

Dear customer –

We are pleased to introduce to you an exciting new enhancement to the attachment and seal at the neck of our CUBITAINER® products. This enhancement will be rolling out first with our standard 20 Liter/5 Gallon products in July 2017, then to 10 Liter/2.5 Gallon products, before extension to the rest of our CUBITAINER® products soon.

Some of our largest customers, with the most demanding and regulated applications, have already been using this enhanced neck with great success.

CUBITAINER® is already one of the most robust and trustworthy flexible packages on the market today, and with this enhancement to sealing properties, it becomes even more reliable.

Please read through the following white paper, and feel free to get in touch with any questions you may have.

You can also find this white paper on our website under “Resources” if you need to refer to it in the future.

Have a terrific afternoon!

Best regards,

***The Sales Team at the Hedwin Division of Zacros America***

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# CUBITAINER®

## A Review of 38mm Standard Sealant Closure Compared to Hybrid Closure without Sealant

White Paper

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### Contents

Introduction/Background .....	2
Abstract/Business Case .....	2
Problem Statement .....	2
Proposed Solution .....	3
Introduction of Solution .....	4
Application of Solution .....	4
Future Direction .....	5
Additional Information .....	5

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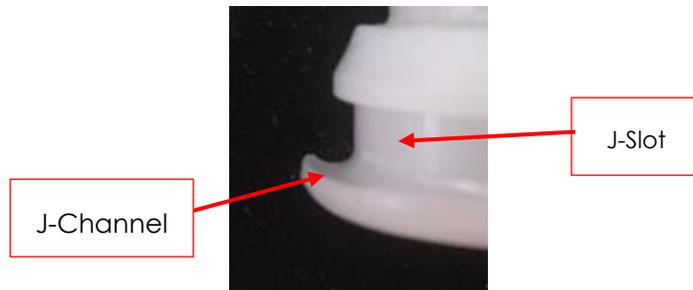
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## 1. Introduction / Background

Sealant Closures were historically used within Hedwin's Baltimore CUBITAINER® manufacturing facility. The specific reason for sealant use was to reduce and/or stop leaking at the intersection of the manually attached closure and the CUBE®. The sealant is used to fill the space within the J-Channel that is in the bottom of the J-Slot (see Figure 1) as an additional barrier to preventing leakage.

**Figure 1: Standard 38mm Closure**



The desire to adopt automated attachment of the closure to the CUBE® enabled an opportunity to simultaneously improve the sealing properties of the closure. Based on engineering studies and extensive testing, a "Hybrid Closure" design was developed to eliminate the need for blue sealant on the closure while adding a slight geometry modification to allow for handling by the automated attachment equipment. The elimination of the blue sealant removes risk that it will contaminate solutions contained in the CUBE®.

The Hybrid Closure does not require sealant to prevent leaking; the closure uses a proprietary geometry that prevents leaks which may occur at the point of intersection with the CUBE® walls. Based on the findings from the engineering tests, the new design was put into use on CUBITAINER® products coming from an existing automated production line at the Newark facility of the Hedwin Division of Zacros America (HDZA). Qualification of the design was achieved with new products produced exclusively on that automated line.

Existing manual manufacturing lines are gradually being converted to automated attachment systems and therefore the hybrid closure. Processes already established on the one already automated line will be integrated into conversion of existing manual lines.

## 2. Abstract / Business Case

In an effort to reduce variation caused by current manual processes, HDZA is implementing robotic equipment to attach the closure system to the CUBITAINER®. One production line in Newark already uses a version of this automation and closure. Zacros manufacturing centers in Japan and Malaysia have used this automated technology for several years. Further automation implementation in Newark has been informed by these experiences.

An inner radius change is required to ensure compatibility with the new automated handlers. At the same time, the closure system was re-engineered to provide enhanced leak protection via a proprietary sealing geometry in the threaded tube. This design modification, coupled with the reproducibility and uniformity of the attachment with

robotics, eliminates the need for sealant. With the pending addition of this robotic system, HDZA has begun a system-wide move to the hybrid closure system. All 20L and 10L products that are currently being manufactured with sealant will eventually be changed over to the Hybrid Closure system, using a staged approach by production line.

### **3. Problem Statement / Introduction**

Using a fairly inefficient process, blue sealant is applied to the junction of the closure and the CUBITAINER® walls in order to overcome potential leaks caused by unevenness inherent in the process of manual mechanical attachment. Although application is fairly controlled, dispersion of the blue sealant within the J-slot cannot be fully controlled.

A move to automation requires the re-design of the internal dimensions of the neck (below the threads) to allow for compatibility with new handling systems. This re-design requirement provided an opportunity to improve sealing properties at the same time.

### **4. Proposed Solution(s)**

#### **a. Introduction of Solution**

Internal neck dimensions were modified for compatibility with automated handling equipment, and a proprietary sealing geometry was added. This improved design, coupled with the reduced variation and increased reproducibility of automated attachment systems, eliminates the need for sealant at the neck of the CUBITAINER® closure.

Dimensionally, the threaded customer-facing portions of the hybrid closure and the existing sealant closure are the same. The exterior of the closure remains dimensionally the same and follows the SPI standards for plastic threads within the respective family.

#### **b. Application of Solution**

Three phases of testing have been conducted, to prove the hybrid closure and automated process methodology has and can outperform the requirement to show repeatability within the performance for the leak standard.

##### **1. Data from Japan**

A test was performed, using both clean and blended resin formulations to manufacture 20 liter CUBITAINER® products with the new hybrid 38mm Closure system using the automated attachment method. A total of 1613 parts were run, split between clean and blended resin formulations. The parts were 100% tested for leaks with pressure within the internal chamber and vacuum check on the Closure Assembly. From this production sample, 1612 parts passed. One failure was observed, due to a closure defect which caused damage to the mating surface. This defect was identified and flagged by the leak detection system.

##### **2. Glycol test**

A series of liquid leak tests were conducted to establish statistically significant equivalency of leak performance of sealant closure vs. the Hybrid Closure. 32 samples of each design were leak tested and passed, therefore, showing equivalency.

### 3. Review of Customer Complaints

Complaint data shows that the hybrid closure is more dependable than that of the sealant closure

Specifically, the number of complaints regarding leakers, are reduced by 75% as depicted in Chart 1. When looking at complaints on line 6 and FT4 as a percentage of sales, FT4 has a complaint rate of .0005%. Line 6 has a complaint rate of .0029%.

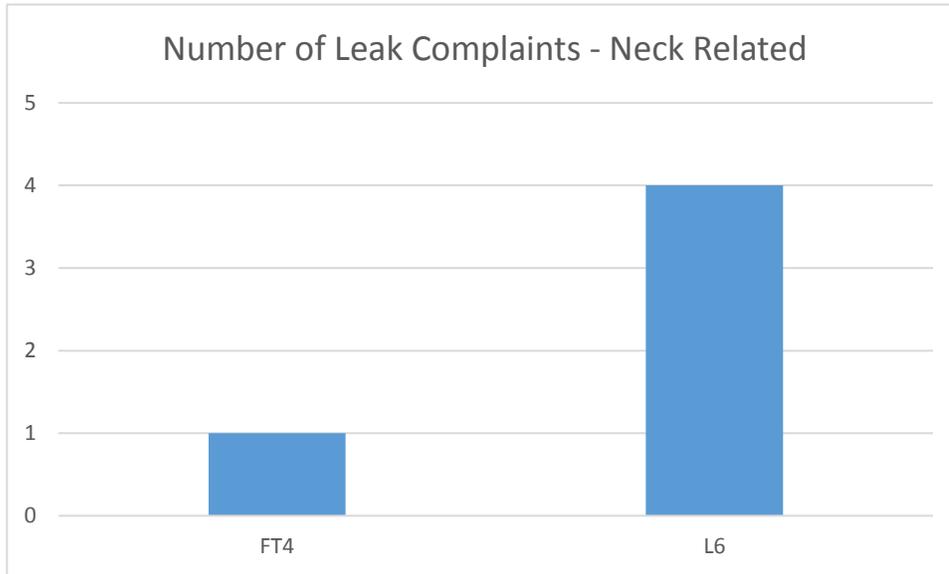


Chart 1

### 5. Future Direction / Long-Term Focus

Based on the results of this report and data results from ongoing automated production of new parts with hybrid closures, HDZA intends to convert all 20L and 10L threaded tube production to the hybrid closure assembly using automated attachment processes. This decision is based on the improved sealing results of the hybrid tube from the proprietary sealing geometry and the reduction in variation eliminated by the move to automated attachment processes. As a result of this improvement, Zacros will ultimately obsolete the current 38mm sealant tube design and will no longer offer the option of a sealant barrier. The geometry and automation changes offer improved quality and performance without impact to handling or normal use at customer sites.

An added benefit to the customer on this conversion lies in the iterative automation processes in place between Zacros locations in the US, Japan and Malaysia, assuring alternative sources of supply for standard production the event of interruptions.

### 6. Additional Information

For additional information not covered in this white paper, please contact us at 800.890.1183.