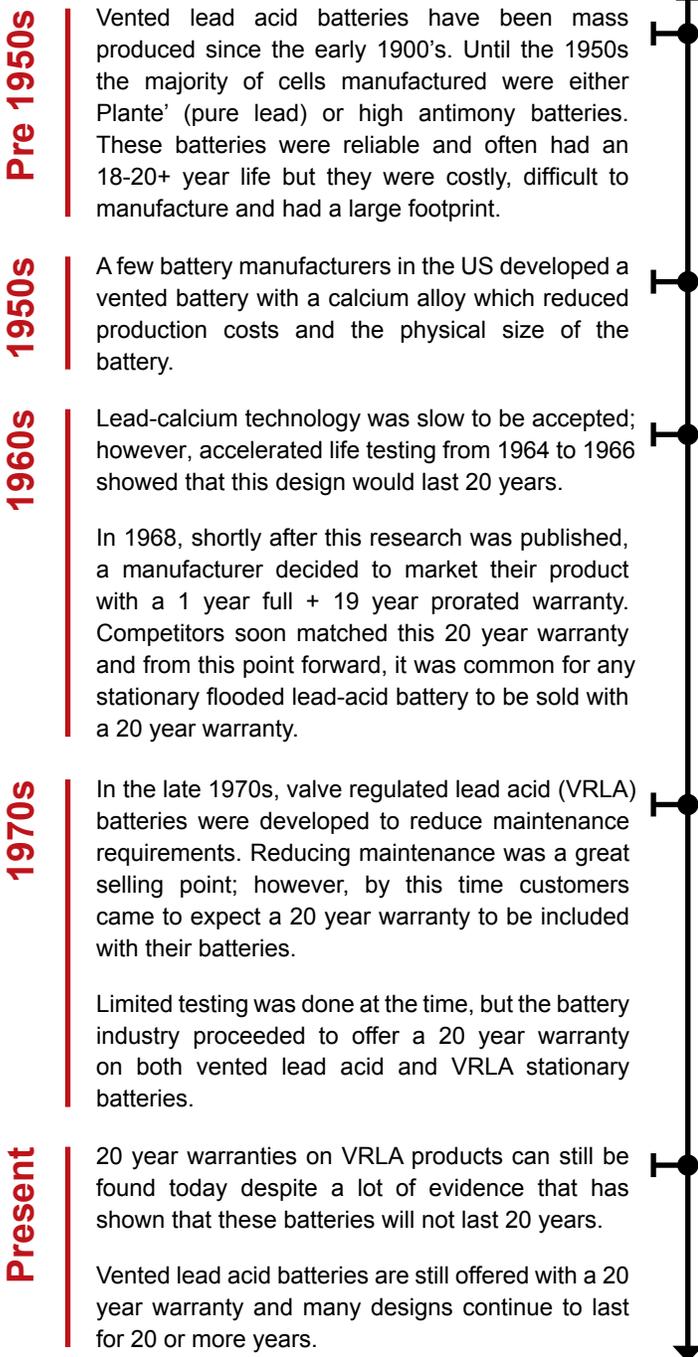


## Introduction: Battery warranties

The idea of the 20-year warranty began in the 1960s as a marketing campaign for lead calcium batteries. With newer battery technologies being developed with different design, performance and construction principles, the industry finds it difficult to shift the expectation of a standard 20-year warranty. The resulting confusion is addressed as this white paper explores the history of stationary battery warranties, modern warranty programs and ways to maximize your warranty and battery system performance.



## Three main objectives behind warranties

- Define the responsibilities of the manufacturer and the end user over the life of the battery system
- Outline the battery life cycle from the installation to end of the usable life
- Establish the value of the battery at any stage in its life, especially in the event of battery failure and replacement

# Questions?

Contact SBS @ 800-554-2243

## What could void your warranty?

- 1. Improper installation**—Follow the manufacturers' installation and operation instructions. Proper initial charging and commissioning of the system should be documented as manufacturers will ask for it when warranty questions arise.
- 2. Lack of routine maintenance**—IEEE/NERC have maintenance recommendations/requirements for every type of battery on a monthly, quarterly and yearly basis. Maintaining a battery log with either handwritten or digital records is crucial to not only ensure that your system is operating correctly, but it is also mandatory to have this information to support a warranty claim. The manual supplied with your batteries should specify the records necessary for any warranty claim.
- 3. Extreme temperatures/weather**—Prolonged exposure to heat and cold can take their toll on a battery system. If conditions are hot, the life of the battery will be shortened and the warranty will be derated. If conditions are too hot or too cold, the warranty could be voided entirely. Recommended operating temperature range is 68-77F.
- 4. Overcharging**—Proper control of charging voltages and currents is vital to the performance and lifespan of the battery. Long periods of overcharging, or excessive number of cycles will reduce the service life of your system.
- 5. Application of additives to the electrolyte**—Almost all batteries ship filled and charged from the factory with the proper mixture of electrolyte. Adding anything to a flooded battery, other than distilled water (when needed), will damage the solution and cause battery failure.
- 6. Mixing different types/ages of batteries**—Batteries from different manufacturers can vary in voltage, specific gravity and internal resistance. Old batteries will have a higher internal resistance than that of a new cell. This can lead to charge and discharge imbalances, shortening the life of the battery.
- 7. Unauthorized repairs to the battery**—Physical, mechanical or chemical adjustments and repairs to a battery without consent from the manufacturer will void the warranty completely.

# Questions?

Contact SBS @ 800-554-2243

## Typical 20 year prorated warranty

Most warranties offer a limited time for a full replacement, then the prorated warranty period begins. In other words, the cells initially hold a 100% warranty which means the cells would be replaced should the cells fail due to a manufacturing defect within one year. After the full warranty time limit is exceeded, the prorated value diminishes. The calculation is determined by several factors including age, temperature, operating conditions and maintenance.

*In the example below, just 5 months of operating at elevated temperatures will reduce the prorated warranty by 1.2 years in the first year. If this trend continues for 14 years more, 17.5 years of the batteries warranty will be used up. In comparison, a system which is at 85°F the majority of the year would only have a prorated warranty of 15 years.*

## Prorated warranty = derating factor at operating temperature (DT) x design life (DL)

<b>PW=</b>	Design Life (Months)						
	Time @ T1 DT1	+	Time @ T2 DT2	+	Time @ T3 DT3	+	Time @ T4 DT4
<b>Operating conditions:</b>	Temperature (°F)		Months % of Life @ Temp.			DT	
	77° or below		7			100	
	80°		2			89	
	85°		2			75	
	95°		1			50	
<b>PW=</b>	240 Months						
	7 months (1.00)	+	2 months (0.89)	+	2 months (0.75)	+	1 month (0.50)
<b>PW=</b>	240 Months						
	7 months	+	2.25 months	+	2.67 months	+	2 months
<b>PW=</b>	$240 \div 13.92 = 17.241 \text{ years}$						

*\*Actual life expected (LA) = derating factor at operating temperature (DT) x design life (DL)*

## Conclusion

Battery warranties all carry specific requirements to be met to maintain compliance and consideration. Each battery manufacturer sets operational limits for warranties, including operation over a range of ambient temperatures, float voltage, normal and equalization charge conditions, depth of discharge, current limits, etc. When operating conditions fall outside the specified limits, guidelines are available for compensating certain control parameters to maintain the design life of the product. Contact the battery manufacturer for specific instructions relating to your battery.

### SBS contact information

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Menomonee Falls, WI 53051-5686

**Email:** stationary@sbsbattery.com

**Toll free:** (800) 554-2243

## References

- IEEE-1187-2002 Recommended Practice for Installation of Valve-Regulated Lead Acid Batteries for Stationary Applications
- IEEE-1189-2005 Recommended Practice for Maintenance, Testing and Replacement of Valve-Regulated Lead Acid Batteries for Stationary Applications
- IEEE-1189-2007 Guide Selection of Valve-Regulated Lead Acid Batteries for Stationary Applications
- IEEE-1657-2009 Recommended Practice for Personnel Qualifications for Installation and Maintenance of Stationary Batteries
- Got Warranty? Taking Another Look At The 20-Year Battery Warranty - Carey O'Donnell & Chuck Finn

## SBS's recommended testing schedule based on IEEE & NERC PRC-005

x—Meets the minimum requirements of NERC PRC-005-2\*

x or x—Meets IEEE Recommendations\*

### Vented/Flooded Lead Acid Batteries (VLA)

#### IEEE450-2010

	Monthly	Quarterly	Yearly	5 years
Visually inspect batteries, rack, charger, room	X	X	X	
Record battery system float voltage and current at battery terminals	X	X	X	
Record charger output voltage and current. Correct, if needed.	X	X	X	
Check electrolyte levels. Fill with distilled water to 'max' line if necessary.	X	X	X	
Record ambient/room temperature	X	X	X	
Make sure ventilation system is operational	X	X	X	
Inspect system for unintentional battery grounds	X	X	X	
Record pilot cell(s) or block(s) voltage and electrolyte temperature	X			
Record pilot cell(s) specific gravity (temp. corrected to 77°F)	X			
Record voltage of ALL cells/blocks				
Record specific gravity of 10% of the cells (temp. corrected to 77°F)		X		
Record temperature of 10% of the cells		X		
Record specific gravity of ALL cells (temp. corrected to 77°F)		X	X	
Record the internal resistance value of ALL cells/blocks			X	
Record temperature of ALL cells/blocks		X	X	
Record internal resistance value of ALL cell-to-cell and terminal connections			X	
Conduct load test two years after installation and then every five years. When the system's capacity falls below 90%, load test annually.				X

### Nickel Cadmium Batteries

#### IEEE1106-2005

	Monthly	Quarterly	Yearly	5 years
Visually inspect batteries, rack, charger, room	X	X	X	
Record battery system float voltage and current at battery terminals	X	X	X	
Record charger output voltage and current. Correct, if needed.	X	X	X	
Check electrolyte levels. Fill with distilled water to 'max' line, if necessary.	X	X	X	
Record ambient/room temperature	X	X	X	
Make sure ventilation system is operational	X	X	X	
Inspect system for unintentional battery grounds	X	X	X	
Record voltage of ALL cells/blocks		X	X	
Record temperature of 10% of the cells	X	X	X	
Record the internal resistance value of ALL cells/blocks			X	
Record temperature of ALL cells/blocks			X	
Record internal resistance value of ALL cell-to-cell and terminal connections			X	
Conduct load test two years after installation and then every five years. When excessive capacity loss is noticed, load test annually.				X

### Valve Regulated Lead Acid Batteries (VRLA)

#### IEEE-1188-2005

	Monthly	Quarterly	Yearly	5 years
Visually inspect batteries, rack, charger, room	X	X	X	
Record battery system float voltage and current at battery terminals	X	X	X	
Record charger output voltage and current. Correct, if needed.	X	X	X	
Record ambient/room temperature	X	X	X	
Make sure ventilation system is operational	X	X	X	
Inspect system for unintentional battery grounds	X	X	X	
Record voltage of ALL cells/blocks		X	X	
Record temperature of ALL cells/blocks at the negative terminal		X	X	
Record the internal resistance value of ALL cells/blocks		X	X	
Record internal resistance value of ALL cell-to-cell and terminal connections			X	
Conduct load test after initial installation and then every two years or 25% of expected battery life				X

\*The above testing schedules are based on SBS's interpretations of both IEEE and NERC PRC-005-2. This information should be used for guidance purposes only and SBS can't be held responsible if the information is incorrect or if other parties interpret the information differently.