

June, 2024

TECHNICAL SERVICE BULLETIN SB-2024-06-01A Rev B

Subject: Vapor Shipper NER and Hold Times (Metric)

This Service Bulletin provides customers with instructions and guidelines for performing Hold Time testing on the CX/CXR Series, D/DX Series, and TW Dual Series Vapor Shipper products.

While the Normal Evaporation Rate (NER) is mentioned in IC Biomedical's marketing materials for Vapor Shippers, the Hold Time is the critical factor to consider when testing the performance of these products. The Hold Time values represent tanks observed in a static setting, meaning the tanks were left undisturbed in controlled conditions without any lid openings for a set period.

We acknowledge that our vessels are often used in non-static conditions. Therefore, the figures provided are intended as general estimates. These values can vary due to a range of uncontrolled parameters, and test results that are within 10% above the documented specifications should still be considered acceptable.

Additionally, it is important to note that the cool-down period required to perform the NER hold test can vary depending on the size of the vessel. To accommodate all vessel sizes, this procedure will use a standardized 48-hour cool-down period.

Procedure for Estimating Normal Evaporation Rate and Hold Time

Please note that weights are measured in kilograms (kgs). Ensure that scales are set to kgs and not lbs when performing hold time testing.

1. Weighing the Empty Vessel

- **Step 1:** Weigh the empty vessel and record the weight in kgs [W1].
 - o Note: The vessel should be weighed with the necktube cork fitted, but without any racks or canisters inside.

2. Filling the Vessel with Liquid Nitrogen (LN2)

- **Step 2:** Remove the necktube cork and fill the vessel to the bottom of the necktube with liquid nitrogen (LN2).
 - o The liquid nitrogen should be at a saturation pressure of 22 psi or below.
 - o Replace the necktube cork between fills.
- **Step 3:** Repeat the filling process until the liquid has stopped rapidly boiling and the level has stabilized at the bottom of the necktube.

 1-855-750-8191

 www.icbiomedical.com

 1031 Cass White Road, NW
Cartersville, Georgia 30121

3. Thermal Equilibrium

- **Step 4:** When the liquid level has stabilized at the bottom of the necktube, install the necktube cork and allow the shipper to stand undisturbed for a minimum of 12 hours to reach thermal equilibrium.

4. Ensuring Liquid Level Stability

- **Step 5:** After the 12 hours, ensure that the liquid level is still at the bottom of the necktube. If the liquid level is lower, top off the liquid to the bottom of the necktube and leave undisturbed for an additional hour with the necktube cork installed.

5. Removing Excess Liquid

- **Step 6:** With the liquid fully absorbed, the excess liquid needs to be poured off to start the testing process.
 - o Carefully tilt the tank to a 45-degree angle, allowing liquid nitrogen to pour out of the vessel into an approved container until you have a pencil-sized stream of liquid.
 - o Momentarily invert the tank completely, then return it to the upright position.
 - o A small amount of residual liquid may remain at the bottom of the vessel; this is normal.
 - o Refit the necktube cork in the vessel.

6. Recording Initial and Final Weights

- **Step 7:** Record the first weight (kgs), date, and time (W2).
 - o Ensure the necktube cork is on, but no racks or canisters are inside.
- **Step 8:** Wait at least 48 hours.
- **Step 9:** Take a second weight, recording the weight (kgs), date, and time [W3].
 - o Ensure the necktube cork is on, but no racks or canisters are inside.

Data Collection			
	Weight	Date	Time
Dry Weight (kgs.)	(W1)	(D1)	(T1)
Pour Off Weight (kgs.)	(W2)	(D2)	(T2)
48 Hour Minimum			
Final Weight (kgs.)	(W3)	(D3)	(T3)

7. Calculations

- **Absorbed Weight**

Absorbed Weight, kgs $AW=W2-W1$	
Absorbed Volume, liters $AV=AW \times 1.237$	

- **NER**

Liquid Evaporation $L=(W2-W3) \times 1.237$	
Test Time in hours 2 decimal points. $T=D3\ T3 - D2\ T2$	
NER $(L/T) \times 24$	

- **Hold Time**

$AV/NER=\text{Hold Time}$	
---------------------------	--

An Excel file to assist with hold time calculations is available at:

<https://icbiomedical.com/knowledge-center/>