Standard Battery Testing Requirements Summary

The tables below summarize the testing requirements and schedules from the following standards:

- IEEE Std 450-2010: IEEE Recommended Practice for Maintenance, Testing, and Replacement of Vented Lead-Acid Batteries for Stationary Applications
- IEEE Std 1188-2005: IEEE Recommended Practice for Maintenance, Testing, and Replacement of Valve-Regulated Lead- Acid (VRLA) Batteries for Stationary Applications
- ANSI/NETA MTS-2015
- NERC Standard PRC-005-6: Protection System, Automatic Reclosing, and Sudden Pressure Relaying Maintenance.

LEAD ACID		Monthly			
		VLA		VRLA	
Float voltage measured at the battery terminals	- I		- I		
General appearance and cleanliness of the whole installation	- I	N	- I	N	
Charger output current and voltage	I		I		
Crack in cells (evidence of electrolyte leakage)	I		I		
Evidence of corrosion at terminals, connectors, racks or cabinets	I	N	I	N	
Ambient temperature and ventilation	I	N	I	N	
Pilot cells (If used) voltage and electrolyte temperature	I				
Battery float charging current or pilot cell specific gravity					
Unintentional battery grounds	I	N		N	
Electrolyte levels	I	N			
Cell-to-cell and terminal connection resistance		N ⁶		N ⁶	
Structural Integrity of the battery rack		N		N	
Verify tightness of accessible bolted electrical connections ⁵	N ⁶		N ⁶		
Perform a thermographic survey under load ⁷	N ⁶		N ⁶		
Verify presence of flame arresters		N			
Verify existence of suitable eyewash equipment		N		N	

The information and comparison provided in these tables is based on the standards versions stated above and the purpose is to provide a quick reference and guidance to determine testing activities for batteries. For further details and information please consult the standards and interna
Terefice and guidance to determine testing activities for batteries. For further details and information please consult the standards and interna

testing requirements.

- Time frames indicated in NERC-PRC-005-6
- This inspection applies for the initial installation as well, according to IEEE Std 1188 2 For lead-antimony batteries. For other technologies, only if float charging current is not used to monitor state of charge
- 3 Standard indicates to verify battery continuity, terminal connection resistance, intercell or unit-to-unit connection resistance
- 4 Standard indicates to evaluate battery performance by indicative measurements like internal ohmic values or float current every 18 months or perform a capacity test every 6 years
- 5 NETA MTS Table 100.12
- 6 Only one of the three actions is required
- 7 According to NETA MTS Section 9
- 8 Intervals and test procedure according to IEEE Std 450, every 25% of life expectancy or two years (whichever is less)
- 9 Intervals and test procedure according to IEEE Std 1188, every 25% of life expectancy or two years (whichever is less)
- 10 Measure internal ohmic values every 6 months or perform a capacity test every 3 years

LEAD ACID		Quarterly/ Tri-annual*			
ACTIVITY	VLA V		VR	′RLA	
Float voltage measured at the battery terminals	- I	Р	- I		
General appearance and cleanliness of the whole installation	I		I		
Charger output current and voltage	- I		I	Р	
Crack in cells (evidence of electrolyte leakage)	I		I		
Evidence of corrosion at terminals, connectors, racks or cabinets	I		I		
Ambient temperature and ventilation	- I		I.		
Pilot cells (If used) voltage and electrolyte temperature	I				
Battery float charging current or pilot cell specific gravity	I				
Unintentional battery grounds	T	Р		Р	
Electrolyte levels	I	Р			
Voltage of each cell	- I		I.		
Specific Gravity of 10% of the cells of the battery	²				
Temperature of at least 10% of cells	- I				
Temperature of the negative terminal of each cell			I		
Cell/unit internal ohmic values				P ¹⁰	

LEAD ACTIVITY

Float voltage meas

General appearance installation

Charger output cui

Crack in cells (evide

Evidence of corrosi racks or cabinets

Ambient temperate

Pilot cells (If used) temperature

Battery float charg gravity

Unintentional batt

Electrolyte levels

Voltage of each ce

Specific Gravity of

Temperature of at

Temperature of the

Specific Gravity of

Cell condition

Cell/unit internal o

Cell-to-cell and ter

Structural Integrity

AC ripple current a battery

Performance or mo of entire bank

Verify Equalizing V to Battery's Manuf

Verify all charger f

- Indicates recommendations by IEEE Standards
- Indicates recommendations by NETA Standard for Maintenance **Testing Specifications**

Indicates NERC PRC-005-6 requirements

ACID	Yearly/18-months*					
,	VLA			VRLA1		
ured at the battery terminals	I	N	Р	I	N	P ¹
e and cleanliness of the whole	T			I.		
rent and voltage	T			I.		
ence of electrolyte leakage)	T			I.		
on at terminals, connectors,	T			I.		
ure and ventilation	T			T		
voltage and electrolyte	T					
ing current or pilot cell specific	I					
ery grounds	T					
	I					
I	T	N			N	
10% of the cells of the battery	T					
east 10% of cells	- I					
negative terminal of each cell				- I	N	
all cells	²					
	T		Р			
hmic values		N	P ⁴	- I	N	Р
ninal connection resistance	- I	N	P ³	- I	N	Р
of the battery rack	T		Ρ			Р
nd/or voltage imposed on the				- I		
dified performance capacity test	⁸	N ⁸	P ⁴	l _a	N ⁹	P ¹⁰
oltage Setting is in accordance acturer recommendation		N			N	
unctions and alarms		N			N	

Megger. Power on

Standard Battery Testing Requirements Summary

The tables below summarize the testing requirements and schedules from the following standards:

- EEE Std 1106-2005: IEEE Recommended Practice for Installation, Maintenance, Testing, and Replacement of Vented Nickel-Cadmium Batteries for Stationary Applications
- ANSI/NETA MTS-2015
- NERC Standard PRC-005-6: Protection System, Automatic Reclosing, and Sudden Pressure Relaying Maintenance.

NiCad

ACTIVITY	Quarterly/ Tri-annual*	
Float voltage measured at the battery terminals	I	
General appearance and cleanliness of the whole installation	I	
Charger output and voltage	I.	
Electrolyte levels	I	Р
Unintentional battery grounds		Р
Crack in cells (evidence of electrolyte leakage)	I.	
Evidence of corrosion at terminals, connectors, racks or cabinets	I	
Ambient temperature and ventilation	I.	
Pilot cells (If used) voltage and electrolyte temperature	I	
Verify Station DC supply voltage		Р

The information and comparison provided in these tables is based on the standards versions stated above and the purpose is to provide a quick reference and guidance to determine testing activities for batteries. For further details and information please consult the standards and internal testing requirements.

- * Time frames indicated in NERC-PRC-005-6
- 1 This inspection applies for the initial installation as well, per NETA-ATS
- 2 Only on of the three methods is required
- 3 Method in accordance with manufacturer's published data or Table 100.12 of NETA-MTS
- 4 Method in accordance with NETA-MTS Section 9
- 5 NETA-MTS specifies float voltage measurement for each cell and total battery
- 6 Optional, in accordance with manufacturer's published data or IEEE 1106
- 7 Every five-year intervals until the battery shows signs of excessive capacity loss

Cad
Cad

ACTI	VITY	Semi-annuall
Float volta	ge measured at the battery terminals	l I
General a installatio	ppearance and cleanliness of the whole n	I
Charger o	utput and voltage	I.
Electrolyte	levels	I
Crack in ce	ells (evidence of electrolyte leakage)	l I
Evidence of cabinets	of corrosion at terminals, connectors, racks or	I
Ambient t	emperature and ventilation	I
Pilot cells	(If used) voltage and electrolyte temperature	I
Voltage of	each cell	l I

Indicates recommendations by IEEE Standards

N Indicates recommendations by NETA Standard for Maintenance Testing Specifications

P Indicates NERC PRC-005-6 requirements



NiCad

ACTIVITY

Float voltage measu

General appearance installation

Charger output and

Charger float and eq Adjust to manufactu

Verify all charger fur

Electrolyte levels

Crack in cells (eviden

Evidence of corrosior racks or cabinets

Ambient temperatur

Pilot cells (If used) vo temperature

Voltage of each cell

Intercell connection

Condition and resista

Verify tightness of ac connections by calibr

Perform thermograp

Structural Integrity of

Verify existence of su

Verify application of battery terminal con

Perform internal ohn

Perform load test

Measure battery syst to-ground and negat

Performance or modi test of entire bank

NiCad

ACTIVITY

Performance or modi bank

	Yearly1 / 18 months*			
ed at the battery terminals	I	N		
and cleanliness of the whole	I	N	Р	
voltage	I		Р	
ualizing voltage levels. rer's recommended settings		N	Р	
ctions and alarms		Ν		
	I			
ce of electrolyte leakage)	I.			
n at terminals, connectors,	I			
e and ventilation	I	N		
ltage and electrolyte	I	N		
	I	N⁵		
orque	T			
ance of cable connections	I.	N ²	Р	
ccessible bolted electrical rated torque-wrench ³		N ²		
hic survey ⁴		N ²		
f the battery rack	I.	N	Р	
uitable eyewash equipment		N		
an oxide inhibitor on nections		N		
nic measurements		Ν		
		N ⁶		
em voltage from positive- ive-to-ground		N		
ified performance capacity	12	N ⁶		

	6 Years
ied performance capacity test of entire	Р