BLAST AND PRESSURE-RESISTANT PRODUCTS

The widest range of blast- and pressure-resistant door and window systems in the world.
**Overview**

For over 50 years, Overly Door, an ISO 9001 Certified Company, has been an industry leader in the design, testing and manufacture of Blast- and Pressure-Resistant Door and Window Systems. All of these products have been tested to the latest ASTM Standards or verified with structural analysis by our engineering group.

In addition to the blast- and pressure-resistant testing, many of these products have also been successfully fire tested to both UL 10b (neutral pressure) and UL 10C (positive pressure) Standards for Safety.

**LEEDS**

These blast- and pressure-resistant products may also be available with LEED certifications including one or more of the following:

- MR-4 Recycled Content
- MR-5 Regional Materials
- EQ 4.4 Low Emitting Materials

Consult factory with your defined project needs to see what performance requirements are available for the specific products required.

**Typical Uses for Blast- and Pressure-Resistant Products**

They can be used in a variety of both public and private institutional installations where the need for blast- and pressure-resistant protection is required including:

- Chemical Plants
- Petrochemical Plants
- Pharmaceutical Manufacturing
- Refineries
- Research Facilities
- Manufacturing Environments
- Processing Facilities
- Nuclear Plants
- DOD and DOE Facilities
- Modular Blast Buildings
- Fracking Sites
In order to determine the specific door design for your project, Overly looks for the following information to help define the product to be supplied:

- Door opening size.
- Door Orientation, Single Swing or Pair, In-swing or Out-swing.
- Are door(s) flush or is a vision light required? Maximum vision light area is 100 square inches.
- Interior or exterior installation and any special environmental concerns?
- What are the door and frame material requirements? Any special paint requirements?
- Ingress and egress requirements to determine hardware. Are there any special hardware requirements such as door position switches, access control (electric lock/unlock or electric latch retraction), and operators.
- What is the wall construction and how will the blast door frame be anchored to the wall?
- Is the pressure requirement an equivalent static pressure or a dynamic pressure? If it is an equivalent static pressure, a static pressure, expressed in psi or psf, is required. If it is a dynamic pressure, the peak reflected pressure and duration/impulse or the TNT equivalent charge weight and standoff distance is required.
- Does the initial blast pressure act to seat the door(s) into the frame or act to unseat the door(s) from the frame?
- What is the rebound percentage? Typical rebound percentages are 0%, 50%, 100%, and “based on the structural response of the door” if the door is to be designed for a dynamic pressure.
- What is the permissible Damage Level Category per ASTM F2247-11?
- Is there a fragmentation requirement? If so, a fragment size, weight, and velocity are required.
- Is there an air leakage requirement? If so, an allowable leakage rate and differential pressure is required.
- Are there any fire rating and/or temperature rise requirements?
- Does the door have to meet ADA clear opening width requirements?
- What are the operating force requirements for the opening?
  - force required to retract the latchbolt(s)
  - force required to set door into motion
  - force required to swing door to minimum clear width
**Very Low (VLRB) and Low (LRB) Range Series**

Overly’s VLRB and LRB series blast- and pressure-resistant doors are personnel size 1-3/4” thick, lightweight that have the appearance and user friendly features of standard hollow metal type doors.

VLRB units are designed to utilize standard builder’s hardware including hinges and mortise or mortise panic devices to accommodate blast pressures defined as Very Low.

LRB units are “hardened” heavy-duty hollow metal doors with strategically placed reinforcing steel and incorporating proprietary modified mortise locksets or mortise panic device restraining hardware to accommodate blast pressures defined as Low.

Both series of product are available in single and double leaf swings. Horizontal sliding doors of similar construction and load ratings are also available.

These units are available fabricated from carbon steel for interior use; galvannealed steel for exterior use; and, depending on the projects blast requirements, 316 and 316L stainless steel. Other features that may be incorporated into these openings include such items as vision lights up to 100 sq inches, door position indicators, lock/unlock sensors, insulation and weatherstripping.

For those openings requiring automatic power assist opening operation, Overly can incorporate devices to accommodate this need.

If fire ratings are required, all VLRB and LRB can be UL Labeled up to 3-hours in accordance with UL Standard for Safety 10b, “Fire Tests of Door Assemblies,” and UL10C, “Positive Pressure Fire Tests of Door Assemblies,” when the project parameters meet the requirements of the UL procedures. Consult factory with your specific project requirement needs for availability.

Overly’s VLRB and LRB series product can also be provided to meet the Unified Facilities Criteria (UFC) 4-010-01, “DOD Minimum Anti-terrorism Standards for Buildings.” This criterion requires all exterior doors to be designed in accordance with ASTM F2247, “Standard Test Method for Metal Doors used in a Blast-resistant application (Equivalent Static Load Method).” To accommodate these requirements, Overly has designed and tested several blast door models and sizes to determine the damage level categories at various loads and document the ultimate load capacity of the doors.

**Mid (MRB) Range Series**

Overly’s MRB series product are personnel size 2-3/4” thick doors. These doors are equipped with Overly designed and tested hinges and latching/locking devices. These Overly designed hinges are specifically engineered to accommodate the weights of the doors for many years of trouble free service.

The MRB latching/locking device is a proprietary design that incorporates one, two, three or four latching pins depending on the design pressures of the opening. The latching points can either be retracted by lever handle or panic device. All typical builders hardware locking functions are fully supported by this design. Panic hardware has been tested and passed all of the stringent requirements of UL Standard for Safety 305 to ensure its integrity and operating functionality.
**Mid (MRB) Range Series (cont.)**

Both series of product are available in single and double leaf swings. Horizontal sliding doors of similar construction and load ratings are also available.

These units are available fabricated from carbon steel for interior use; galvannealed steel for exterior use; and, depending on the projects blast requirements, 316 and 316L stainless steel. Other features that may be incorporated into these openings include such items as electric lock/unlock, electronic latch retraction, door position indicators, lock/unlock sensors, insulation and weatherstripping.

For those openings requiring automatic power assist opening operation, Overly can incorporate devices to accommodate this need.

If fire ratings are required, MRB units can be UL Labeled up to 3-hours in accordance with UL Standard for Safety 10b, "Fire Tests of Door Assemblies," and UL10C, "Positive Pressure Fire Tests of Door Assemblies," when the project parameters meet the requirements of the UL procedures. Consult factory with your specific project requirement needs for availability.

### Pre-Engineered Blast Door Selector Chart for VLRB, LRB, AND MRB Doors

<table>
<thead>
<tr>
<th>DOOR MODEL</th>
<th>JAMB OPENING</th>
<th>DOOR THICK</th>
<th>LATCHING POINTS</th>
<th>UL FIRE LABEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3'-0&quot; x 7'-0&quot;</td>
<td>3'-0&quot; x 8'-0&quot;</td>
<td>4'-0&quot; x 7'-0&quot;</td>
<td>4'-0&quot; x 8'-0&quot;</td>
</tr>
<tr>
<td>VLRB</td>
<td>1.54 psi</td>
<td>1.34 psi</td>
<td>1.17 psi</td>
<td>1.15 psi</td>
</tr>
<tr>
<td>LRB</td>
<td>2.17 psi</td>
<td>1.83 psi</td>
<td>1.60 psi</td>
<td>1.51 psi</td>
</tr>
<tr>
<td>MRB-1</td>
<td>3.30 psi</td>
<td>2.89 psi</td>
<td>2.52 psi</td>
<td>2.48 psi</td>
</tr>
<tr>
<td>MRB-2</td>
<td>7.04 psi</td>
<td>6.16 psi</td>
<td>5.36 psi</td>
<td>5.28 psi</td>
</tr>
<tr>
<td>MRB-3</td>
<td>12.00 psi</td>
<td>10.50 psi</td>
<td>9.50 psi</td>
<td>9.00 psi</td>
</tr>
<tr>
<td>MRB-4</td>
<td>20.00 psi</td>
<td>17.50 psi</td>
<td>15.30 psi</td>
<td>15.00 psi</td>
</tr>
</tbody>
</table>

### High (HRB) Range Series

**Custom High Range Blast Doors**

Pressures above 20 psi are considered High Range Blast (HRB). Overly HRB Doors are custom designed on a job-specific basis and are generally made from varying thickness of monolithic steel plate. These doors are capable of withstanding high momentary explosions and other forces such as explosion-generated fragments and remain operable after the incident. The design of all HRBs are verified by calculations based on Tri-Services Manual TM5-1300, “Structures to Resist the Effects of Accidental Explosions.” Details, performance specifications for the HRB line can be obtained from Overly or downloaded from our web site on the Internet.
Overly has done shock tube testing in order to determine the true dynamic performance of three of its blast- and pressure-resistant door models under blast load conditions.

This research has allowed the true capacity of the doors at various acceptable damage levels. Through the use of the “shock tube”, the door and frame assembly can be subjected to an actual blast and its true reaction can be witnessed and recorded. A shock tube is a device used to generate a blast load in a controlled environment by producing a shock wave from compressed air. The testing performed was done by Baker Engineering and Risk Consultants of San Antonio, Texas.

By incorporating this test method, lighter and more cost effective doors can be provided to resist the pressures specified.

### Shock Tube – Dynamic Load Test Results

<table>
<thead>
<tr>
<th>DOOR TYPE</th>
<th>TEST No.-YEAR</th>
<th>PEAK PRESSURE (PSI)</th>
<th>IMPULSE (PSI-MS)</th>
<th>DURATION (MS)</th>
<th>EQUIVALENT DURATION (MS)</th>
<th>DAMAGE LEVEL CLASSIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>3' x 7' Single Leaf LRB</td>
<td>1-96</td>
<td>3.0</td>
<td>27.4</td>
<td>17.9</td>
<td>18.3</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>2-96</td>
<td>6.0</td>
<td>50.9</td>
<td>20.5</td>
<td>17.0</td>
<td>IV</td>
</tr>
<tr>
<td></td>
<td>3-96</td>
<td>8.1</td>
<td>77.2</td>
<td>21.0</td>
<td>19.1</td>
<td>IV</td>
</tr>
<tr>
<td></td>
<td>1-02</td>
<td>4.0</td>
<td>160.0</td>
<td>80.0</td>
<td>80.0</td>
<td>II</td>
</tr>
<tr>
<td>3' x 7' Single Leaf MRB-3</td>
<td>4-96</td>
<td>11.4</td>
<td>122.3</td>
<td>21.6</td>
<td>21.5</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>5-96</td>
<td>17.0</td>
<td>200.5</td>
<td>28.0</td>
<td>23.6</td>
<td>II</td>
</tr>
<tr>
<td>6' x 7' Double Leaf MRB-1</td>
<td>6-96</td>
<td>6.0</td>
<td>37.7</td>
<td>18.5</td>
<td>12.6</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>7-96</td>
<td>9.4</td>
<td>73.7</td>
<td>20.2</td>
<td>15.7</td>
<td>III</td>
</tr>
<tr>
<td></td>
<td>8-96</td>
<td>13.0</td>
<td>130</td>
<td>27.2</td>
<td>20.0</td>
<td>III</td>
</tr>
</tbody>
</table>

### Damage Level Category (per ASTM F2247-11)

<table>
<thead>
<tr>
<th>DAMAGE LEVEL CATEGORY</th>
<th>PROTECTION LEVEL</th>
<th>DESCRIPTION OF THE DOOR PANEL RESPONSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Safe</td>
<td>The door panel is unchanged and fully operable. There is no permanent deformation and the door behaves elastically.</td>
</tr>
<tr>
<td>II</td>
<td>High</td>
<td>The door panel is operable but there is measurable permanent deformation. It remains an integral system.</td>
</tr>
<tr>
<td>III</td>
<td>Medium</td>
<td>The door panel is permanently deformed and inoperable. The door remains a barrier to blast wave advancement.</td>
</tr>
<tr>
<td>IV</td>
<td>Low</td>
<td>The door panel is severely deformed and inoperable. For a seating blast, the deformation of the door shall be limited to a level that does not push the door through the opening. For an unseating blast, the latching mechanism is permitted to fail and let the door rebound open.</td>
</tr>
</tbody>
</table>
To compliment its full line of door products, Overly also designs and manufactures blast- and pressure-resistant windows in a wide variety of configurations and glazing materials. In addition to the blast- and pressure-resistance, these window systems can also be designed to withstand fragmentation requirements. Consult Overly to your specific project requirements for product availability.

**Blast- And Pressure-Resistant Windows**

When only pressure-resistance is required, Overly can custom design and manufacture openings to meet your specific project requirements. Additionally, these units can incorporate a wide range of gasketing options capable of meeting a variety of air leakage and environmental requirements including corrosive atmospheres.

**Pressure-Resistant Doors**

Watertight doors and flood barriers are also available from Overly. These products are designed to resist specified water pressure loadings. Engineered by Overly for reliability and maintenance-free service, these doors incorporate continuous silicone or neoprene gaskets built directly into the coaming frame. Inflatable gaskets are also available when required. These doors are made from steel or corrosive-resistant metals such as all grades of stainless steel.

**Radiation Shielding Doors**

Overly custom fabricates an extraordinarily large range of shielding doors for installations such as research and test laboratories, hot cells, medical facilities, and communications centers. Depending upon the hazard, doors may be constructed of solid steel plate or supplied with cores of concrete or borated polyethylene. Additionally, power operation and special hardware, including electrical interlocks for controlled access, are available.
**Other Overly Products**

Overly’s complete Product Binder is available to provide detailed information on each of the Company’s product lines. These product lines include the following Specialty Door and Fixed Windows Systems:

- Acoustic Doors
- Blast
- Security
- Bullet-Resistant
- Watertight/Airtight
- Radiation Shielding

The detailed product information includes:

- Monographs
- Drawing Cut Sheets
- Long Form Specifications
- Installation Instructions

For copies of any of the Overly information listed above, please call, write or e-mail the Company. Overly will answer your requests within 24 hours. All of the above information as well as details for any of the individual products manufactured by Overly can be viewed and downloaded immediately via our website: www.overly.com

**Visit Our New and Expanded Website**

Overly Door Company is pleased to announce the launch of the newly updated and expanded website for Overly Door. In addition to a pleasing new graphic interface, the website features easy navigation and a fully searchable database to help visitors to the site quickly find the information they need. www.overly.com

P.O. Box 70 • 574 West Otterman Street • Greensburg, PA 15601-0070 U.S.A.
Tel: (800) 979-7300 • (724) 834-7300 • Fax: (724) 830-2871
E-mail: info@overly.com • Web: www.overly.com

*Printed in the U.S.A.* © Overly Door Co. (2015)