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Center for Pet Safety 2015 Crate Crashworthiness Study Summary Report

Sponsored by Subaru of America

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Center for Pet Safety

Scope

In 2015 Center for Pet Safety and Subaru of America renewed a partnership with the intent to study the crashworthiness of pet travel crates that claimed “testing”, “crash testing” or “crash protection”. Only crates valued under a purchase price of \$1,000.00 (cost of product plus shipping) were considered for this study. Additionally, understanding that product cost is a purchasing factor for pet owners, CPS also performed investigative testing on “value” crates that are commonly used for pet travel to determine if they could be adapted to achieve improved structural integrity and crash protection. For this effort value crates are defined as typically costing under \$150.00 and do not make claims of “testing”, “crash testing” or “crash protection”. Plastic Crates have been defined as “Carriers” and that summary report can be found here:

<http://www.centerforpetsafety.org/test-results/carriers/2015-carrier-study-results/>

Background

In 2011 Center for Pet Safety conducted a limited number of crate tests to determine the safety and crashworthiness of crates commonly used for pet travel. The 2011 testing indicated a significant risk of failure of products classified as “value” crates that could lead to injury or escape of the pet, as well as concern for the safety and wellbeing of the vehicle occupants in the case of an accident. In 2013 Subaru of America was a project sponsor of the Center for Pet Safety Harness Crashworthiness Study that raised travel safety awareness around the globe and led to the first published test protocol and ratings guidelines to measure performance of safety harnesses. In 2015 Subaru has once again signed on as a project sponsor to help Center for Pet Safety educate pet owners about travel crate safety.

Purpose

The purpose of the 2015 Crate Study is:

- Independently evaluate the current-state travel crate products that claim “testing”, “crash testing” or “crash protection” and cost less than \$1,000.00 (US).
- Examine the safety, structural integrity and crashworthiness of “value” crates.
- Examine connection options to help educate pet owners.
- Collect performance data necessary to support a formal test protocol and ratings guidelines for pet travel crates.
- Determine top performing crate brand(s).



Center for Pet Safety acknowledges that proper passenger and cargo restraint is critical for successful crash protection. Crates that are not structurally sound, have insufficient connection strength and/or are reliant on the seatback for additional support during a sudden stop or accident place the pet and human vehicle occupants at risk.¹

About our Team

Center for Pet Safety – Center for Pet Safety (CPS) is a 501(c)(3) non-profit research and consumer advocacy organization dedicated to consumer and companion animal safety. Based in the Washington, D.C. Metropolitan area, the Center for Pet Safety’s mission is to have an enduring, positive impact on the survivability, health, safety and well-being of companion animals and the consumer through scientific research and product testing. For additional information visit www.CenterforPetSafety.org.

Chris Sherwood, Biocore, LLC. – Chris Sherwood is a former senior research engineer for the Insurance Institute for Highway Safety (IIHS). He is currently employed by Biocore, LLC, a biomechanics consulting and research firm. Mr. Sherwood holds a Master’s Degree in Biomechanics and has been actively involved in the research and development of automotive child safety standards. Mr. Sherwood brings his years of passenger safety expertise to the Center for Pet Safety Crate and Carrier Studies as a passenger safety consultant. He was integral in the development of the CPS Harness Crashworthiness Test Protocol and Ratings Guidelines.

MGA Research Corporation – MGA Research Corporation, a National Highway Traffic Safety Administration (NHTSA) contracted test facility, located in Manassas, Virginia was hired to perform independent, third party testing of pet travel products. Center for Pet Safety Representatives were on-site to witness testing of all pet travel products.

Test Methodology

Center for Pet Safety developed a rigid metal fixture to simulate the seatback in a vehicle. CPS acknowledges that vehicle seatbacks have strength limitations as illustrated in preliminary crate testing in 2011. During that testing, the seatback sustained damage when struck with a 55 lb. crash test dog. It is for this reason that Center for Pet Safety is concerned about crate products that rely on the seatback for added support, especially when transporting large dogs (Labrador Retriever, Weimaraner, Visla, etc.).

Due to the marketing by brands that claim “testing”, “crash testing” or “crash protection”, CPS opted to select the test condition of ECE R-17 a European test standard developed to assess the strength of seats, their anchorages and head restraints. In this test, a weighted block of 39.6 lbs. (18kg) is used to assess the strength of the seatback. Because crates are generally considered cargo, Center for Pet Safety acknowledges the increased risk of seatback failure should a front impact accident occur and cargo (weight of the crate plus the dog) exceeding 40 lbs. strikes the seatback.

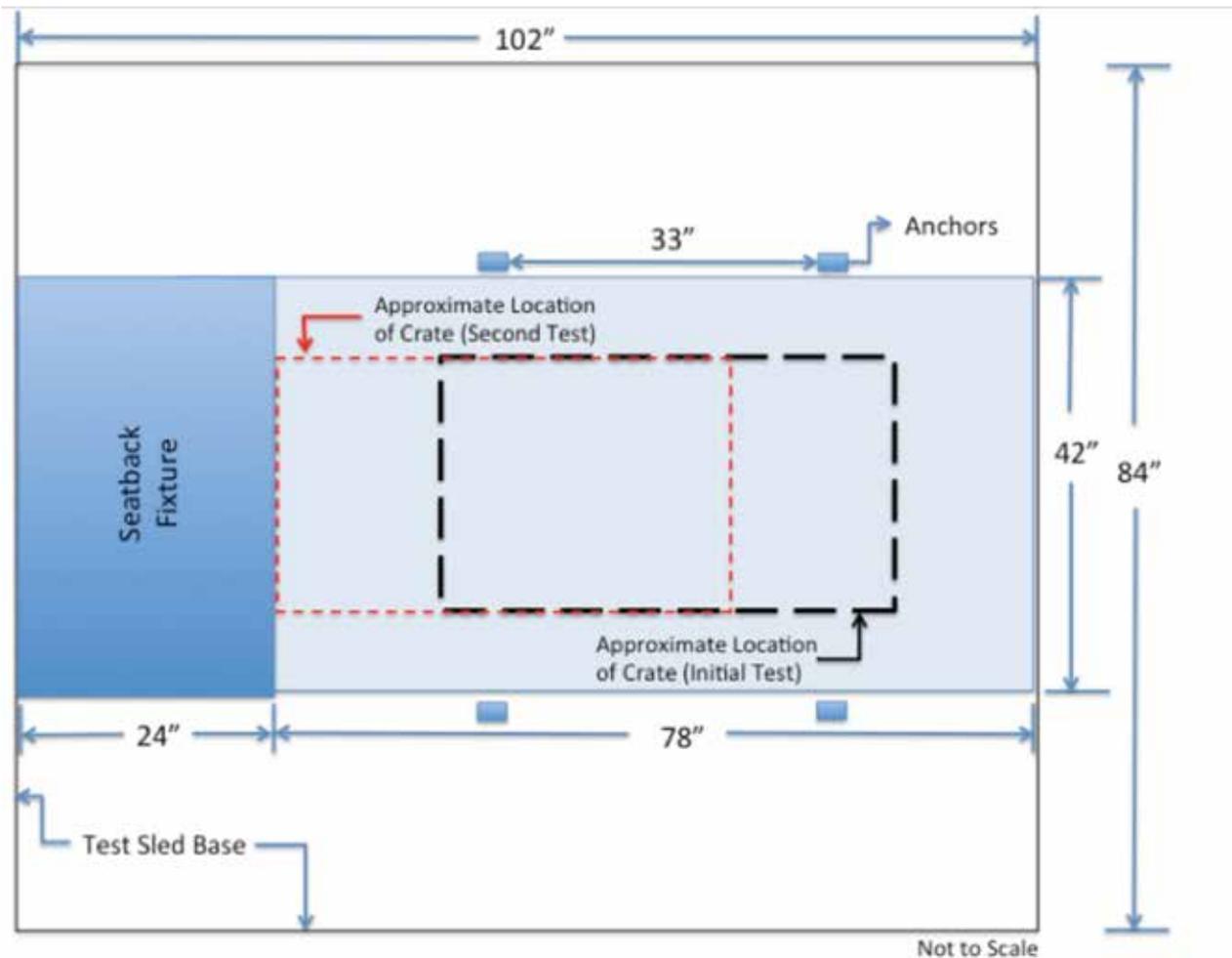
This initial data collection effort examined crates using only front-impact testing using the ECE R-17 test conditions.

Test Dogs

Unless otherwise specified in this report, crash tests were conducted using a Center for Pet Safety Crash Test Dog weighing 75 lbs.

Test Fixturing

CPS specified a simulated cargo area for testing to be mounted on the test sled at MGA Research Corporation. A flat plywood floor was bolted to the sled base and carpeted. The seatback fixture was placed in front of the simulated cargo area. Four strength rated anchor points were specified by Center for Pet Safety and mounted to the sled.



For this study it is important to focus on the structural integrity of the crate and the connectors provided by, or specified by, the manufacturer. Connections should not break or detach from the crate in a crash simulation. Additionally, the crate should not rely on the seatback for additional support in a front impact crash, nor should the product shift excessively or release completely from the anchorage.



Initial Test (Test 1)

This test was designed to reflect a “real-world” test where the crate for the large dog would necessitate folding the rear seats down to accommodate the larger containment system. The crate was placed centrally in the simulated cargo area and attached to the anchor points per manufacturer instructions without contacting the simulated seat.

Second Test (Test 2)

If the product components failed in any way during the initial test (Test 1), it was then retested with the crate touching the simulated seatback. This setup would provide additional support to the crate therefore predicting a better outcome in performance and demonstrating that the product was somewhat reliant on the seatback for additional support. However, if the crate relies on the seatback for additional support, there is an increased risk of seatback failure should a front impact accident occur when the combined weight of the crate plus the dog exceeds ~ 40 lbs.

For this effort, the Center for Pet Safety’s definition of a successful test outcome was determined by the ability of the crate to:

1. In the Initial Test (Test 1), the crate will not contact the simulated seatback.
2. Anchor straps and crate connections must retain integrity. (Indicating a reduced chance of injury to other vehicle occupants by preventing unrestrained movement of the crate during a crash.)
3. Must provide full containment of the test dog, before, during and after the crash simulation with no breach of the crate structure or door. (Illustrates the best possible chance of survival for the pet during and after the crash.)



Product Selection for the 2015 Crate Study

1. 4Pets Proline Milan (page 5)
2. MIM Safe Variocage Single (page 8)
3. Gunner Kennel G1 Intermediate (page 11)
4. Roto Mold, LLC. Ruff Tough Kennel (page 13)

4Pets Proline Milan

- Claims Crash Testing, TUV Certification
- Manufacturer has not published test evidence.
- Claims to be the only crash tested and approved dog crate in the world.

The description of crash testing from the manufacturer's website: <http://www.4pets-products.com/#!4pets-proline-en/c19f9>

"The 4pets ProLine dog-boxes have been mounted on a sledge and loaded with reference weights of up to 55kg (121.2 pounds). This setup is equivalent to a dog-box in a car trunk with a folded-down rear bench. To comply with the TÜV-SUD provisions it had been required that a dog does not break through the back panel in case of a head-on collision. The tests have been executed with a speed of 50 kmph (31 mph). The force generated during such tests are approximately equivalent to the twentyfold weight of the load in the crate. All the crates have passed these tests with excellent results. Additionally there have been test drives on a bad road (Belgian block test drives) with 25 kmph (15.5 mph) with following criteria: There must be no permanent deformations, which impair the function; cargo must still be in secured condition; no breakdown of the attachment parts; attachment parts must not loosen and doors must not open. The ProLine crates also passed these tests and all the other above listed and tested aspects with excellent results.

TÜV SÜD and 4pets are very well aware of the fact that people normally do not drive with their back seat down. A back seat in its normal upright position provides additional resistance in case of an impact. The TÜV crash-test for the ProLine has been carried out under aggravated conditions. In case of the ProLine, this was with a folded down rear bench to investigate if the included straps could hold the crate in its position and the animal does not break through the back panel during a crash. The ProLine passed all tests under these aggravated conditions. Consequently, in the normal every day situation with the extra resistance of the upright rear bench to the back panel of the ProLine, it is even safer."

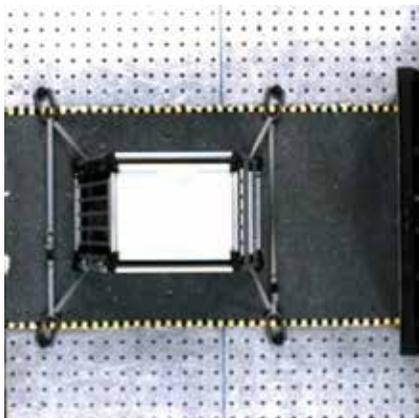
Purchasing Overview: After several orders of the ProLine Milan crate from Amazon.com were received broken, a ProLine Milan crate was ordered from Cesar Milan's webstore. The box was marked "Fragile – Do Not Drop". The box was packed with Styrofoam peanuts and the crate was intact and in good condition. A second crate was sourced through Mr. Milan's website and also delivered in good condition.

Assembly: Manufacturer's instructions were largely illustrative with little detail. The vehicle connection instruction insert was poorly designed leaving much of the connection decisions to the consumer. Additionally, this connection instruction insert required the CPS team to obtain a translation because the instructions were not in English.

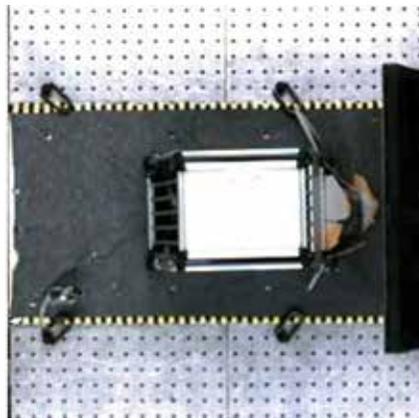
Test 1 (Test V15573)

CPS first placed the crate in the center of the simulated cargo area to illustrate a front impact crash with the rear passenger seat folded down. The test dog was placed inside of the crate and the door was locked with the accompanying key.

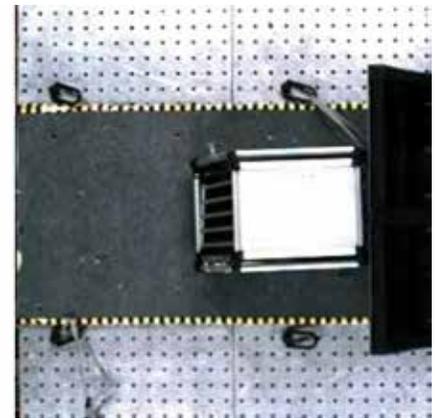
Two anchor straps, included with the ProLine Milan, were used to secure the crate to the connections in the simulated cargo area.



Pre-test



*Straps have broken.
Dog breaking back of crate and
being partially ejected*



*Crate moving forward and
impacting seatback*



Door opening inward during crash

Test Results: The cargo connection anchor straps experienced a complete rupture and fully released the crate. The rear panel of the crate was destroyed. The rear end of the test dog protruded out of the crate. The rear and side panels of the crate were confirmed to be wooden chip board.

The lock failed and the door of the crate released inwards toward the test dog upon impact.

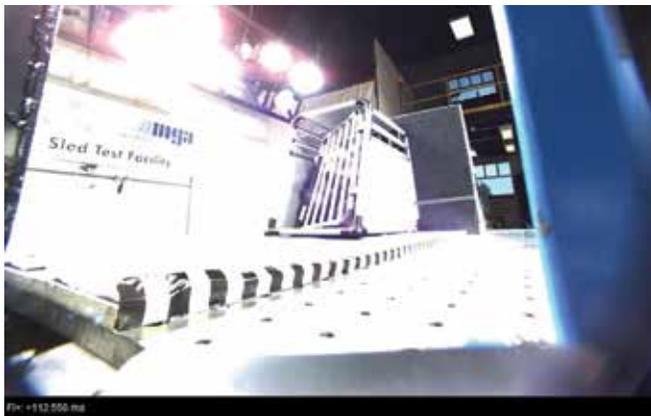
The crate subsequently tumbled in free flight off of the test sled and onto the floor.

The door could not be opened and required extra force to open and release the test dog.

Test 2 (Test V15575)

CPS placed the crate against the solid fixture that represented the rear passenger seat.

Two anchor straps are included with the ProLine Milan were used to secure the crate to a single connection point in the simulated cargo area and around the simulated seat fixture.



Door opening during crash



ProLine Milan Post Test 2. Connection to seatback intact, crate door release inwards, wooden back panel damage.

Test Results: With the support of the simulated seat fixture, the ProLine Milan crate experienced minor damage to the back wooden panel.

The lock failed and the door of the crate released inwards toward the test dog upon impact.

The door could not be opened. Additional tools, including a small crow bar, were used to pry the door open and release the test dog.

The crate remained in position and tethered to the seatback fixture.

The crash test dog was contained by the crate.



MIM Safe Variocage Single

- Claims Crash Testing, TUV Certification
- Manufacturer has published test evidence.
- Claims to be the only crash tested and approved dog crate in the world.

Source of information regarding MIM Variocage: <https://4x4northamerica.com/mim-safetyvariocage/>

MIM continues to improve their products and has now released the latest generation Variocage, which passes the SPCT crash test. Additionally, crash test performance of the MIM Safe Variocage was measured against the criteria established in ISO 27855, ECE R-17, ECE R-44, with a dog dummy weighing 99 lbs in a single cage and two (2) dog dummies weighing 77 lbs each in a double cage at speeds exceeding 30 mph.

In a rear-end collision, the Variocage will be compressed in a controlled manner mimicking the automobile's crumple zone. The result is that rear seat back will not be pushed forward by the crate. This will prevent the cage and your dog from causing serious injury to human occupants.

The Variocage crumple zone also protects your dog from being injured by limiting the deformation of the crate in a rear-end collision. In addition, the MIM Safe Variocage also reduces the risk of injury to your dog because it is designed to minimize puncture wounds and lacerations from the cage material. The MIM Safe Variocage is carefully crafted so that no feature on the crate can harm the dog.

The Variocage is constructed of steel. It is flexible enough to absorb impacts and strong enough to retain its shape.

The Variocage is the only dog crate on the market built to meet government crash test safety standards.

MIM Safe Variocage features an escape hatch. This very important feature allows you to remove your dog from the vehicle after a collision.

All Variocage models are equipped with tie-down straps for securing the cage to cargo anchor points, a rubber carpet, and safety locks (keys included).

The quality of the Variocage is second to none. They are designed to last a lifetime.

Purchasing Overview: Two MIM Safe Variocage Singles were purchased in new condition from Amazon.com. Both were inspected upon arrival and were found to be in good condition.

Assembly: Manufacturer's instructions were poor and no English translation was provided. Connection details were non-existent requiring the CPS team to examine multiple sources online to determine the connection details.

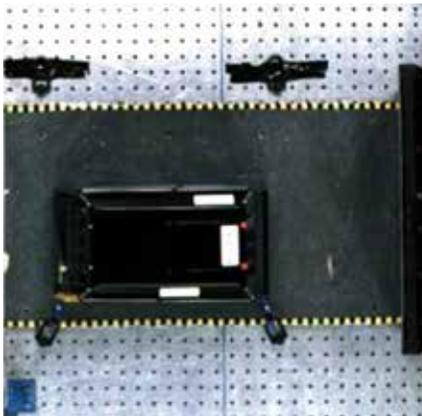
Test 1 (V15574)

CPS first placed the crate on the included rubber mat in the center of the simulated cargo area to illustrate a front impact crash with the rear passenger seat folded down. The test dog was placed inside of the crate and the door was locked with the accompanying key.

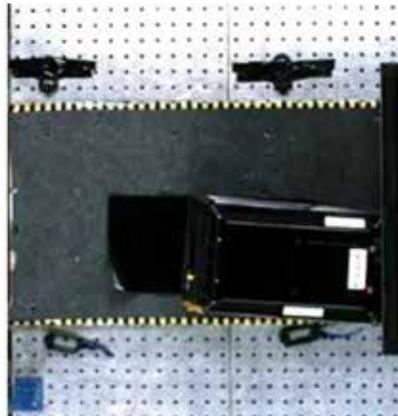
Two anchor straps are included with the MIM Variocage were used to secure the crate to the connections in the simulated cargo area.



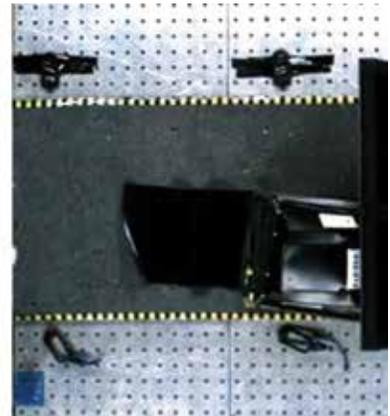
MIM Variocage Pre-Test 1.



Pre-test



Straps have broken.
Initial impact with seatback.



Rear of crate crushes forward, reducing interior crate volume



MIM Variocage Post-Test 1. Complete connection failures (Front and Rear)

Test Results: The front cargo connection failed – the front cargo strap remained intact, however it tore through the metal connection point on the crate.

The rear cargo connection failed and the webbing ruptured.

The crate crushed (as noted in the marketing material) during impact with an average crush of 10 inches.

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The top and sides of the crate experienced minor deformation.

The locked door retained integrity and was unlocked and opened easily.

The crash test dog was retained.

Test 2 (V15576)

CPS placed the crate on the included rubber mat against the solid fixture that represented the rear passenger seat.

Two anchor straps are included with the MIM Variocage were used to secure the crate to two connections in the simulated cargo area.



MIM Variocage Pre-Test 2



MIM Variocage Post-Test 2

Test Results: The front cargo connection failed – the front cargo strap remained intact, however it tore through the metal connection point on the crate.

The crate crushed (as noted in the marketing material) during impact with an average crush of 10 inches.

The top and sides of the crate experienced minor deformation.

The locked door retained integrity and was unlocked and opened easily.

The crash test dog was retained.

Gunner Kennel G1 Intermediate

- Claims testing, Structural Integrity

At the time of product selection, manufacturer had not published test evidence.

Source: <https://www.gunnerkennels.com/>

“Our kennel was tested to withstand more than 4,000 lbs of force. Nothing else comes close.”

“Our patent pending, American-made kennel withstood the most rigorous tests we could throw at it, tests that other kennels simply couldn’t hold up to.”

Purchasing Overview: Two new Gunner Kennels and connection kits were purchased from the manufacturer and received in good condition.

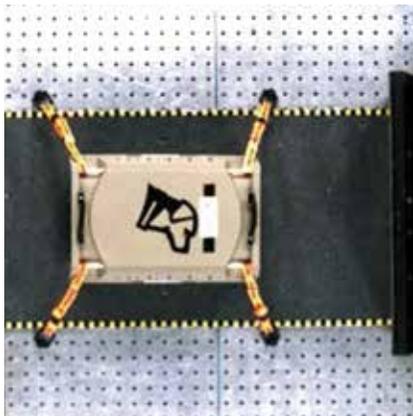
Assembly: Manufacturer’s instructions were clear and well designed.

Connection Instructions: The instructions for connection were clear. Manufacturer’s instructions are specific to Pickup Truck Bed attachments. Center for Pet Safety opted to test this crate using the simulated cargo area.

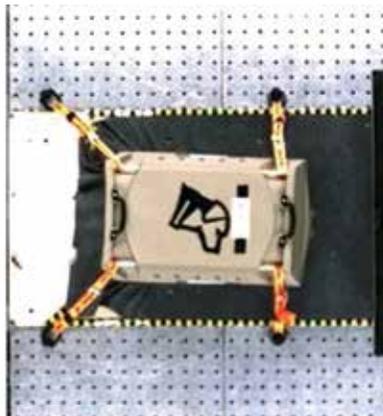
Test 1 (Test V15572)

CPS placed the crate in the center of the simulated cargo area to illustrate a crash with the rear passenger seat folded down. The test dog was placed inside of the crate and the door was locked with the accompanying key and additional embedded locking latches.

A connection kit (4 anchor straps included in the kit) was purchased with the Gunner Kennel and was used to secure the crate to the connections in the simulated cargo area per manufacturer instructions.



Pre-test



Maximum forward excursion



Pre-test



Post-test

Test Results: The anchor straps held firmly with no hardware deformation or webbing migration.

The anchor pins on the crate experienced minor deformation.

The Gunner Kennel did not strike the seatback.

The kennel experienced no structural integrity issues with the overall crate body.

The locked door retained integrity and was unlocked and opened easily.

The crash test dog was retained.

Test 2: The test results from the first test of the Gunner Kennel were superior and a second test was deemed “not necessary” by Center for Pet Safety.



- **Gunner Kennel G1 Intermediate with 8 ft. Tie Down Straps has been named a 2015 Top Performer by Center for Pet Safety.**

Roto Mold, LLC Ruff Tough Kennel

- Claims Impact Testing
- Manufacturer has published informal test evidence.

Manufacturer does not claim Crash Testing. Source: <http://rufftoughkennels.com/about.html>

“When impact testing the Ruff Tough Kennel we dropped it from a height of twelve feet, with no noticeable damage. ... We’ve received testimonials that our kennels have also been involved in actual car accidents and are happy to report that dog and kennel have survived each and every time.”

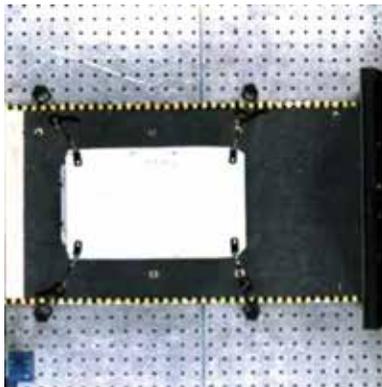
Two new Ruff Tough Kennels were ordered from the manufacturer’s website with two connection kits.

The crate does not require assembly, however, the connection points need to be installed. No anchor/tiedown straps are included with the connection kit. No mounting or tie-down instructions are included. Website instructions on the tie-down bracket page instruct consumers to “secure your kennel in place with a strap or cord of your choice”. Center for Pet Safety opted to select four new strength-rated cargo straps to connect the Ruff Tough to the simulated cargo area anchor points.

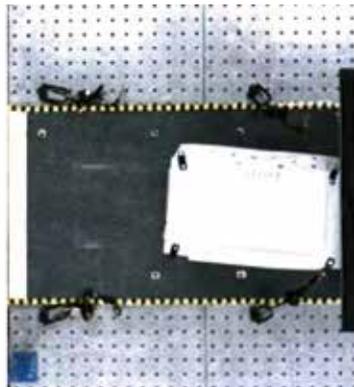
Test 1 (Test V15577)

CPS first placed the crate in the center of the simulated cargo area to illustrate a front impact crash with the rear passenger seat folded down. The test dog was placed inside of the crate and the door closed (no locking mechanism is present).

Center for Pet Safety used four new strength-rated cargo straps connected to the crate connectors and the anchors in the simulated cargo area to anchor the crate.



Pre-test



*Crate impact with seatback
after anchor failure*



Door separating from crate during impact

Test Results: The tie-down brackets failed on three of four corners.

The door of the crate completely separated from the crate and broke into multiple pieces.

The crate body itself sustained minimal deformation at the point of impact. No fracture of the crate body occurred.

The crate contacted the seatback fixture and the test dog was not retained in the crate.



Test 2 (Test V15702)

CPS placed the crate against the solid fixture that represented the rear passenger seat.

Center for Pet Safety used four new strength-rated cargo straps connected to the crate connectors and the anchors in the simulated cargo area to anchor the crate.



Pre-test



Post-test



Detail of broken door

Test Results: The tie-down brackets retained integrity.

The crate body itself sustained minimal deformation at the point of impact. No fracture of the crate body occurred.

The test dog impacted the front door of the crate causing a section of the door to break, however the test dog was retained.

Investigative Testing

Additional investigative testing was completed to educate pet owners on the crashworthiness of “value” crates.

Wire Crate – Investigative Test with Rubber Anchor Straps

In 2011 Center for Pet Safety performed preliminary crate testing. The published test illustrated an untethered wire crate in a simulated cargo area. Upon publication, pet owners shared their tethering methodologies with CPS. Many pet owners use rubber straps or bungee cords to secure their crate in the vehicle. CPS opted to perform a crash test using rubber anchor straps to illustrate to pet owners the expected performance of these types of tie-downs.

Center for Pet Safety sampled a LifeStages crate made by Midwest Homes for Pets (also indicated by Amazon.com as a popular selection of wire crate). The manufacturer does not claim the product will offer protection in the case of a short stop or accident. However, during multiple parking lot walkthroughs, similar wire crates were the product used most by pet owners in vehicles. [Note: Midwest Homes for Pets does stipulate that their Solutions Series Wire Crate is “Designed Specifically to fit Side by Side in Sport Utility & Van Rear Compartments”.]

Test 1: (Test V15570) Wire Crate – Investigative Test with Rubber Anchor Straps

CPS placed the crate in the center of the simulated cargo area to illustrate a crash with the rear passenger seat folded down. A 110# test dog was placed inside of the crate and the door was closed.

The wire crate was anchored by popular rubber straps (purchased from the local Lowes).



Wire Crate w/Rubber Straps Pre-Test



Wire Crate with Rubber Straps Post-Test



Open door during impact

Test Results: The wire crate slid forward directly into the seatback fixture. The crate was severely deformed on impact. The rubber straps fail to provide any protection to the crate, the dog or the human passengers in the case of an accident.

Wire Crate – Investigative Test with Reinforced Cage Support System

Test 2: (Test V15571) Wire Crate – Investigative Test with Cage Support System

Center for Pet Safety wanted to take our assessment of wire crates one step further than simply accepting that they are only distraction prevention tools. Center for Pet Safety designed a reinforcing system made up of a number of strength rated straps. The purpose of this test was to see if there was any logical way to make a “value” crate perform better in a crash test.

CPS placed the crate in the center of the simulated cargo area to illustrate a crash with the rear passenger seat folded down. A 110# test dog was placed inside of the crate and the door was closed.



Wire Crate w/ Reinforced Cage Support Strap System Pre-Test



Wire Crate w/ Reinforced Cage Support Strap System Post-Test



Major crate deformation allowing partial ejection of dog

Test Results: The wire crate remained in the cargo area and did not strike the seatback.

The test dog hit the back of the crate thus causing the crate to fail and the crash test dog struck the seatback. The crate was severely deformed on impact.

Test evidence indicates that even with strength rated support systems, wire crates should be considered as distraction prevention tools and will not provide significant protection in the case of an accident.



Plastic crates were defined as “Carriers” and test results are published as part of the 2015 Carrier Study that accompanies this effort. Results can be reviewed here:

<http://www.centerforpetsafety.org/test-results/carriers/2015-carrier-study-results/>



Center for Pet Safety 2015 Crate Crashworthiness Study Report Summary

Upon completion of scientific testing of crate products that claim “testing”, “crash testing” or “crash protection” CPS has named:

Gunner Kennels, G1 Intermediate with 8' Tie Down Straps as the 2015 Top Performing Crate

The Gunner Kennel retained structural integrity for the duration of the crash simulation, fully containing the test dog with no breach to the containment device. Additionally, the strength rated connection straps adequately restrained the crate and prevented the product from striking the seatback fixture.

Center for Pet Safety recognizes that there is a distinct difference in performance between a Distraction Prevention Crate and Crash Protection Crate. Many pet owners make the assumption of crash protection, or believe that because a crate looks strong, and is specified by the manufacturer for use in an automobile it will provide protection beyond that intended by the manufacturer. It is the opinion of the Center for Pet Safety that a performance standard and formal testing protocol is needed to ensure consistent and uniform performance of these safety devices to reduce the risk to consumers and their companion animals in the event of a sudden stop or accident.

About the Sponsor: Subaru of America

Center for Pet Safety is grateful to Subaru of America for their sponsorship of this important effort to educate pet owners on pet passenger safety and select the top performing crates on the market.

About Center for Pet Safety

Center for Pet Safety (CPS) is a registered 501(c)(3) non-profit research and advocacy organization dedicated to companion animal and consumer safety. Our mission is to have an enduring, positive impact on the survivability, health, safety and well-being of companion animals and the consumer through scientific research and product testing.

CPS is an independent safety science entity leading a unique mission for companion animals and their owners. Through the scientific study of pet products, we establish criteria to ensure acceptable product performance.

- CPS does not use live animals in our crash testing.
- CPS is not affiliated with the pet products industry.
- CPS does not endorse products.



References

Source:

1. Marianne Skjerven-Martinsen, Pal Aksel Naess, Trond Boye Hansen, Torleiv Ole Rognum, Inggard Lereim & Arne Stray-Pedersen (2011): In-Depth Evaluation of Real-World Car Collisions: Fatal and Severe Injuries in Children Are Predominantly Caused by Restraint Errors and Unstrapped Cargo, *Traffic Injury Prevention*, 12:5, 491-499

Link: <http://dx.doi.org/10.1080/15389588.2011.596868>

Revision History

Date:	Revision:	By: