Application and Design

United Enertech has gained its position as a leader in the manufacturing of air movement and control equipment by producing high quality innovative products. In our most recent development, United Enertech teamed up with Applied Research Associates (ARA), a leading researcher in explosive dynamics, to develop a multi-functional Blast Damper. The result is a damper/louver system which can withstand a high yield blast, offer AMCA ratings for water penetration and pressure drop, and comply with FEMA 361 zone IV criteria, 250 mph winds (2x 4'x 15lbs missile impact at 100mph) when ordered with the screen.

To facilitate the design, ARA examined the effects of blast loading using Finite Element Modeling and Single Degree of Freedom calculations. Their modeling replicated a close-in explosive threat, one similar to a car bomb. The simulation was a 2000 lbs TNT surface charge at a range of 50 feet. The numerical simulation demonstrated that the damper was able to withstand the high peak incident pressure/short duration explosive load with only moderate damage. Further analysis showed that the blast overpressure downstream of the damper was greatly reduced by as much as 83%, thereby protecting equipment and personnel downstream. The ability of the Damper to reduce the downstream overpressure was accomplished by designing a blade profile and linkage system which quickly shuts at the onset of a blast pressure wave. In this simulation of a close range blast, the damper was able to close in 7 milliseconds. The ICBL-20-WR is also rated for gas/oil type and vapor cloud explosions.

The ICBL-20-WR is ideal for protecting equipment and personnel from sudden blasts and instantaneous pressure changes. Engineers can design with confidence when specifying this product.

STANDARD CONSTRUCTION:

FRAME:
1/2" (25.4mm) Deep, 10 ga. (2x thickness @ jamb flange) Carbon Steel Frame (ASTM A-653)

BLADES:
10 ga Carbon Steel Double Skin Airlal (ASTM A-653)

BLADE LOCK:
Latch mechanism to lock blades in closed position after Blast

AXLES:
G 1/2" (12.7mm) solid A36 steel on 6" (152mm) centers

REAR SCREEN:
1/8 ga x 1/2" (12.7mm) Expanded Steel

LINKAGE:
3/16" (4.76mm) thick x 3/4" (19.05mm) wide bars

BEARINGS:
Two hole flange ball bearing (type III)

FINISH:
Powder coated, Zinc Rich Primer (Medium Gray, Top coat not required)

SIZE LIMITATIONS:
Minimum size: 14"w x 14"h (355mm x 355mm) O.D.
Maximum single section: 48"w x 66"h O.D. (1219mm x 1676mm) O.D.
For factory assembled multi-section size limitations, consult factory

VARIATIONS:

☐ 304 Stainless Steel construction (ASTM A-240,SA240,AMS 5513)
☐ 316 Stainless Steel frame and blades (some parts may not be 316 ss) (ASTM A-240,SA240,AMS 5513)
☐ Custom Finish Powder Coating, select color
☐ FEMA 361 Screen
☐ Omit Flange (in duct mount-see installation details)

REQUIRED SPECIFICATIONS:

Airflow / Volume
☐ Intake
☐ Exhaust
Air Volume cfm

Blast Criteria
☐ Reflective Pressure psi
☐ Duration msecs
☐ Impulse psi-msecs

Adjustable Spring
Tensioner location
☐ Accessible from Interior (Side A) - Standard
☐ Accessible from Exterior (Side B) - Optional

The following equation can be used to approximate Impulse:
Impulse = 1/2 \( \frac{\text{Duration} \times \text{Pressure}}{\text{Area}} \)

Due to continuing research, United Enertech reserves the right to change specifications without notice.

Job Name: □ ICBL-20-WR
Location:
Architect:
Engineer:
Contractor:

DATE: February 2013
REV. NO.: 3
APPROVED BY: BGT
REV. DATE: September 2016

*Note: Front & Rear Screen required with FEMA 361 option
*Note: Front & Rear Screen required with FEMA 520 psi-msec, flange will be 1/2" thick.

Complies with FEMA 361 and ICC 500 storm shelter and safe room standards.
ICBL-20-WR PERFORMANCE DATA

Wind Pressure Examples per ICC500

Free Area Chart (square feet):

<table>
<thead>
<tr>
<th>Louver O.D. Height in Inches</th>
<th>Louver O.D. Width in Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>0.13 0.20 0.30 0.40 0.49 0.59 0.69</td>
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<tr>
<td>18</td>
<td>0.17 0.26 0.38 0.51 0.64 0.77 0.89</td>
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<td>24</td>
<td>0.42 0.63 0.94 1.25 1.56 1.88 2.19</td>
</tr>
<tr>
<td>30</td>
<td>0.58 0.88 1.31 1.75 2.19 2.63 3.06</td>
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<tr>
<td>36</td>
<td>0.67 1.03 1.50 2.02 2.50 3.04 3.52</td>
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<tr>
<td>42</td>
<td>0.76 1.15 1.72 2.29 2.86 3.44 4.01</td>
</tr>
<tr>
<td>48</td>
<td>0.98 1.29 1.91 2.60 3.18 3.81 4.36</td>
</tr>
<tr>
<td>54</td>
<td>1.12 1.68 2.51 3.35 4.18 5.03 5.27</td>
</tr>
<tr>
<td>60</td>
<td>1.26 1.90 2.84 3.79 4.74 5.69 6.13</td>
</tr>
<tr>
<td>66</td>
<td>1.38 2.05 3.18 4.13 5.16 6.19 7.03</td>
</tr>
</tbody>
</table>

United Enertech certifies that the ICBL-20-WR shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publications 511 and comply with the requirements of the AMCA Certified Ratings Program. The AMCA certified rating seal applies to air performance ratings and water penetration ratings.

Complies with FEMA 361 and ICC 500 storm shelter and safe room standards

FEMA 361 / ICC-500 MISSILE IMPACT TEST:

<table>
<thead>
<tr>
<th>MISSILE TYPE</th>
<th>VELOCITY IN MPH</th>
<th>IMPACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 lb. 2&quot;x4&quot; (Wood grade #2 or better)</td>
<td>100</td>
<td>4</td>
</tr>
</tbody>
</table>

A-19b
9-22-16