



APPLICATION NOTE NO. 71

Revised October 2012

Desiccant Use and Regeneration (drying)

This application note applies to all Sea-Bird instruments intended for underwater use. The application note covers:

- When to replace desiccant
- Storage and handling of desiccant
- Regeneration (drying) of desiccant
- Material Safety Data Sheet (MSDS) for desiccant – see the Süd-Chemie website (www.sud-chemie.com) for updates

When to Replace Desiccant Bags

Before delivery of the instrument, a desiccant package is placed in the housing, and the electronics chamber is filled with dry Argon. These measures help prevent condensation. To ensure proper functioning:

1. Install a new desiccant bag each time you open the housing and expose the electronics.
2. If possible, dry gas backfill each time you open the housing and expose the electronics. If you cannot, wait at least 24 hours before redeploying, to allow the desiccant to remove any moisture from the chamber.

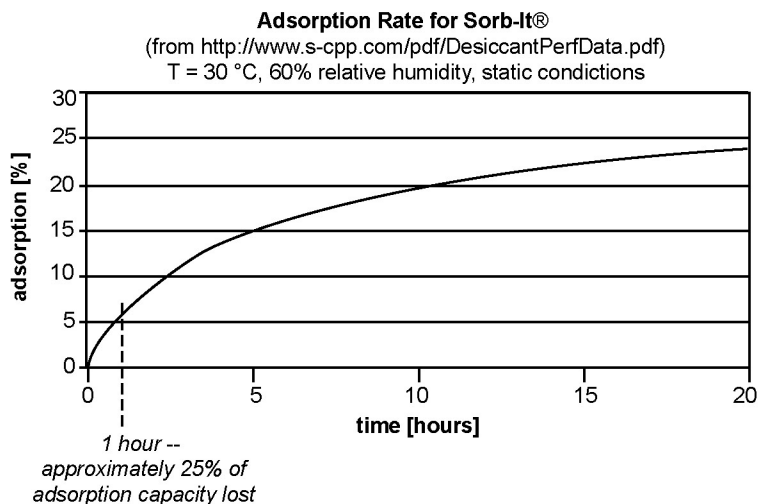
What do we mean by *expose the electronics*?

- For most battery-powered Sea-Bird instruments (such as SBE 16, 16*plus*, 16*plus* V2, 16*plus*-IM, 16*plus*-IM V2, 17*plus*, 19, 19*plus*, 19*plus* V2, 25, 25*plus*, 26, 26*plus*, 37[SM, SMP, SMP-IDO, SMP-ODO, IM, IMP, IMP-IDO, IMP-ODO], 44, 53, 54, 55, Auto Fire Module [AFM]), there is a bulkhead between the battery and electronics compartments. Battery replacement does not affect desiccation of the electronics, as the batteries are removed without removing the electronics and no significant gas exchange is possible through the bulkhead. Therefore, opening the battery compartment to replace the batteries does not expose the electronics; you do not need to install a new desiccant bag in the electronics compartment each time you open the battery compartment. For these instruments, install a new desiccant bag if you open the electronics compartment to access the printed circuit boards.
- For the SBE 39, 39-IM, and 48, the electronics must be removed or exposed to access the battery. Therefore, install a new desiccant bag each time you open the housing to replace a battery.

Storage and Handling

Testing by Süd-Chemie (desiccant’s manufacturer) at 60% relative humidity and 30 °C shows that approximately 25% of the desiccant’s adsorbing capacity is used up after only 1 hour of exposure to a constantly replenished supply of moisture in the air. In other words, if you take a bag out of a container and leave it out on a workbench for 1 hour, one-fourth of its capacity is gone before you ever install it in the instrument. Therefore:

- Keep desiccant bags in a tightly sealed, impermeable container until you are ready to use them. Open the container, remove a bag, and quickly close the container again.
- Once you remove the bag(s) from the sealed container, rapidly install the bag(s) in the instrument housing and close the housing.
Do not use the desiccant bag(s) if exposed to air for more than a total of 30 minutes.



Regeneration (drying) of Desiccant

Replacement desiccant bags are available from Sea-Bird:

- PN 60039 is a metal can containing 25 1-gram desiccant bags and 1 humidity indicator card. The 1-gram bags (PN 30558) are used in our smaller diameter housings, such as the SBE 3 (*plus*, F, and S), 4 (M and C), 5T and 5P, 37 (SI, SIP, SIP-IDO, SIP-ODO, SM, SMP, SMP-IDO, SMP-ODO, IM, IMP, IMP-IDO, IMP-ODO), 38, 39, 39-IM, 43, 44, 45, 48, 49, 50, and 63.
- PN 31180 is a 1/3-ounce desiccant bag, used in our SBE 16*plus*, 16*plus* V2, 16*plus*-IM, 16*plus*-IM V2, 19*plus*, 19*plus* V2, 21, and 52-MP.
- PN 30051 is a 1-ounce desiccant bag. The 1-ounce bags are used in our larger diameter housings, such as the SBE 9*plus*, 16, 17*plus*, 19, 25, 26, 26*plus*, 32, 53 BPR, 54, 55, AFM, and PDIM.

However, if you run out of bags, you can regenerate your existing bags using the following procedure provided by the manufacturer (Süd-Chemie, a Division of Clariant):

MIL-D-3464 Desiccant Regeneration Procedure

Regeneration of the United Desiccants' Tyvek Desi Pak[®] or Sorb-It[®] bags or United Desiccants' X-Crepe Desi Pak[®] or Sorb-It[®] bags can be accomplished by the following method:

1. Arrange the bags on a wire tray in a single layer to allow for adequate air flow around the bags during the drying process. The oven's inside temperature should be room or ambient temperature (25 – 29.4 °C [77 – 85 °F]). **A convection, circulating, forced-air type oven is recommended for this regeneration process. Seal failures may occur if any other type of heating unit or appliance is used.**
2. When placed in forced air, circulating air, or convection oven, allow a minimum of 3.8 to 5.1 cm (1.5 to 2.0 inches) of air space between the top of the bags and the next metal tray above the bags. If placed in a radiating exposed infrared-element type oven, shield the bags from direct exposure to the heating element, giving the closest bags a minimum of 40.6 cm (16 inches) clearance from the heat shield. Excessive surface film temperature due to infrared radiation will cause the Tyvek material to melt and/or the seals to fail. Seal failure may also occur if the temperature is allowed to increase rapidly. This is due to the fact that the water vapor is not given sufficient time to diffuse through the Tyvek material, thus creating internal pressure within the bag, resulting in a seal rupture. Temperature should not increase faster than 0.14 to 0.28 °C (0.25 to 0.50 °F) per minute.
3. Set the temperature of the oven to 118.3 °C (245 °F), and allow the bags of desiccant to reach equilibrium temperature. **WARNING:** Tyvek has a melt temperature of 121.1 – 126.7 °C (250 – 260 °F) (Non MIL-D-3464E activation or reactivation of both silica gel and Bentonite clay can be achieved at temperatures of 104.4 °C [220 °F]).
4. Desiccant bags should be allowed to remain in the oven at the assigned temperature for 24 hours. At the end of the time period, the bags should be immediately removed and placed in a desiccator jar or dry (0% relative humidity) airtight container for cooling. If this procedure is not followed precisely, any water vapor driven off during reactivation may be re-adsorbed during cooling and/or handling.
5. After the bags of desiccant have been allowed to cool in an airtight desiccator, they may be removed and placed in either an appropriate type polyliner tightly sealed to prevent moisture adsorption, or a container that prevents moisture from coming into contact with the regenerated desiccant.

NOTE: Use only a metal or glass container with a tight fitting metal or glass lid to store the regenerated desiccant. Keep the container lid **closed tightly** to preserve adsorption properties of the desiccant.

Application Note Revision History

Date	Description
November 2002	Initial release.
September 2003	Add reference to newer instruments – 16plus-IM, 37-SMP, 37-IMP.
July 2005	<ul style="list-style-type: none">• Add information on use in SBE 37-SIP, 39-IM, 52-MP, and 53 BPR.• Remove '90208' from AFM name (90208 is AFM with standard connectors).
Mar 2008	<ul style="list-style-type: none">• Add applicability to V2 Seacats (16plus V2, 16plus-IM V2, 19plus V2).• Add applicability to SBE 5P, 54, and 55.
October 2012	<ul style="list-style-type: none">• Add applicability to SBE 25plus, IDO and ODO MicroCATs, and SBE 63.• Update MSDS from Süd-Chemie.• Change ownership information for Süd-Chemie.

MATERIAL SAFETY DATA SHEET



Date Issued: 12/01/2004
MSDS No: 5015
Date-Revised: 07/12/2010
Revision No: 2

Sorb-It®

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Sorb-It®
GENERAL USE: Desiccant

MANUFACTURER

Süd-Chemie Performance Packaging
101 Christine Drive
Rio Grande Industrial Park
Belen, NM 87002
Customer Service: 505-864-6691

24 HR. EMERGENCY TELEPHONE NUMBERS

CHEMTREC : (800) 424 - 9300
Outside the U.S. Call Collect : 001 (703) 527-3887

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

PHYSICAL APPEARANCE: Performance packaging product, size and type vary.

IMMEDIATE CONCERNS: Poses little or no immediate hazard.

POTENTIAL HEALTH EFFECTS

EYES: Route of exposure unlikely. Dust may cause a mechanical irritation which can scratch the eye.

SKIN: No adverse effects expected.

INGESTION: Non-toxic by ingestion. Packets or canisters may pose a choking hazard. Keep away from children and pets.

INHALATION: No adverse effects expected.

MEDICAL CONDITIONS AGGRAVATED: None

ROUTES OF ENTRY: Ingestion, skin

TARGET ORGAN STATEMENT: None

3. COMPOSITION / INFORMATION ON INGREDIENTS

INGREDIENT(S)	CAS	% BY WEIGHT
Pouch, Bag, Canister, Stopper, or Cap		1 - 75
Silica Gel	63231-67-4	25 - 99

See Section 8 for Exposure Limits

4. FIRST AID MEASURES

EYES: Do not rub eyes. Flush with lukewarm, gently flowing water for 5 minutes or until the particle/dust is removed, while holding the eyelid(s) open. Obtain medical attention.

SKIN: Wash with soap and water.

INGESTION: Normally not needed. If whole canisters or sachets are ingested, call a physician or your local Poison Control Center (1-800-222-1222 in the United States).

INHALATION: Remove to fresh air. Seek medical attention if cough or other symptoms develop or persist.

5. FIRE FIGHTING MEASURES

FLASHPOINT AND METHOD: Material is not flammable

EXTINGUISHING MEDIA: Use extinguishing agent applicable to surrounding fire.

FIRE FIGHTING PROCEDURES: As in any fire, wear self-contained breathing apparatus operated in pressure-demand mode, (NIOSH approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

SMALL SPILL: No special precautions required.

LARGE SPILL: With shovel or scoop, place material into appropriate container.

7. HANDLING AND STORAGE

GENERAL PROCEDURES: There are little or no health hazards associated with intact product package. Do not cut, open or remove chemical agent from package.

HANDLING: Use of proper hygiene practices in the workplace is recommended.

STORAGE: Store in a dry area.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE GUIDELINES

HAZARDOUS COMPONENTS					
		EXPOSURE LIMITS			
		OSHA PEL		ACGIH TLV	
Chemical Name		ppm	mg/m ³	ppm	mg/m ³
Silica Gel	TWA	[1]	[1]	[2]	[2]
OSHA TABLE COMMENTS: 1. (80 mg/m ³)/(%SiO ₂) 2. TLV® withdrawn					

ENGINEERING CONTROLS: If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Follow facility guidelines.

SKIN: Use of proper hygiene practices in the workplace is recommended.

RESPIRATORY: Good general ventilation should be sufficient to control airborne levels.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: Solid

ODOR: None

pH: Not Determined

PERCENT VOLATILE: None

VAPOR PRESSURE: Not applicable.

SOLUBILITY IN WATER: Insoluble

10. STABILITY AND REACTIVITY

STABLE: Yes

HAZARDOUS POLYMERIZATION: No

11. TOXICOLOGICAL INFORMATION

ACUTE

ORAL LD₅₀: Silica gels are very low in oral toxicity based on comparison to related forms of silica. No adverse effects have been observed in experimental animals following ingestion of any form of amorphous silica. (*Silica. In: IARC Monographs on the evaluation of the carcinogenic risk of chemicals to humans. Volume 42. Silica and some silicates. International Agency for Research on Cancer, 1987. p. 39-143*)

CARCINOGENICITY

Chemical Name	NTP Status	IARC Status	OSHA Status
Silica Gel	Not listed.	Not listed.	Not listed.

SENSITIZATION: Not sensitizing

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL DATA: Low hazard for usual industrial or commercial handling.

CHEMICAL FATE INFORMATION: This material is of mineral origin. It is not biodegradable.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: This product, if discarded as sold, is not a Federal RCRA hazardous waste. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations.

14. TRANSPORT INFORMATION

DOT (DEPARTMENT OF TRANSPORTATION)

PROPER SHIPPING NAME: Not regulated

ROAD AND RAIL (ADR/RID)

PROPER SHIPPING NAME: Not regulated

AIR (ICAO/IATA)

SHIPPING NAME: Not regulated

VESSEL (IMO/IMDG)

SHIPPING NAME: Not regulated

CANADA TRANSPORT OF DANGEROUS GOODS

SHIPPING NAME: Not regulated

15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

FIRE: No **PRESSURE GENERATING:** No **REACTIVITY:** No **ACUTE:** No **CHRONIC:** No
313 REPORTABLE INGREDIENTS: Not listed.

CERCLA (COMPREHENSIVE RESPONSE, COMPENSATION, AND LIABILITY ACT)

CERCLA REGULATORY: Not listed.

TSCA (TOXIC SUBSTANCE CONTROL ACT)

TSCA STATUS: All components are listed on the TSCA Inventory or are excluded or exempt.

REGULATIONS

STATE REGULATIONS: California

CALIFORNIA PROPOSITION 65: This product does not contain chemical(s) known to the state of California to cause cancer, birth defects, or reproductive harm.

RCRA STATUS: This product, if discarded as sold, is not a Federal RCRA hazardous waste. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations.

CANADA

WHMIS (WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM): This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

CANADA INGREDIENT DISCLOSURE LIST: Does not contain chemicals listed on the Canadian Ingredient Disclosure List

CANADIAN ENVIRONMENTAL PROTECTION ACT: All ingredients are listed on the Canadian Domestic Substances List inventory.

16. OTHER INFORMATION

APPROVED BY: Prepared and approved by SHE Dept. Sud-Chemie Inc.

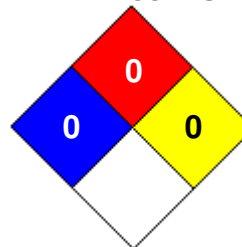
INFORMATION CONTACT: 502-634-7492

REVISION SUMMARY: Revision #: 2. This MSDS replaces the July 12, 2010 MSDS., , Any changes in information are as follows: In Section 9: (Group Field) for Vapor Pressure In Section 14: International (IMO /IMDG) - Proper Shipping Name, Air (IATA /ICAO) - Proper Shipping Name, TDG Proper Shipping Name, ADR/RID (Transport by Road and Rail) - Shipping Name In Section 16: HMIS Health (chronic '*')

HMIS RATING

HEALTH:	0
FLAMMABILITY:	0
PHYSICAL HAZARD:	0
PERSONAL PROTECTION:	

NFPA CODES



HMIS RATINGS NOTES: Personal Protection should be determined based on workplace conditions.

MANUFACTURER DISCLAIMER: The information presented herein is believed to be accurate but is not warranted. Recipients are advised to confirm in advance that the information is current, applicable and suitable to their circumstances.