipment

IET Guidance Note 3 Inspection & Testing