

5-GALLON WATER BOTTLE TRANSPORTATION SYSTEM COMPARISON CONDUCTED BY A MAJOR HOME DELIVERY BOTTLED WATER SUPPLIER

Objective of Logistical Study:

- Determine bottle and transport failure mode
- Compare 5 bottle types (4 bottle designs/3 manufacturers)
- Compare Metal Rack, Metal/Polymer Sleeve Rack, ProStack® Modular Rack
- Correlate Modes of Failure with Factory Experience

Overview:

- Extensive test conducted by a major home delivery company
- Independent worldwide recognized ISO 9000 test facility
- Electrodynamic vibration table
- Follow ASTM D4169, Method E at 0.5 grms table input
- Test vibration curve adequately represents actual route environment according to a major truck supplier
- Four bottle types/three manufacturers tested

Test Parameters:

All Racks = 3 Bottles Wide X 5 High X 2 Deep

- Metal Rack (30 Bottle Capacity)
- Metal Rack (30 Bottle Capacity) with Plastic Sleeves
- ProStack® Modular Rack (30 Bottle Capacity)
- Racks secured to vibration table at 3°, like truck bed
- Restraints used as a precaution to keep bottles from falling from rack during vibration test

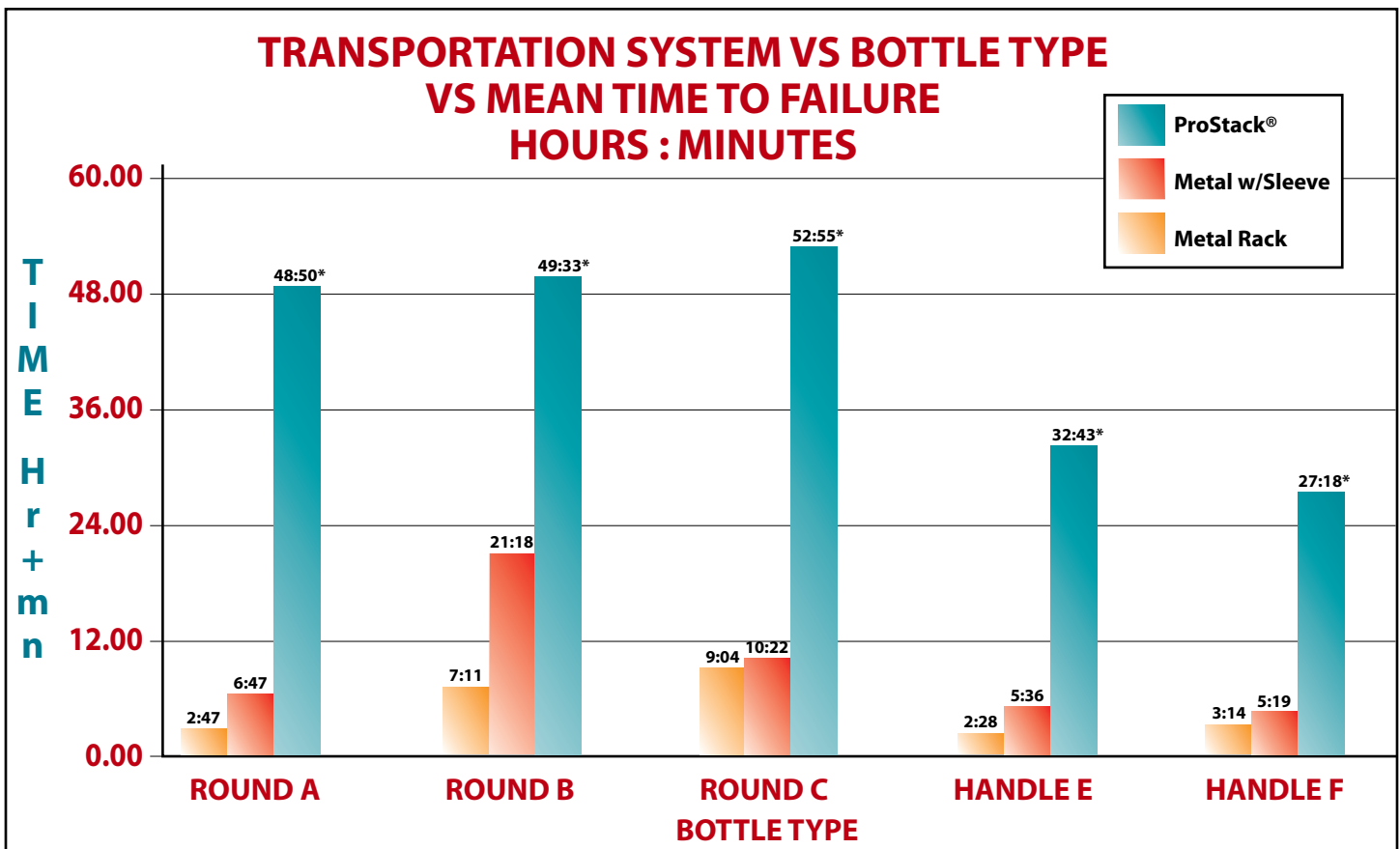
Six Bottles of Each Type

- Minimum of one bottle of each type or each level of the rack (five levels)
- Alternate locations chosen (front/back)
- Bottle position maintained during test
- Broken bottles replaced with same type bottle
- Water volume same on all bottles

Bottles must be Driven to Failure to Obtain MTTF (Mean Time to Failure)

- **Minimum of 2 bottle failures of longest lasting bottle type=33%**

Note: the Plastic Modular Rack test as stopped after 52-55 test hours with only one failure of each of the round bottles, because of equipment availability and time limitations.



*Only one bottle failure during test.

RESULTS

Correlate Modes of Logistical Failure with Factory Experience:

SOME of the 5 gallon handle bottle failures seen on the metal rack correspond with factory failure experience

LITTLE apparent correlation with Modular Rack Failures and factory failure experience

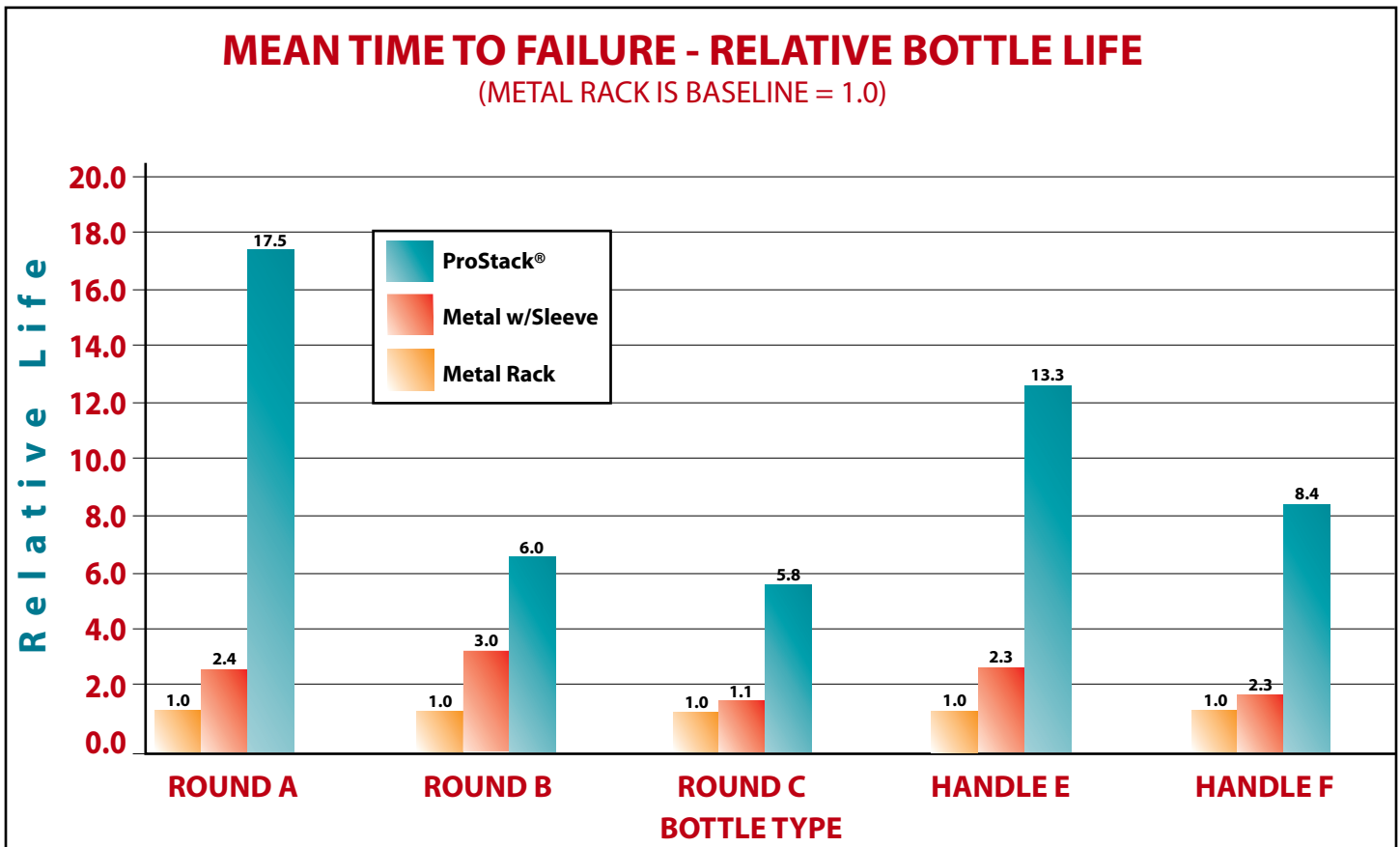
NO base cracks or catastrophic failures occurred during testing

Rack Performance Compared With A Metal Rack:

- ProStack® Modular Rack Improved Logistical Bottle Life by a factor of at least 6 to 18 times dependant on bottle design
- ProStack® results were limited when the test was stopped early
- Metal Rack with Plastic Sleeves improved logistical bottle life by a factor of only 2 to 3

Conclusions:

- Significant differences in logistical performance between bottle designs in each transportation mode
- Difference in logistical performance between handle bottle molders (molds identical) in different racks
- ProStack® Modular rack will minimize the influence of bottle designs on logistical life
- ProStack® Modular rack dramatically reduces logistical failures compared with other systems tested



Design defects were identified in several bottle types as a result of this test.