



PRODUCT APPLICATION NOTES

PRONGO® - Fisheries



Fisheries- why there is need for cooling solution?

Fish is highly perishable commodity among all the other food commodities resulting in significant post-harvest losses. These losses occur both quantitatively, through weight reduction, and qualitatively, through spoilage and insect infestation due to various factors. Being among the most perishable food commodity, the cold chain, packaging, storage, and transportation becomes an extremely important factor in reducing these losses.

Fish shipment is one of the largest transportation sectors in India. Currently, ice is used to maintain low storage temperatures and keep the fish fresh. However, relying solely on ice has several drawbacks.

1. Retention time – Retention time is less and need replenishment for long distance travel.
2. Non-environment friendly – Requires loads of water for converting it into ice.
3. Product quality – Blood of fish mixed with water degrades the fish quality.
4. Temperature compliance – Not precise temperature compliance with Ice which degrades fish quality.
5. High on weight – Loads of Ice is required for transportation which increases the weight of the box.

PronGO® is an innovative solution which enables the transport of temperature sensitive food like fish, chicken, dairy items, beverages, and pharmaceuticals through passive cooling. It can maintain the required temperature for longer durations. It represents a promising solution to overcome the challenges associated with conventional ice-based transportation methods. By incorporating PCM technology, it offers extended temperature maintenance, reduced dependency on ice, environmental friendliness, and improved handling, ultimately enhancing efficiency and sustainability in fish transportation.

Phase Change Materials (PCMs) filled in HDPE bottles (thermoTabs) or nylon pouches are used. The encapsulated PCM acts as a medium to provide the cold backup required for long duration temperature maintenance. The tabs/pouches can be used in two ways:

1. PCM + Ice in rotomoulded boxes along
2. PCM + Ice in plastic crates



Figure 1: 25L, 50L, 100L and 150L rotomoulded boxes with HDPE thermoTab bottles

How selection is done?

The selection is done on the basis of amount of fish to be transported, retention hours (time duration) required during transit of goods.

The choice between PronGO® boxes or plastic crates can be made on the basis of the user's point of view. If the user is willing to move from existing crates to sophisticated boxes to control the quality of fish more precisely then PronGO® boxes are a perfect solution. But if the user is willing to integrate PCM solution in existing crates to reduce capital cost then PCM tabs can be integrated with the crates easily.

Similarly, PronGO® Recharging Station can be selected on the basis of the number of tabs which customer wants to freeze in one cycle.

How is it better than conventional systems?

1. Long lasting - It is long lasting and gives retention time of more than 48 hours.
2. Environment friendly – Multiple time use reduces the amount of Ice used for shipping.
3. Better product quality – PCM tabs keep the fish in required temperature range without quality degradation.
4. Temperature compliant – PCM solution maintains temperatures precisely.
5. Low on weight – Compared to Ice solution, the box weight reduces significantly due to less use of Ice.
6. Reusable – PronGO® is reusable solution compared to one-time use of Ice.

How is it used?

- 1) Put the HDPE bottles (thermotabs) in the cold chamber whose temperature is lower than -15 degree C.
- 2) Place the charge (cooled) thermotabs inside the box.
- 3) Load the product and get ready to **GO**.

Case study

Comparison of using Ice alone and Ice + PronGO® solution was done in the case study at customer site to gauge the benefits and user friendliness of the solution.

Trial details:

Itinerary – Bhimavaram, Andhra Pradesh to Kolkata, West Bengal

Transit time - 65 hours

Crate size - 75 litres

Product loaded - Fish weighing 3 to 4 kg each

Product quantity - 40 kg Fish

PCM quantity used - 4 nos. of thermoTab 1200 containing 4.8 kg PCM

Ice used - 11.45 kgs

Required temperature - below 4-degree C

Trial Pictures:



Figure 2: thermoTab 1200 along with Ice used in 75 Litres crate for fish shipping

Performance:

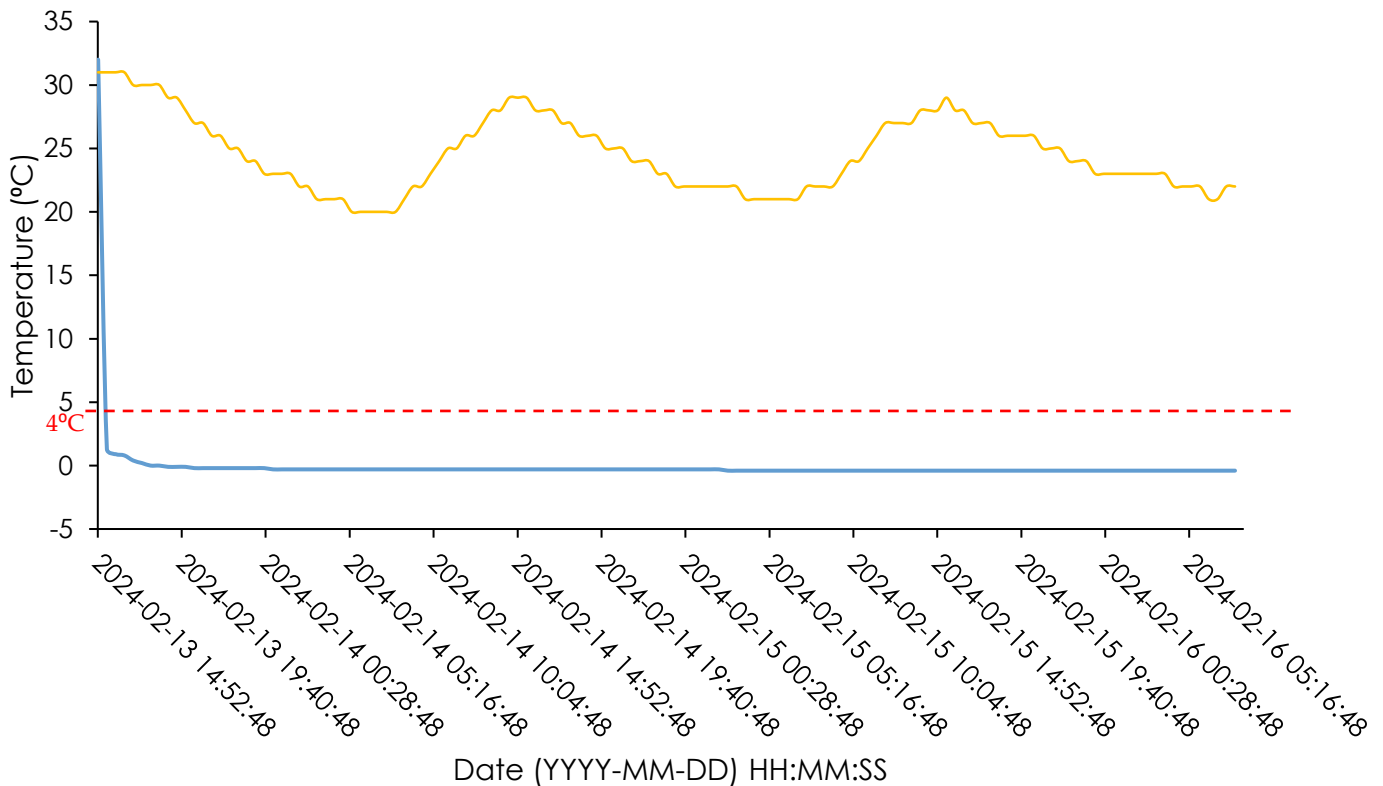


Figure 3: Temperature profile of fish temperature shipped in 75 litre crate with PCM tabs and ice

Despite the high ambient temperature of 30°C, the fish temperature was maintained at -4°C even after 65 hours of transit time and the fish quality was also maintained same as it was before shipping. The fish was transported in a 75 litres crate with Ice and PCM tabs without any insulation, still the fish quality did not deteriorate.

Analysis:

Cooling method ->	Only Ice	PCM + Ice
Parameter	Weight (kg)	Weight (kg)
Fish	40	40
PCM tabs	-	5.2
Ice	22.44	11.45
Total crate weight	62.44	56.65

Compared to the conventional shipping method of using only Ice to keep the fish quality maintained, PCM tabs use along with Ice in crates reduces the ice quantity from 22.44 kg to 11.45 kg. The significant reduction of around 11 kgs is good value to impact on operational costs and from environmental sustainability point of view.

11 kg of Ice per trip translates into approximately 770 kgs of Ice use reduction per annum per crate considering 70 trips per year. Currently, Ice worth 15,000 INR is used for 1 truck shipment. Considering 80% reduction in Ice usage and 70 trips per year, there will be approximately savings of 5.25 lakhs annually.

Parameter	Value
Ice use reduction with PCM	80%
Current Ice cost per truck (INR)	15,000
Number of trips per year	70
Operational cost savings with PCM (INR)	8,40,000

Disclaimer:

The information given here is meant as a guide to determining suitability of our products for the stated applications. It is based on trials carried out by our laboratories and data selected from literature and shall in no event be held to constitute or imply any warranty. The products are intended for use in industrial applications. The users should test the materials before use and satisfy themselves with regard to contents and suitability in the desired application. Our formal specifications define the limits of our commitment. Recommendation herein may not be construed as freedom to infringe/operate under any third party patents. In the event of a proven claim, our liability is limited only to replacement of our material and in no case shall we be liable for special, incidental or consequential damages arising out of usage of our material. This datasheet is subject to change without notice.