

MATERIAL SAFETY DATA SHEET

LEAD ACID BATTERY



Springfield, Missouri

I. PRODUCT IDENTIFICATION:

- A. Chemical/Trade Name (per on label): Lead Acid Battery
- B. Chemical Family/Classification: Electrical Storage Battery
- C. Manufacturer's Name & Address: NorthStar Battery Co. LLC
4000 Continental Way
Springfield, MO 65803
- D. Contact: U.S. - NSB Safety and Health Department
Phone: (417) 575-8219
Fax: (417) 575-8250
Aust. NorthStar Battery Pty Ltd
Phone: 02 9888 1998
- E. Emergency Information: Chemtrec (US, Canada & Mexico)
Phone: (800) 424-9300
Chemtrec (Outside US, Canada & Mexico)
Phone: +1 (703) 527-3887 (call collect)
- F. Non-Hazardous Classification
Per US DOT, Northstar Battery Company products, submitted and tested by Wyle Labs, have been deemed to meet all requirements as specified in 49CFR§ 173.159 (d) for **exception** as hazardous material classification.

II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION:

NORTH AMERICAN INFORMATION:			Air Exposure Limits (ug/m ³)		
Materials	Approx % by Wt.*	CAS Number	OSHA	AGGIH (TLV)	NIOSH
Lead	50	7439-92-1	50	150	100
Lead Oxide	20	1309-60-0	50	150	100
Electrolyte (Sulfuric Acid) 1.400 sg	17	7664-93-9	1	1	1

*Please reference **Appendix I** for detailed product data.

AUSTRALIAN INFORMATION			
Chemical or Material	Australian Dangerous Goods Classification	Hazardous Substance Classification as per NOHSC Australia	Australian Poison Schedule Classification
Non-Spillable Lead Acid Battery	Exempt under A67 (NATA Identification Guide) and Clause 238 of the Australian Dangerous Goods Code, Appendix 3	R34/R41	Schedule 6 Agricultural, Domestic and Industrial Substances

Note: Product contains toxic chemicals that are subject to the reporting requirements of Section 302 and 313 of the Emergency Planning and Community Right-to-Know Act of 1986.

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III. PHYSICAL DATA:

Material is solid at normal temperatures.

A. Electrolyte:

1. Specific Gravity:
 - (a) Standard Product 1.320 +/- 0.01 kg/dm³
 - (b) BLUE Product 1.290 +/- 0.01 kg/dm³
2. Boiling Point: 110°C (230°F)
3. % Volatiles By Weight: Not Applicable
4. Solubility in Water: 100%
5. Melting Point Lead: 327°C (621°F)
6. Vapor Density: Not Determined

B. Appearance and Odor

1. Electrolyte is a clear liquid with an acidic odor.

IV. HEALTH HAZARD INFORMATION:

Under normal operating conditions, because the battery is "non-spillable", the internal material will not be hazardous to your health. Only internally exposed material during production or case breakage or extreme heat (fire) may be hazardous to your health.

A. Routes of Entry:

1. Inhalation: Acid mist from formation process may cause respiratory irritation.
2. Skin Contact: Acid may cause irritation, burns and/or ulceration.
3. Skin Absorption Not a significant route of entry.
4. Eye Contact: Acid may cause sever irritation, burns, cornea damage and/or blindness.
5. Ingestion: Acid may cause irritation of mouth, throat, esophagus and stomach.

B. Signs and Symptoms of Over Exposure:

1. Acute Effects: Over exposure to lead may lead to loss of appetite, constipation, sleeplessness and fatigue. Over exposure to acid may lead to skin irritation, corneal damage of the eyes and upper respiratory system.
2. Chronic Effects: Lead and its components may cause damage to kidneys and nervous system. Acid and its components may cause lung damage and pulmonary conditions.
3. Potential to Cause Cancer: The International Agency for Research on Cancer has classified "strong inorganic acid mist containing sulfuric acid" as a Category 1 carcinogen, a substance that is carcinogenic to humans. This classification does not apply to liquid forms of sulfuric acid or sulfuric acid solutions contained within a battery. Inorganic acid mist is not generated under normal use of this product. Misuse of the product, such as overcharging, may however result in the generation of sulfuric acid mist.

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- C. Emergency and First Aid Procedures:
1. Inhalation: Remove from exposure, move to fresh air, and apply oxygen if breathing is difficult. Consult physician immediately.
 2. Skin: Wash with plenty of soap and water for at least 15 minutes. Remove any contaminated clothing. Consult physician if skin irritation appears.
 3. Eyes: Flush with plenty of water immediately for at least 15 minutes, lifting lower and upper eyelids occasionally. Consult a physician immediately.
 4. Ingestion: Do not induce vomiting. Give large quantities of water. Never give anything by mouth to an unconscious person. Consult a physician immediately.
- D. HANDLING AND STORAGE
1. Safe Storage: Store in a cool, dry place in closed containers. Keep away from ignition sources and high temperatures.
 1. Contact NorthStar Battery Company (417-575-8200) for shelf life information.
 2. Handling: Avoid skin or eye contact. Avoid breathing vapors. Do not use near sources of ignition
- V. CARCINOGENICITY: See section IV, Part B "Signs and Symptoms of Over Exposure"
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: See section IV, Part B "Signs and Symptoms of Over Exposure"
- VI. FIRE AND EXPLOSION HAZARD DATA:
- A. Flash Point: Hydrogen = 259°C
 - B. Auto ignition Temperature: Hydrogen = 580°C
 - C. Extinguishing Media: Dry chemical, foam, CO₂
 - D. Unusual Fire and Explosion Hazards: Hydrogen and oxygen gases are produced in the cells during normal battery operation (hydrogen is flammable and oxygen supports combustion). These gases enter the air through the vent caps. To avoid the chance of a fire or explosion, keep sparks and other sources of ignition away from the battery.
 - E. Firefighting PPE: Full protective clothing and
NIOSH-approved self-contained breathing apparatus with full facepiece
- VII. REACTIVITY DATA:
- A. Stability: Stable
 - B. Conditions to Avoid: Sparks and other sources of ignition.
 - C. Incompatibility: (materials to avoid)

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1. Lead/lead compounds: Potassium, carbides, sulfides, peroxides, phosphorus, sulfur.
 2. Battery electrolyte (acid): Combustible materials, strong reducing agents, most metals, carbides, organic materials, chlorates, nitrates, picrates, and fulminates.
- D. Hazardous Decomposition Products:
1. Lead/lead compounds: Oxides of lead and sulfur.
 2. Battery electrolyte (acid): Hydrogen, sulfur dioxide, and sulfur trioxide.
- E. Conditions to Avoid:
- High temperature. Battery electrolyte (acid) will react with water to produce heat. Can react with oxidizing or reducing agents.

VIII. CONTROL MEASURES:

- A. Engineering Controls:
- Store lead/acid batteries with adequate ventilation. Room ventilation is required for batteries utilized for standby power generation. Never recharge batteries in an unventilated, enclosed space.
- B. Work Practices:
- Do not remove vent covers. Follow shipping and handling instructions which are applicable to the battery type. To avoid damage to terminals and seals, do not double-stack industrial batteries.
- C. Personal Protective Equipment:
1. Respiratory Protection: None required under normal handling conditions. During battery formation (high-rate charge condition), acid mist can be generated which may cause respiratory irritation. Also, if acid spillage occurs in a confined space, exposure may occur. If irritation occurs, wear a respirator suitable for protection against acid mist.
 2. Eyes and Face: Chemical splash goggles are preferred. Also acceptable are "visor-gogs" or a chemical face shield worn over safety glasses.
 3. Hands, Arms, Body: Vinyl coated, VC, gauntlet type gloves with rough finish are preferred.
 4. Other Special Clothing and Equipment: Safety shoes are recommended when handling batteries. All footwear must meet requirements of ANSI Z41.1 -Rev. 1972.

IX. ACCIDENTAL RELEASE MEASURES:

- A. Not applicable under normal conditions.
- B. In case of damage resulting in breakage of the battery container, see VIII, Sec. C Personal Protective Equipment.

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X. PRECAUTIONS FOR SAFE HANDLING AND USE:

- A. Hygiene Practices: Following contact with internal battery components, wash hands thoroughly before eating, drinking, or smoking.
- B. Respiratory Protection: Wear safety glasses. Do not permit flames or sparks in the vicinity of battery(s). If battery electrolyte (acid) comes in contact with clothing, discard clothing.
- C. Protective Measures:
1. Remove combustible materials and all sources of ignition. Cover spills with soda ash (sodium carbonate) or quicklime (calcium oxide). Mix well. Make certain mixture is neutral, then collect residue and place in a drum or other suitable container. Dispose of as hazardous waste.
 2. Wear acid-resistant boots, chemical face shield, chemical splash goggles, and acid-resistant gloves. Do not release unneutralized acid.
- D. Waste Disposal Method (*):
1. Battery electrolyte (acid): Neutralize as above for a spill, collect residue, and place in a drum or suitable container. Dispose of as hazardous waste.
 2. Do not flush lead contaminated acid to sewer.
 3. In case of accidental spill, utilize personal protective equipment, i.e., face shield, rubber apron, rubber safety shoes.
 4. Batteries: Send to lead smelter for reclamation following applicable Federal, State and local regulations. Product can be recycled along with automotive (SLI) lead acid batteries.
 5. Battery may be returned, shipping pre-paid, to the manufacturer or any distributor for recycling. See 1.C for manufacturer's address or visit our web site @ www.northstarbattery.com.
- *In accordance to Local, State and Federal regulations and laws.
- E. Other Handling and Storage Precautions: None Required.

XI. ECOLOGICAL INFORMATION:

Lead and its compounds can pose a threat if released to the environment.
See Waste Disposal Method in Section X, Part D.

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XII. NFPA HAZARD RATING: SULFURIC ACID:

Flammability (Red)	=	0
Health (Blue)	=	3
Reactivity (Yellow)	=	1

XIII. DEPARTMENT OF TRANSPORTATION AND INTERNATIONAL SHIPPING REGULATIONS:

Proper Shipping Name	UN2800 - Battery, wet, non-spillable (electric storage)
IATA	Batteries must be packed to protect against short circuits and firmly secured to skids or pallets. Packaging instruction 806 Not restricted per special provision A67.
US DOT	Northstar Battery Company products, submitted and tested by Wyle Labs, have been deemed to meet all requirements as specified in 49CFR§ 173.159 (d) for exception as hazardous material classification.
IMDG	Northstar Battery Company products, submitted and tested by Wyle Labs, have been deemed to meet all requirements as specified in special provision 238 for determination of "Non-Spillable" and are not subject to the provision of this Code.

XIV. SPECIAL REQUIREMENTS:

TLV

- Sulfuric Acid - Occupation Exposure Limit - AUSTRALIA TWA 1mg/m³, JAN1993
- Lead - Occupation Exposure Limit - AUSTRALIA TWA 0.15 mg/m³, 2002



NorthStar Battery Lead and Acid Weights per 12-Volt Module

Battery Type			NSB13	NSB40	NSB70	NSB75	NSB90	NSB125	NSB40FT	NSB60FT	NSB90FT	NSB100FT	NSB100BT NSB100 BLUE	NSB110FT	NSB130FT	NSB155FT	NSB170FT	NSB170BT NSB170 BLUE
Electrolyte	Weight	/kg	0.8	27	45	45	62	85	24	38	53	61	61	68	81	99	105	105
		/lbs	1.8	59	99	99	138	186	53	83	116	134	134	149	178	218	232	232
	Volume	/litres	0.6	20	34	34	47	63	18	28	39	45	45	50	60	74	78	78
		/gallons	0.2	0.5	0.9	0.9	1.2	1.7	0.5	0.7	1.0	1.2	1.2	1.3	1.6	20	208	208
Acid	Weight	/kg	0.4	1.2	20	20	28	38	1.1	1.7	24	28	28	30	36	44	48	48
		/lbs	0.8	26	43	44	62	84	24	3.7	5.2	6.1	6.1	6.7	80	97	10.5	10.5
	Volume	/litres	0.2	0.6	1.1	1.1	1.5	2.1	0.6	0.9	1.3	1.5	1.5	1.7	20	24	26	26
		/gallons	0.1	0.2	0.3	0.3	0.4	0.6	0.2	0.2	0.3	0.4	0.4	0.4	0.5	0.6	0.7	0.7
	% Acid Weight to Total Weight		7%	7%	7%	7%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%	8%
Lead	Weight	/kg	23	89	149	146	197	220	7.2	9.8	136	156	156	184	205	232	266	266
		/lbs	6.4	19.7	32.9	32.2	43.5	48.4	15.8	21.7	30.0	34.5	34.5	40.6	45.1	51.1	58.7	58.7
Lead Oxide	Weight	/kg	1.7	3.2	4.7	5.3	7.5	10.4	3.0	4.7	6.3	8.0	8.0	8.4	10.1	11.4	13.6	13.6
		/lbs	2.3	7.0	10.4	11.7	16.5	23.0	6.5	10.3	13.9	17.7	17.7	18.6	22.2	25.2	29.9	29.9
Cells	# of Cells		6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Total Weight	Weight	/kg	5.7	16.3	26.8	26.7	35.4	44.3	14.1	21.6	30.5	33.5	33.5	38.7	43.4	51.9	58.2	58.2
		/lbs	11.7	36.0	59.0	59.0	78.0	98.0	31.0	48.0	67.0	74.0	74.0	85.0	96.0	114.0	128.0	128.0



NorthStar UPS Battery Lead and Acid Weights per 12-Volt Module

Battery Type			NSB 12-180	NSB 12-330	NSB 12-270	NSB 12-370	NSB 12-475	NSB 12-150FT	NSB 12-330FT	NSB 12-380FT	NSB 12-450FT	NSB 12-600FT
Electrolyte	Weight	/kg	27	45	45	62	85	24	53	61	68	105
		/lbs	5.9	9.9	9.9	13.8	18.6	5.3	11.6	13.4	14.9	23.2
	Volume	/litres	2.0	3.4	3.4	4.7	6.3	1.8	3.9	4.5	5.0	7.8
		/gallons	0.5	0.9	0.9	1.2	1.7	0.5	1.0	1.2	1.3	2.08
Acid	Weight	/kg	1.2	2.0	2.0	2.8	3.8	1.1	2.4	2.8	3.0	4.8
		/lbs	2.6	4.3	4.4	6.2	8.4	2.4	5.2	6.1	6.7	10.5
	Volume	/litres	0.6	1.1	1.1	1.5	2.1	0.6	1.3	1.5	1.7	2.6
		/gallons	0.2	0.3	0.3	0.4	0.6	0.2	0.3	0.4	0.4	0.7
	% Acid Weight to Total Weight		7%	7%	7%	8%	8%	8%	8%	8%	8%	8%
Lead	Weight	/kg	8.9	14.9	14.6	19.7	22.0	7.2	13.6	15.6	18.4	26.6
		/lbs	19.7	32.9	32.2	43.5	48.4	15.8	30.0	34.5	40.6	58.7
Lead Oxide	Weight	/kg	3.2	4.7	5.3	7.5	10.4	3.0	6.3	8.0	8.4	13.6
		/lbs	7.0	10.4	11.7	16.5	23.0	6.5	13.9	17.7	18.6	29.9
Cells	# of Cells		6	6	6	6	6	6	6	6	6	6
Total Weight	Weight	/kg	16.3	26.8	26.7	35.4	44.3	14.1	30.5	33.5	38.7	58.2
		/lbs	36.0	59.0	59.0	78.0	98.0	31.0	67.0	74.0	85.0	128.0



NorthStar Marine Battery Lead and Acid Weights per 12-Volt Module

Battery Type			NSBM 12-70	NSBM 12-100	NSBM 12-115	NSBM 12-130	NSBM 12-210
Electrolyte	Weight	/kg	3.8	5.3	6.1	6.8	105
		/lbs	8.3	11.6	13.4	14.9	232
	Volume	/litres	2.8	3.9	4.5	5.0	7.8
		/gallons	0.7	1.0	1.2	1.3	2.08
Acid	Weight	/kg	1.7	2.4	2.8	3.0	4.8
		/lbs	3.7	5.2	6.1	6.7	10.5
	Volume	/litres	0.9	1.3	1.5	1.7	2.6
		/gallons	0.2	0.3	0.4	0.4	0.7
	% Acid Weight to Total Weight		8%	8%	8%	8%	8%
Lead	Weight	/kg	9.8	13.6	15.6	18.4	26.6
		/lbs	21.7	30.0	34.5	40.6	58.7
Lead Oxide	Weight	/kg	4.7	6.3	8.0	8.4	13.6
		/lbs	10.3	13.9	17.7	18.6	29.9
Cells	# of Cells	6	6	6	6	6	
Total Weight	Weight	/kg	21.6	30.5	33.5	38.7	58.2
		/lbs	48.0	67.0	74.0	85.0	128.0



NorthStar Engine Start Battery Lead and Acid Weights per 12-Volt Module

Battery Type			NSBG-2200	NSBG-2700	NSBG-2400	NSBG-3100
Electrolyte	Weight	/kg	27	45	45	62
		/lbs	5.9	9.9	9.9	13.8
	Volume	/litres	20	3.4	3.4	4.7
		/gallons	0.5	0.9	0.9	1.2
Acid	Weight	/kg	1.2	2.0	2.0	2.8
		/lbs	2.6	4.3	4.4	6.2
	Volume	/litres	0.6	1.1	1.1	1.5
		/gallons	0.2	0.3	0.3	0.4
	% Acid Weight to Total Weight		7%	7%	7%	8%
Lead	Weight	/kg	8.9	14.9	14.6	19.7
		/lbs	19.7	32.9	32.2	43.5
Lead Oxide	Weight	/kg	3.2	4.7	5.3	7.5
		/lbs	7.0	10.4	11.7	16.5
Cells	# of Cells	6	6	6	6	
Total Weight	Weight	/kg	16.3	26.8	26.7	35.4
		/lbs	36.0	59.0	59.0	78.0