

**Official Technical Report on Humidity-Sorb™ Blanket  
Trials with Mediterranean Shipping Corp (MSC) in Miami  
With Oceanic Transport Containers**

**Introduction**

Red Lion Chem Tech (RLCT) has developed a humidity controlling system that absorbs moisture in ambient air in an enclosed space and thus automatically adjusts the indoor humidity to an appropriate range of 30%–50% relative humidity (RH). Research has shown that RH levels of above 65% can promote microbial growth, while those below 25% can lead to brittleness and cracking. The application of a humidity controlling system that keeps transport container contents in the proper humidity range has the advantages of zero energy consumption, no pollution to the environment, ease of handling and can be regenerated.

The humidity controlling system developed by RLCT is the Humidity-Sorb™ Blanket. Units are placed in closed ocean going vessels for 4 to 6 weeks during transport in order to control ambient RH. The number and size of Humidity-Sorb™ Blankets is adjusted based on the size of the ocean going container (20 or 40 ft length) and the percent open space in the container not occupied by goods being transported. This assures optimal RH control.

**Standard Protocol Used for Both MSC Trials:**

1. All blankets kept under seal, unopened, in plastic bags until step 4/5 below.
2. Before starting, examine the 8'x8'x20' unfilled container for air leaks as follows:
  - a. Enter Container
  - b. Close Doors
  - c. Examine for light (total darkness required)
  - d. If light appears, seal all holes with masking tape
  - e. Door leaks may need to be sealed at Step 6.
3. Introduce the three remote sensors, as follows:
  - a. The first sensor shall be placed within 1 meter of the entry way.
  - b. The second sensor shall be placed 10 feet from the entry way.

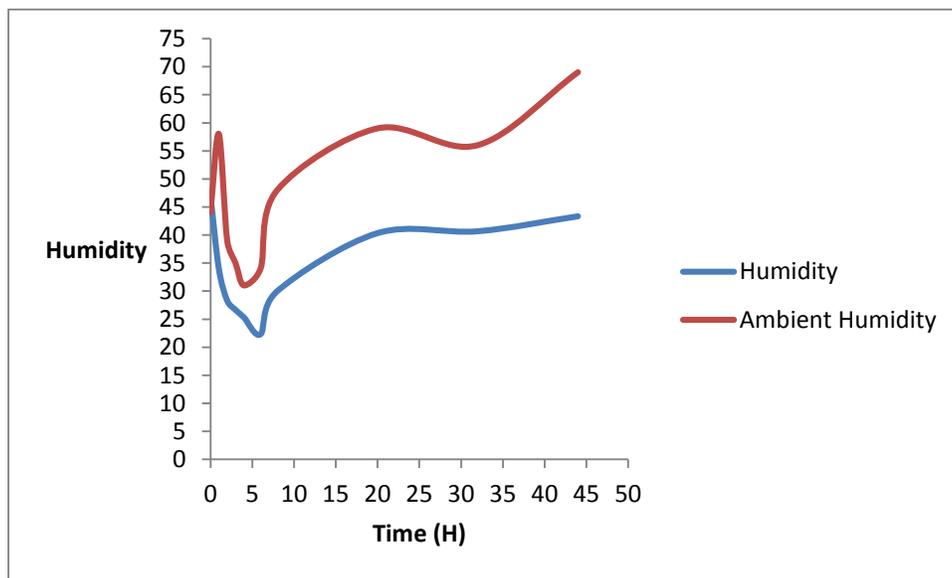
- c. The third sensor shall be placed at the rear of the container.
- d. Pre-equilibrate the humidity monitor with the 3 sensors inside the container before proceeding to the next steps.
4. With the door closed (as much as possible), open the blanket containers one at a time. Tie ropes on to the grommets. Reseal the bags until all ropes are tied on all blankets .
5. Rapidly hang the blankets and seal the door as follows:
  - a. First hang two (2) blankets along the sides of each wall, for a total of four (4) blankets.
  - b. Next hang three (3) additional blankets at the five (5) foot, ten (10) foot and fifteen (15) foot distances parallel to the walls of the container.
6. Close the container doors and seal them if necessary (if light is noticed)
7. Write down the humidity measurement every hour for the first four hours. Then measure every two hours for the next 4 hours. After that measure every 12 hours.

**MSC Controlled Trial #1:**

In the MSC controlled Trail #1, one empty 8’x8’x20’ container was employed as described in the Standard Protocol above. Ambient (outside) RH and Internal RH were measured remotely over several days using remote read sensors placed within the container.

**Results:** The results are show in Figure 1. The Humidity-Sorb™ blanket started to absorb moisture from the container immediately within the first hour and held it between 23 to 45% even though outside Ambient RH rose to over 70%.

**Figure 1**



**Trial 1 Conclusions:** In the first Controlled MSC Trial, the humidity absorption abilities of the Humidity-Sorb™ composite material were investigated at various Ambient and “within Container” relative humidity’s. From the data in figure 1, after 4hours the humidity was reduced by 52.5% and held in range, temperature was 46-54° F.

### **MSC Controlled Trial #2:**

In the MSC Controlled Trial #2, two 8’x8’x20’ containers were used. One container received no Humidity-Sorb™ blankets but contained a 5 gallon open pail of water. The second container contained a 5 gallon open pail of water and Humidity-Sorb™ blankets.

**Results:** The results for MSC Controlled Trial # 2 are shown in Figures 2 & 3. Figure 2 shows the initial shorter time according to the trial protocol. Figure 3 shows the extended time results. Each Figure 2 and 3 shows the Ambient RH, the Internal Humidity result for Container 1, water only (Humidity A), and the Internal Humidity results for Container 2, water + blankets (Humidity B).

The second trial had heavy rain during the study.

### **Figure 2**

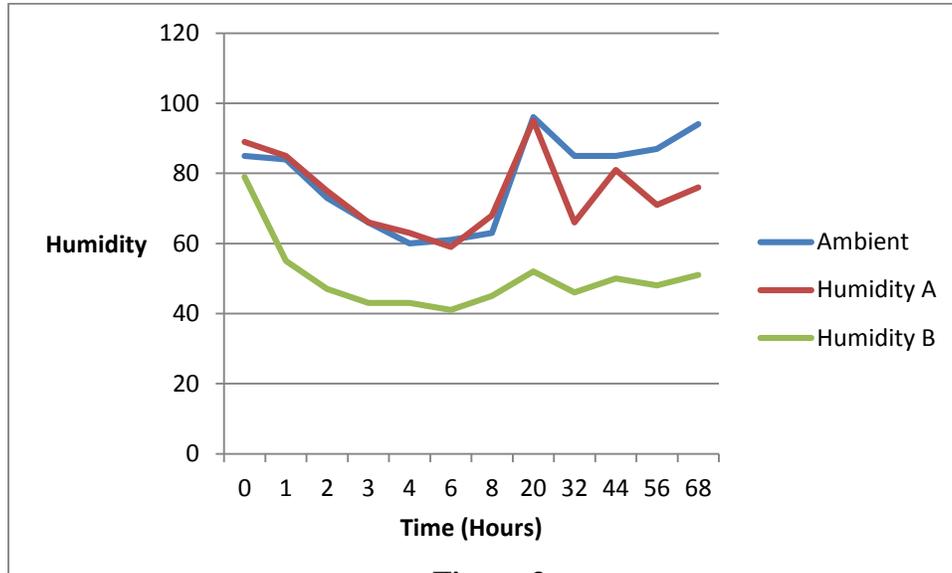
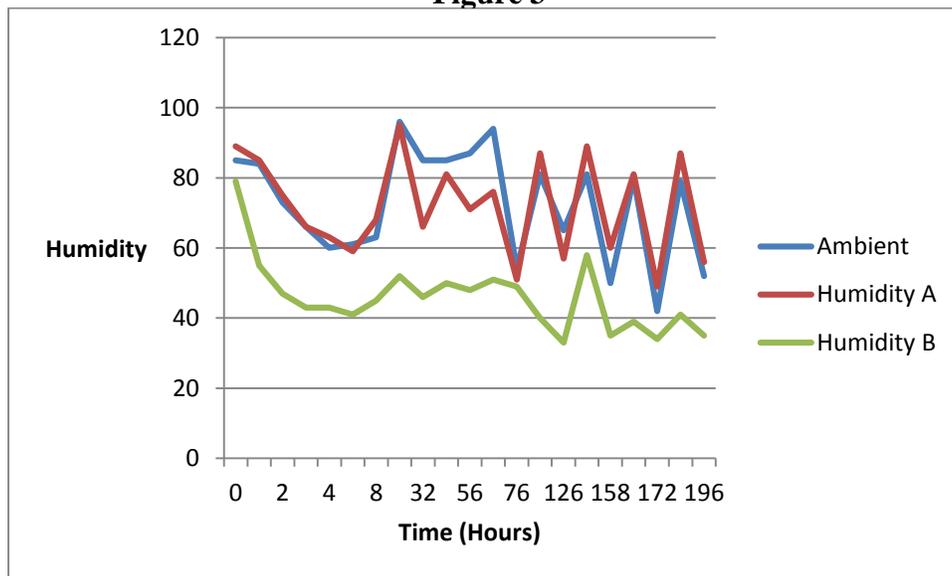


Figure 3



**Trial 2 Conclusions:** From the data in figures 2 and 3, after 6 hours, humidity was reduced by 47.5% by Humidity-Sorb™ blankets and was held there in spite of heavy rains and subsequent sunshine.

Appendix A

**RLCT Prototype Humidity-Sorb™ Blanket**



Appendix B

Container Preparation



Appendix C

Humidity Meter

