Manual Contents:
This manual provides the information necessary to specify, purchase, and install the CrashGard Sand Barrel System:

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CrashGard® Limitations and Warranty
Limitations
The CrashGard® Sand Barrel System meets NCHRP-350 criteria, Test Level 3, for non-redirective, gating crash cushions. It should not be used for any other function.

Impacts that exceed design capabilities may not result in acceptable crash performances as described in NCHRP-350.

Warranty
Plastic Safety Systems, Inc. (PSS):

• warrants each CrashGard Sand Barrel System is free from manufacturing defects for one (1) year, from date of purchase. (Subject to additional terms and conditions. Please contact PSS for complete warranty.)

• warrants each CrashGard Sand Barrel System against UV degradation for six (6) years from date of purchase, on a pro-rated, “repair or replace” basis.

CrashGard® is a registered trademark of Plastic Safety, Systems, Inc.

FHWA Issues Acceptance Letter for CrashGard®

FHWA Acceptance Letter CC-97
In March, 2007, the FHWA issued acceptance letter CC-97 to Plastic Safety Systems, Inc. (PSS) for the CrashGard® Sand Barrel System.

Summary of CC-97
In CC-97, the FHWA:
• identifies the CrashGard Sand Barrel System as a non-redirective, gating crash cushion that consists of a barrel, insert, and lid, manufactured from HDPE plastic.

• acknowledges that PSS conducted and passed full-scale crash tests NCHRP-350, 3-40 through 3-44.

• confirms that CrashGard meets the criteria of NCHRP-350 Test Level 3 for non-redirective, gating crash cushions.

• states that the CrashGard may be used on the National Highway System.

For more information about the CrashGard® Sand Barrel System:
Call us at 800-662-6338.
Contact your local sales representative, as listed on the back cover.
General Information (cont’d)

Description of Sand Barrel:
The Plastic Safety Systems, Inc. (PSS) CrashGard® Sand Barrel System is a non-redirective, gating sand barrel, or crash cushion. Sand barrels are designed to protect fixed objects, whether permanent or temporary. Sand barrels are designed to reduce the likelihood of a vehicle impacting the object.

Function of Sand Barrel:
As the AASHTO Roadside Design Guide states, sand barrels absorb energy.
• Sand barrels stop the impact vehicle in a short distance and at a controlled rate.

• The controlled rate reduces the potential for injury to the occupants.

• Sand barrels allow the vehicle to pass through the array but they do not redirect the vehicle.

NCHRP-350 Certification:
To ensure effective performance and compliance, PSS tested the CrashGard Sand Barrel System to NCHRP-350 Tests 3-40 through 3-44, at Test Level 3.

CrashGard passed all applicable NCHRP-350 tests and is certified to Test Level 3 (62 miles / 100 kilometers per hour).

The FHWA has issued acceptance letter CC-97 for the CrashGard Sand Barrel System. See previous page for details.
Plastic Safety Systems, Inc. (PSS) designed the CrashGard® Sand Barrel System for the intended use as a gating, non-redirective crash attenuator.

**Description of System:**
The CrashGard Sand Barrel consists of 3 components:

**Barrel, P/N CC-48:**
**Overall dimensions:** 36.0” diameter, 48.0” height.

**Configuration of lower portion:** configured in a square profile, which creates lifting shelves at the intermediate section of the barrel.

**Design function of lifting shelves:** provide support for forklift transport.

**Configuration of upper portion:** configured in a straight wall. Groove in top of barrel allows for snap-on lid. Barrels will easily nest when empty of contents and with insert and lid removed.

**Design function of straight wall:** allows for easy application of retro-reflective sheeting, and supports the CrashGard Hoist lift ring used for transport.

**Maximum ballast:** 2,100 lbs. of sand. The barrel is marked externally with the following fill marks: 200, 400, 700, 1,400 and 2,100 lbs.

**Molding process and material:** blow-molded from high molecular, high density polyethylene (HLMI-HDPE) material, which includes UV stabilizer agents. Safety Yellow in color.
Specifications (cont’d)

Insert, P/N CC-I27:
**Overall dimensions:** 27.0” square, 10.4” height.

**Configuration:** conical in shape. Inserts will nest.

**Design function:** allows for ballast of either 200, 400, or 700 lbs. of sand when installed on the ledge molded into the internal lower portion of the barrel. Install conical side up, as indicated.

**Molding process and material:** rotationally molded from high density polyethylene (HDPE) material.

Lid, P/N CC-L36:
**Overall dimensions:** 36.5” diameter, 6.6” height.

**Configuration:** round in shape. Lids will nest.

**Design function:** tamper-resistant fit on top of barrel. Reduces vandalism and infiltration of water. Lip of lid snaps into a groove in the top of the barrel.

**Molding process and material:** blow-molded from high molecular, high density polyethylene (HLMI-HDPE) material, which includes UV stabilizer agents. Black in color.

Performance:
Installers will position the CrashGard Sand Barrel Systems in front of a hazard in an array format.

Each array shall be designed to reduce the rate of deceleration of the impacting vehicle.

Properly designed arrays (as described in pages 13-15) will decelerate the vehicle within the parameters described in NCHRP-350.

Use only sand that meets ASTM C-33, washed concrete sand or equivalent. Use only sand that contains less than 3% moisture. In freezing conditions, add a minimum of 5% rock salt. In all cases, sand must meet state specifications.

Design and Placement of Arrays:
Design and placement of arrays will adhere to guidelines established in:


Tests:
PSS has tested the CrashGard Sand Barrel System to the requirements set forth in NCHRP-350, Test Level 3.
Shipping Configurations

Specifications (cont’d)

Shipping Configurations

Measurements Shown in Inches [Millimeters]

<table>
<thead>
<tr>
<th>Shipping Configurations</th>
<th>Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Truckload</strong></td>
<td><strong>Lid</strong></td>
</tr>
<tr>
<td>1 stack consists of:</td>
<td>7 lbs. [3.18 kg]</td>
</tr>
<tr>
<td>• 5 CrashGards nested</td>
<td><strong>Insert</strong></td>
</tr>
<tr>
<td>• 5 lids</td>
<td>7 lbs. [3.18 kg]</td>
</tr>
<tr>
<td>Inserts packed separately</td>
<td><strong>Barrel</strong></td>
</tr>
<tr>
<td>No pallet necessary</td>
<td>38 lbs. [17.24 kg]</td>
</tr>
</tbody>
</table>

T/L quantities depend upon the number of inserts required. Please call with your array requirements and we will calculate a T/L configuration.
Proper installation ensures successful performance.

Review all engineering plans prior to installation for proper design array. Contact Plastic Safety Systems at 800-662-6338 for questions about the CrashGard Sand Barrel System.

Plastic Safety Systems, Inc. recommends the following installation procedure, with dimensions as noted. Note well that state specifications may differ from our recommended dimensions. State specifications always supersede our recommendations.

For example, we recommend a minimum 12” space between the fixed object and the first row of barrels. However, some states specify a minimum of 18”. In that case, installers should follow the state specification, and place the barrels at least 18” from the fixed object.

In all installations, installers should adhere to state specifications or drawings.

A) Prepare the Site:
1) Implement proper traffic control procedures to protect workers and the driving public:
2) Clear the site of any debris or snow.
3) Measure the grade of the installation site. The grade should not exceed 5% in either direction. The site requires grading, if over 5%.

B) Set the First Row:
The row of sand barrels, closest to the fixed object, and perpendicular to traffic, is considered the first row. Start the installation at the first row, as the rows should follow a straight line.
1) Laterally offset the first row, on the side of traffic, a minimum of 32”:
2) Allow for a minimum 12” of space between the first row and the fixed object:

C) Set the rest of the Array:
1) Mark the centerline of the array with a chalk line or other marking device. (This works especially well for new installations.)
2) Adhering to the centerline, set each barrel in place:
   a) Allow a minimum of 6” between barrels parallel to traffic. Measure from the top of the barrel.
   b) Allow a maximum of 6” between barrels perpendicular to traffic. Measure from the top of the barrel.

D) Fill the Barrels:
1) Filling the barrels offsite: follow the directions below, but also make sure to mark the barrels with their respective weights, to avoid misplacement in the array.
Installation Procedure (cont’d)

2) Filling the barrels on site:
   a) Review the array plans or drawings to determine the appropriate weight for each barrel.
   b) Install the CrashGard Insert for weights of 200, 400 and 700 lbs.
   c) Weights of 1,400 and 2,100 lbs. do not require inserts.

See page 9 of this manual for Insert instructions.

3) Fill the barrels with the appropriate weight of sand, using the fill level marks on the side of the barrel.

See page 10 of this manual to measure sand fill levels from inside the barrel, if retroreflective sheeting obscures the fill level marks.

4) Use only sand that meets ASTM C-33, washed concrete sand or equivalent. Use only sand that contains less than 3% moisture. In freezing conditions, add a minimum of 5% rock salt. In all cases, sand must meet state specifications.

E) Final Steps:
1) Press a lid on each barrel. Check that each has completely snapped into the lid groove on the barrel.

2) Clean-up and Inspection.
   a) Dispose of loose sand properly.
   b) Remove all tools and equipment from site.
   c) Inspect all lids for proper installation.
   d) Review alignment of barrels.
   e) Compare the array to the specifications for a final check.

DOT Approved Installations:

Figure D: Filling the barrels. (Here, an option: set and fill the barrels one perpendicular row at a time.)
1) Determine which barrels in the array require Inserts. Only those barrels with weights of 200, 400 or 700 lbs. require Inserts. Barrels of 1,400 and 2,100 lbs. do not require Inserts.

2) Always install the CrashGard Insert with the cone-shaped side face up.

3) Figure A: Lean the barrel inward for convenience. Hold the Insert, cone-shaped side face up, with both hands.

4) Figure B: The CrashGard Insert is a square-sided unit. Make sure that the configuration of the Insert matches the configuration of the barrel shelf upon which it rests. Slowly drop the Insert into position.

5) Figure C: Once properly aligned, press-fit the Insert into the barrel. There should be no rocking or sliding; the Insert should fit snugly.

6) Figure D: Fill the barrel with sand.

Refer to the previous page for filling instructions. Refer to the next page for measurements, if needed.
**CrashGard® Sand Fill Measurements**

**Dimensions in Inches [Millimeters]**

To determine sand fill levels from the inside of the barrel, use the measurements listed below. Measure from the TOP of the barrel to determine the appropriate fill level.

For **1,400 & 2,100 lbs.**

- **12-5/8” (321.6 mm)**: 1400 lbs.
- **2100 lbs. fill to top**

Without Insert

For **200, 400 & 700 lbs.**

- **18-1/8” (458.9 mm)**: 400 lbs.
- **22-1/8” (562 mm)**: 700 lbs.
- **700 lbs. fill mark**
- **12-1/8” (309.6 mm)**: 200 lbs.
- **Install Insert with cone-shaped side up**

With Insert
Forklift Transport Instructions

We designed the CrashGard Sand Barrel System for both safe and easy transport using a forklift truck or our CrashGard Hoist.

To accommodate forklift trucks, we designed four flat sides, located just below the bottom round tier, at the 200 lb. fill level. We also designed that bottom tier to act as a “shelf” for the forklift blades.

**Forklift Instructions:**

1) Caution: never stand or walk under a sand barrel during transport.

2) Measure the distance between forklift blades, from inside to inside. That distance should not exceed 28”.

3) Figure A: align the blade with the flat sides of the barrel.

4) Figure B: if the barrel contains any significant weight, use the center of the blades for balance.

5) Figure C: Many forklift blades become looser after years of use. To ensure the blades maintain consistent distance, we suggest using a chain binder, or similar type binding equipment.
CrashGard® Hoist Transport Instructions

We designed and manufactured the CrashGard Hoist for the safe, easy and efficient transport of CrashGard sand barrels. With CrashGard Hoist, loading or unloading a truck is at most a two-person operation, and often a one-person operation.

CrashGard Hoist operates in a scissor-like mode, to engage and disengage as necessary, and uses the CrashGard barrel itself to do so.

**CrashGard Hoist Instructions:**

1) Caution: never stand or walk under a sand barrel during transport.

2) Figure A: using a boom, simply hook the Hoist’s lifting ring. Raise the Hoist.

3) Figures B and C: align the Hoist over a CrashGard barrel, and slowly lower it. The lid of the barrel will open the Hoist.

4) Figures D and E: continue to lower the Hoist until it is fully open and rests upon the barrel top.

5) Figure F: raise the Hoist. The tension on the steel cables will cause the Hoist to clamp tightly, directly underneath the middle round tier.

6) Figure G: once engaged, continue to raise the Hoist, and carry it to its destination. Place the barrel where appropriate.

**To disengage the Hoist:**

1) Lower the Hoist to full rest on the lid of the barrel. The Hoist will open.

2) While the Hoist is in the open position, simply slide it off either side of the barrel.

3) Once off, raise the Hoist clear of the barrel to pick up another.
Recommended Arrays

**Design Velocity 70 mph**
19 barrels/array

```
200 200 200 200 400
200 400 400 700 1400 1400 2100
200 400 400 700 1400 1400 2100
```

**Design Velocity 65 mph**
17 barrels/array

```
200 200 200 200 400
400 400 700 1400 1400 2100
400 400 700 1400 1400 2100
```

**Design Velocity 60 mph**
14 barrels/array

```
200 200 200 400
400 700 1400 1400 2100
400 700 1400 1400 2100
```

Weights listed are in pounds of sand. For metric weights and speeds, see the conversion chart on page 15. PSS recommends the above arrays for the designated speeds, as noted. When combining CrashGard along with sand barrels from other manufacturers, (commonly referred to as mixed arrays) PSS recommends the installer follow the manufacturers’ recommendation, design or plan that utilizes the highest number of barrels.
Weights listed are in pounds of sand. For metric weights and speeds, see the conversion chart on page 15. PSS recommends the above arrays for the designated speeds, as noted. When combining CrashGard along with sand barrels from other manufacturers, (commonly referred to as mixed arrays) PSS recommends the installer follow the manufacturers’ recommendation, design or plan that utilizes the highest number of barrels.
## Recommended Arrays

### Design Velocity 40 mph
- 8 barrels/array

```
400  700
1400 1400 2100
1400 1400 2100
```

### Design Velocity 35 mph
- 7 barrels/array

```
700
1400 1400 2100
1400 1400 2100
```

### Design Velocity 30 mph
- 7 barrels/array

```
700
1400 1400 2100
1400 1400 2100
```

### Design Velocity 25 mph
- 6 barrels/array

```
1400 1400 2100
1400 1400 2100
```

## Metric Conversion Table

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<th>Kilometers (km)</th>
<th>Weight Lbs.</th>
<th>Kilograms (kg)</th>
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<td>200</td>
<td>90.7</td>
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<tr>
<td>30</td>
<td>48.3</td>
<td>400</td>
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<tr>
<td>35</td>
<td>56.3</td>
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<tr>
<td>40</td>
<td>64.4</td>
<td>1,400</td>
<td>635.0</td>
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<td>45</td>
<td>72.4</td>
<td>2,100</td>
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</tr>
<tr>
<td>65</td>
<td>104.6</td>
<td></td>
<td></td>
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<tr>
<td>70</td>
<td>112.6</td>
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</table>

Weights listed are in pounds of sand. For metric weights and speeds, see the conversion chart above. PSS recommends the above arrays for the designated speeds, as noted. When combining CrashGard along with sand barrels from other manufacturers, (commonly referred to as mixed arrays) PSS recommends the installer follow the manufacturers’ recommendation, design or plan that utilizes the highest number of barrels.
### Sales Representatives

<table>
<thead>
<tr>
<th>AR, LA, OK, TX</th>
<th>AZ, IN, KY, MI, NM, OH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>L.B. GAMBRELL</strong>&lt;br&gt;Manufacturers Agency Inc.&lt;br&gt;17774 Cypress Rosehill Rd. Suite 300&lt;br&gt;Cypress TX 77429&lt;br&gt;PH: 281-357-1511&lt;br&gt;Cell: 713-806-8866&lt;br&gt;Fax: 281-357-1505&lt;br&gt;E-Mail: <a href="mailto:mais@sbcglobal.net">mais@sbcglobal.net</a></td>
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</tr>
<tr>
<td><strong>KENT LANGWORTHY</strong>&lt;br&gt;EKL Marketing, Inc.&lt;br&gt;205 Smokerise Trace&lt;br&gt;Peachtree City GA 30269&lt;br&gt;PH: 770-486-1051&lt;br&gt;Cell: 404-966-4775&lt;br&gt;Fax: 770-486-6227&lt;br&gt;E-Mail: <a href="mailto:kent@langworthy1.com">kent@langworthy1.com</a></td>
<td><strong>CO, IL, IA, KS, MN, MO, MT, NB, ND, SD, WI, WY, MI (Upper Peninsula)</strong>&lt;br&gt;All International Accounts</td>
</tr>
<tr>
<td><strong>DAVE MCMASTER</strong>&lt;br&gt;HMR, Inc.&lt;br&gt;123 Whitaker Dr.&lt;br&gt;Butler PA 16001&lt;br&gt;PH: 724-352-1555&lt;br&gt;Cell: 412-480-3822&lt;br&gt;Fax: 724-352-0790&lt;br&gt;E-Mail: <a href="mailto:hmreps@aol.com">hmreps@aol.com</a></td>
<td><strong>AK, CA, HI, ID, NV, OR, UT, WA</strong></td>
</tr>
<tr>
<td><strong>JEFF MCMASTER</strong>&lt;br&gt;HMR, Inc.&lt;br&gt;400 Beechwood Blvd.&lt;br&gt;Saxonburg PA 16056&lt;br&gt;PH: 412-719-6482&lt;br&gt;Cell: 412-719-6482&lt;br&gt;Fax: 724-352-0790&lt;br&gt;E-Mail: <a href="mailto:jeffmcmaster@zoominternet.net">jeffmcmaster@zoominternet.net</a></td>
<td><strong>CUSTOMER AND TECHNICAL SUPPORT</strong>&lt;br&gt;Plastic Safety Systems, Inc.&lt;br&gt;2444 Baldwin Rd. Cleveland OH 44104&lt;br&gt;800-662-6338&lt;br&gt;www.plasticsafety.com&lt;br&gt;www.crashgard.com</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>AL, GA, MS, TN, FL (Panhandle)</th>
<th>CT, DE, MA, MD, ME, NC, NH, NJ, NY, PA, RI, SC, VA, VT, WV, FL (all but Panhandle)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TIM COX</strong>&lt;br&gt;Plastic Safety Systems, Inc.&lt;br&gt;1407 NE Tara Circle&lt;br&gt;Blue Springs MO 64104&lt;br&gt;PH: 816-229-9085&lt;br&gt;Cell: 816-229-9085&lt;br&gt;Fax: 724-352-0790&lt;br&gt;E-Mail: <a href="mailto:timcox@comcast.net">timcox@comcast.net</a></td>
<td><strong>JOE RIEHL</strong>&lt;br&gt;Capitol Barricade, Inc.&lt;br&gt;6329 Elvas Ave.&lt;br&gt;Sacramento CA 95819&lt;br&gt;PH: 916-451-5176&lt;br&gt;Cell: 916-719-5125&lt;br&gt;Fax: 916-451-5388&lt;br&gt;E-Mail: <a href="mailto:joe@capitolbarricade.com">joe@capitolbarricade.com</a></td>
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</table>

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