

# Gel-Pak®

*Protecting the World's Valuable Devices*



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When you need to safely transport valuable devices, Gel-Pak is the carrier of choice. For over 25 years Gel-Pak, an ISO 9001:2000 company, has been an industry leader in ensuring safe device shipping and handling for cutting-edge technologies. Backed by a worldwide network of distributors and sales representatives, as well as an innovative R&D team, Gel-Pak provides both standard and custom solutions to 1000's of companies in a wide range of markets:

- Semiconductor
- Optoelectronics
- Telecommunication
- RF/Wireless
- Medical/Dental
- Automotive
- Data Storage
- Aerospace
- Consumer

Gel-Pak's unique line of products is an enabling technology for applications such as device:

- Handling
- Shipping
- Storage
- Surface Protection
- Inspection
- Assembly
- Backgrinding
- Lapping



Committed to Outstanding Customer Service

## Family of Products

The comprehensive line of Gel-Pak products is suited for even the most intricate device-handling applications. The company is committed to continually improving its existing products while developing new products to meet customer's changing requirements.

The traditional **Gel-Box**, **Gel-Tray™** and **Gel-Slide** products are perfect for applications where devices are manually offloaded by tweezers or by hand. **Vacuum Release™** carriers are designed for use with manual vacuum pick-up tools and fully automated Pick & Place or Die Attach equipment. The **Gel-Film™** series is an extremely versatile product that is used to protect and hold devices in a wide range of process steps.



Worldwide Sales and Distribution

Gel-Pak products are made using a proprietary Gel material that effectively immobilizes a device using only backside surface contact. Unlike traditional waffle packs, Gel-Pak products prevent device damage that can result from contact with the edges or top surface of the carrier. Using surface tension, components are held in place and protected, even if the carrier is tilted, jarred, or turned upside down, yet they can still be easily removed.

These "pocketless" carrier products enable the customer to store a variety of different device sizes in a single tray or box which **eliminates** the need for custom molded waffle packs or chip trays. Gel-Pak also offers low minimum order quantities with no set-up fee. This lowers the cost of ownership by **minimizing** molded tray inventory requirements.

While Gel-Pak products are built to order, the company also offers a variety of "Quick-Turn" part numbers that are available for immediate delivery. Gel-Pak products can also be customized to satisfy new customer specifications.

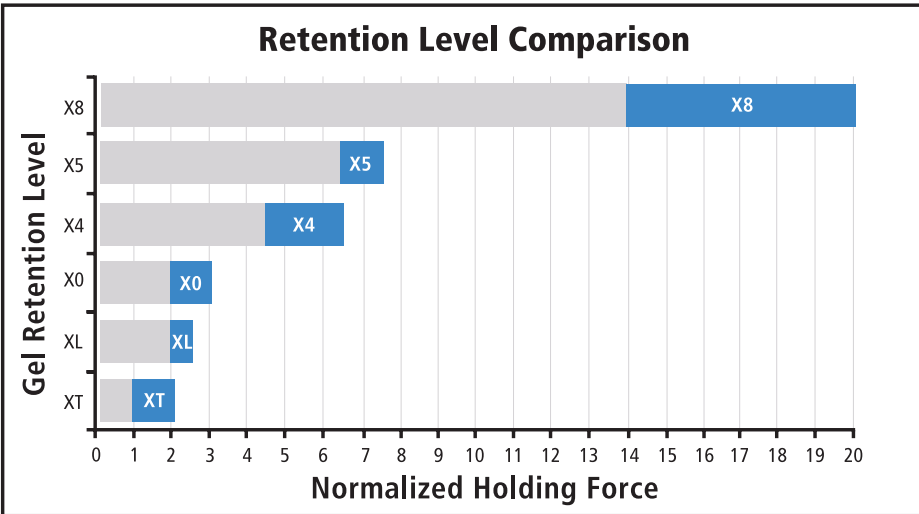
# Gel Technology

Gel-Pak products are made from a highly cross-linked proprietary polymer material referred to as "Gel". The material immobilizes a device on contact based on surface tension. The degree of holding force is intrinsic to the tackiness of the Gel material, which is referred to as Retention Level. The Gel material is strong in both the shear and vertical directions, but weak in the peel direction, which allows the device to be easily unloaded from the Gel surface.

The material is reusable and has a minimum shelf life of 2 years, making it possible to store devices for extended periods of time. Gel is an extremely durable and versatile material that maintains its properties between -40° C to 220° C.

## Retention Levels

Over the years, Gel-Pak has refined its Gel chemistry to provide a range of retention (tack) levels from an extremely low tack Gel for holding small polished optics to a high tack Gel for holding large ceramic substrates. The standard retention levels available are: XT, XL, X0, X4, X5, X8.



Normalized Gel Peel Strength (holding force) based on the ASTM 180 Degree Reserve Peel Test Standard

The optimum tack level for individual devices is dependent on material type, surface roughness, size, thickness and weight. While there is no exact formula to determine the recommended retention level for a device, the general guidelines are low tack level (XL, X0) for polished surfaces, medium tack level (X4, X5) for etched surfaces, and high tack level (X8) for rough surfaces such as ceramic. The XT retention level is an ultra low tack for special applications.

Gel-Pak manufactures two grades of Gel material; a standard grade and a highly purified version (Process B) which is recommended for highly sensitive devices. The Vacuum Release (VR) product line is built using Process B Gel. Process B is available as a special option for the Gel-Box, Gel-Tray, Gel-Slide, and Gel-Film products.

# Product Selection

For device shipping and handling applications, the decision regarding which Gel-Pak product to use is dependent upon how the device will be loaded and unloaded from the carrier. For extremely fragile, thin or large devices, a VR product should always be used to minimize the required unload force.

		Unload Method		
Load Method		Tweezers	Pen-Vac	Auto Equip
	Tweezers	AD/BD/CD	VR	VR
	Pen-Vac	AD/BD/CD	VR	VR
	Auto Equip	BD/VR	VR	VR

Recommended Product Family Based on Load/Unload Method

It is always recommended that the customer perform an internal evaluation to verify that they have selected the correct Gel-Pak product for their application. Contact the factory or your local Sales Agent for a free evaluation sample.

If Gel-Pak does not have a standard product that is right for an application, engineering support is available for customized formulations and new product designs to meet the individual requirements.

Gel-Pak has an interactive Product Selection Wizard on the website and a library of Technical Datasheets available upon request.



VR-44/16CT

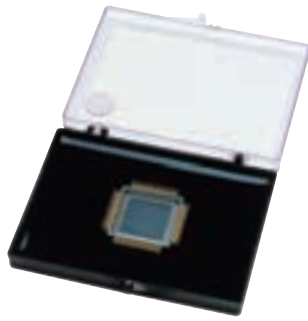
## Gel-Pak's Traditional Products

The Gel-Box, Gel-Tray, and Gel-Slide products are designed for components that can be manually loaded and offloaded easily using tweezers or by hand.

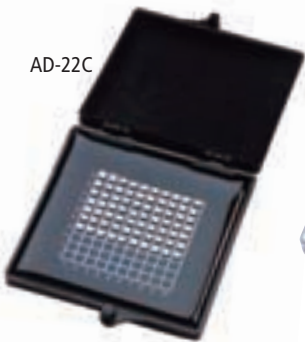
AD-22CAS



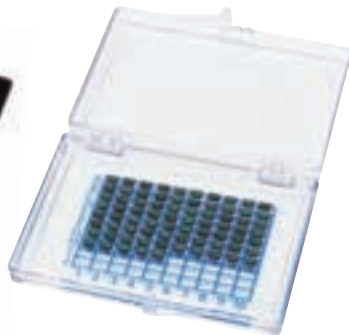
AD-23CAS



AD-22C



AD-23T



### The Gel-Box (AD Series)

The original pocketless carrier is a plastic-hinged box coated with Gel material in the bottom. Standard Gel-Box sizes range from 1" x 1" up to 5" x 7". Custom sizes are available and the Gel coating can be applied to special customer supplied boxes as required. The Gel-Box is great for the handling, storing and shipping of medical, optical and other microelectronic components.

The Gel-Box is available in the standard retention levels (X0, X4, X5 and X8) to accommodate variations in device size, weight and surface roughness. The plastic hinged boxes are available in a variety of base/top configurations using conductive black (C), clear styrene (T) and transparent antistatic (AS) materials.



Removal of Device from Gel-Box Using Tweezers

Gel-Tray and Gel-Slide products are configured as a 2" carrier stored in a protective plastic-hinged box. A Gel coating is applied directly to the surface of either a plastic tray (BD Series) or glass slide (CD Series). These products offer the same functionality as the Gel-Box, however the tray or slide can be conveniently removed from the box for ease of use. The BD Series plastic tray can be either black conductive polycarbonate (C) or clear styrene (T) material.

Unlike plastic trays that can only go up to 70° C to 80° C, the Gel-Slide is unique in that it can be used in higher temperature applications (up to 220° C) such as bonding and reflow. These glass slides are also ideal for backside inspection due to their optical clarity.

Gel-Trays and Gel-Slides are both available in the standard retention levels (X0, X4, X5 and X8) to accommodate variations in device size, weight and surface roughness. The available plastic hinged box materials are the same as the Gel-Box products.



BD-22CC



BD-22CAS



CD-22AS

# Gel-Pak's Vacuum Release Products (VR Series)

Gel-Pak's patented Vacuum Release series introduces an innovative way to handle fragile devices of all sizes, ranging from small transistors and laser diodes to large ICs and wafers. The surface of the Vacuum Release carrier uses the proprietary Gel film, but unlike the manual release products, devices can be released "on demand" by applying vacuum under the tray. This vacuum force is only used when unloading devices. For loading, simply place the device on the Gel surface, vacuum is not required.

VR Trays are the perfect technology for shipping **Known Good Die** especially when automated handling is involved. All of the alternative carrier methods have their limitations:

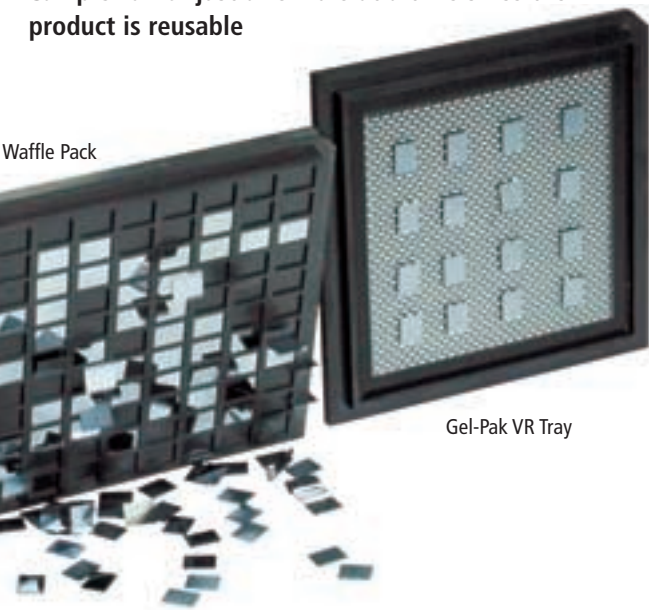
Waffle Packs - Die can be damaged during shipping and handling.

Adhesive Tape on Film Frame - Long term storage is not advised.

UV Tape - All die must be picked once the tape is exposed.

In comparison, the benefits of using a Gel-Pak VR Tray are:

- Damage free shipping and handling
- Die can be left on Gel for extended period of time
- Can pick all or just a few die at a time since the product is reusable

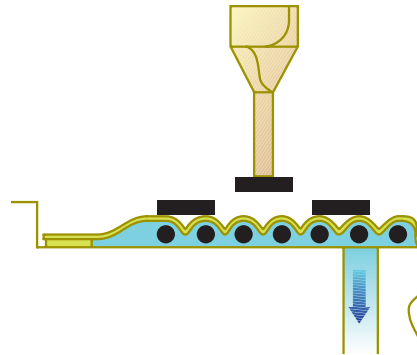


**Can you trust your device in anything less than a Gel-Pak?**

# Vacuum Release Trays

The vacuum release trays consist of a thin, flexible Gel membrane, which is placed over a mesh material. The Gel holds the device securely in place until it is released "on demand" by applying vacuum to the underside of the tray. The device orientation does not change even during release.

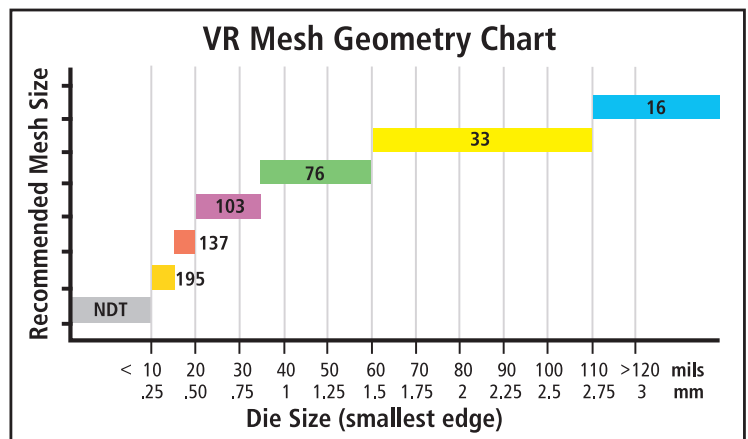
Applying a vacuum under the tray causes the Gel membrane to conform to the shape of the mesh, which significantly reduces the surface contact area between the Gel and the device. This temporarily minimizes the Gel holding force for easy device removal.



Cross-Sectional View Illustrating Vacuum Release Technology (Device Unload Mode)

Devices can be removed with a vacuum pick-up tool once the tray is in the release mode. The hold/release mechanism is reversible and the tray returns to its original holding mode when the vacuum is removed. For best offloading results, a vacuum of 25 Hg is recommended. Gel-Pak's 2" and 4" VR Trays are reusable and are ideal for high-volume die handling applications associated with automated equipment such as Alphasem, ASM, BESI, Datacon, Dymatix, ESEC, F&K Delvotec, Newport, Palomar, Royce, and more.

In order to optimize the offloading performance of the VR Tray as a function of device size, Gel-Pak offers a range of mesh



Recommended Mesh Size based on the Device Size (smallest edge)



Unloading of Device from VR-44 Tray Using Vacuum Pen

geometries (16, 33, 76, 103, 137, and 195). The mesh size corresponds to the number of mesh threads per linear inch.

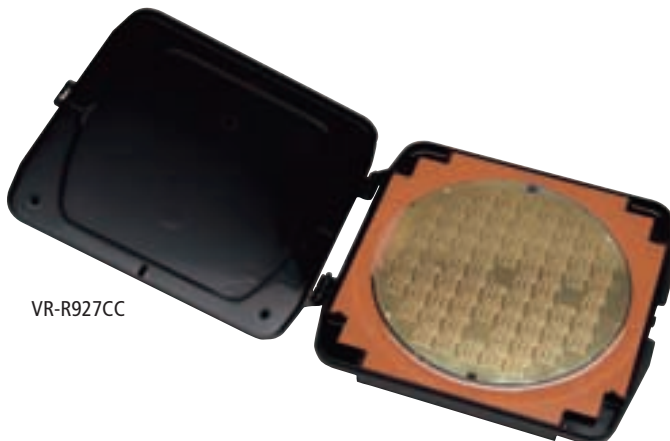
The Vacuum Release Trays are available in black conductive polycarbonate (C) or clear styrene (T) materials and retention levels of XT, XL, X4 and X8. Both the 4" tray and the X8 retention levels are available only with size 16 and 33 mesh. VR trays are packaged either in a hinged box (-02 style) or with a traditional lid and clip (-00B style).

## Large Format Vacuum Release Carrier

Gel-Pak's Large Format Vacuum Release products were developed specifically for handling high value substrates that are larger than 3" in size. These large format carriers are commonly used for shipping thinned InP and GaAs wafers. Carriers are available to hold substrates up to 12" in diameter.

A special version of the Large Format carrier was developed to transport 8" and 12" wafers still mounted on a film frame. When diced, the die edges are highly fragile in this not expanded format and the large VR carrier immobilizes the die to prevent potential damage.

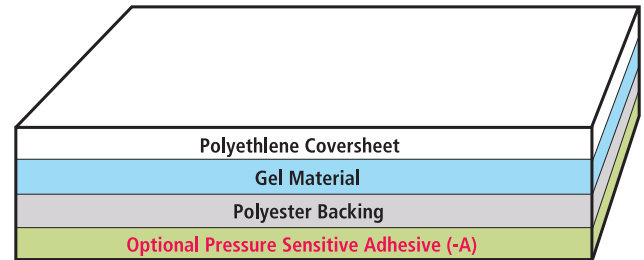
The Large Format carrier product is a VR plate contained in a hinged box and is available in both single wafer and multi-wafer configurations depending on the substrate size. Boxes are either conductive (C) or transparent (T) material. Standard retention levels are XT, XL, and X4, and the standard mesh size is 16.



VR-R927CC

## Gel-Film

Gel-Film products are manufactured using the same proprietary Gel material and are offered in 3 different product configurations: WF, PF, and DGL. The most commonly used Gel-Film product is the WF film which is Gel bonded to a polyester substrate material and it is available with an optional pressure sensitive adhesive backing.



WF Film Configuration

WF film is used for a wide assortment of applications such as:

- Wafer Backgrinding
- Disk Drive Bar Lapping
- Surface Protection
- Polishing Optics
- Process Handling Fixtures
- Probe Tip Cleaning

The WF Gel-Film comes in several retention level and Gel thickness combinations:

Retention Level	Gel Thickness		
	1.5 mil	6.0 mil	17.0 mil
X0		X	
X4	X	X	
X8		X	X

Standard WF Film Gel Thickness and Retention

The PF and DGL films are similar to the WF product except the Gel material is not bonded to the polyester substrate allowing the Gel film material to be easily removed from the backing material, otherwise known as "free Gel." These products are typically used for special process applications.

DGL film is a Process B version of Gel which is laminated onto a thinner polyethylene backing. The primary applications for DGL film is special process handling and as a coversheet during the Scribe & Break process to capture loose debris and particles during the break step.

Gel-Film is available in standard pre-cut sizes or can be sold in custom shapes and sizes upon request.

## Customized Packaging Materials and Solutions



A team of engineers and chemists combined with manufacturing expertise allows Gel-Pak to quickly customize existing packaging and processing products or develop new solutions to meet the ever changing industry requirements. Gel-Pak works with over 100 new startup companies every year assuring that their innovative new technology can be safely shipped and handled all around the world.



Customization capabilities include:

- Modifying Gel Properties (tack, durometer)
- Special Gel-Box Sizes
- Unique VR Active Surface Areas
- Developing New Alternative Gel Materials
- Versatile Film Products and Configurations



## Gel-Pak Accessories

Gel-Pak offers a complete line of accessories to compliment and support the standard products.

- Vacuum Release Workstation (Tray-VAC)
- Wide Variety of Plastic Hinged Boxes
- Membrane Boxes
- Clips for VR Tray (-00B Style)
- Fabric/Foam for use with Gel-Boxes, Gel-Trays, and Gel-Slides
- Vacuum Release Workstations
- Hand-Activated Manual Vacuum Pump (VHP-24)
- Vacuum Plate for Large Format VR Products (VP-900)
- Pen-Vac Vacuum Pick-up Tool (VPV)
- **Prints/Artwork:** All of the Gel-Box, Gel-Tray and VR Tray products can be customized with prints, such as your company logo or a specific grid/matrix pattern for device placement.



Automated Pick & Place Fixture

# **Gel-Pak**<sup>®</sup>

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