



**Cascade Rescue Model 200 Advance Series Rescue Litter
Destructive Testing Results
June 27, 2000**

Cascade Rescue Product Testing

Conducted at Rigging for Rescue in Invermere, BC Canada

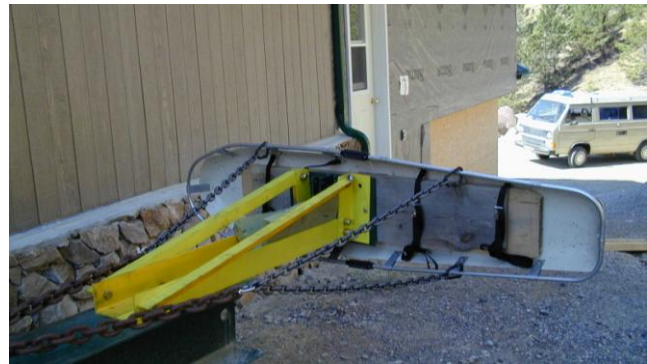
June 27, 2000

Intensive testing was conducted on the Cascade Rescue Model 200 Advance Series Rescue Litter on June 27, 2000 at Rigging for Rescue in Invermere, BC Canada. The primary purpose of the testing was to determine the strengths and weaknesses of the Cascade Rescue Model 200 Advance Rescue Litter and ancillary products. All testing was conducted by and under the supervision of Kirk and Katie Mauthner, the principals of Rigging for Rescue (RfR).

Detailed below are the test results. All tests with the exception of the One Meter Drop Test were conducted to a point of product failure. The results of these tests are provided for informational purposes only. Because the dangerous and varied nature which these products may be used for, Cascade Rescue makes no claims regarding the products breaking strength, useful load, safety factors or intended use.

TEST ONE – CTM200 Distributed Load Over Litter Bed in a Horizontal Orientation.

In this test the CTM200 was placed in a Slow Pull Device (SPD) whereby the ram of the SPD applied force directly to the bed of the litter at the point representing the litter's center of gravity under a specially made static harness constructed of heavy gauge chain and attached to the litter with steel carabiners. The distance from the top of the litter harness to the litter in the front was 74.5 inches; 77.5 inches in the rear.



A rigid backboard was manufactured to place in the bottom of the litter to distribute the load of the SPD across the length of the litter. The footprint of the backboard was 60 inches by 11.25 inches. The distance from the center of the ram to the end of the litter was 47.25 inches and from the head of the litter to the ram was 34.75 inches.

Results and Observations

Force was applied gradually over a period of 32 seconds. Approximately 15 seconds into the test the litter sustained a downward load of 39.84kN. At this point the carabiner attached to right forward railing sheared through the railing. Force then dropped to approximately 22kN before climbing back to approximately 30kN when the left front railing sheared through



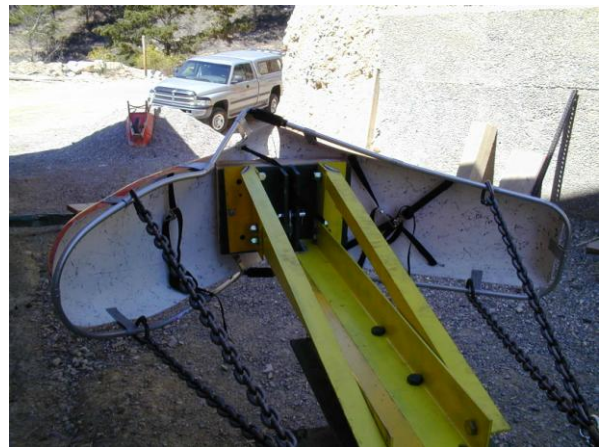
the bracket closest to the carabiner. At this point, the litter, while badly damaged was still attached to the litter harness by three of four attachment points. After several more seconds it was determined the litter had sustained enough damage to render it inoperable. Absolutely no damage was done to the ¹Fastlock™ System and the remnants of the litter were disassembled at the completion of the test.

TEST TWO - CTM200 Non-Distributed Load Over Litter Bed in a Horizontal Orientation (smaller footprint, simulation of pinpoint load at center of gravity).

Test Two is identical in all respects to Test One with the exception that the footprint of where a load was applied was reduced to an 18 inch by 11.25 inch area directly over the center of gravity of the litter as it was attached to the static litter harness.

Results and Observations

Force was applied gradually over a period of 40 seconds. Approximately 11 seconds into the test the litters sustained a downward load of 10kN. The litter then flexed and at approximately 28 seconds into the test failed at a sustained force of 10.06kN. The central point of failure occurred where the litter railing connected the ¹FastLock™ Coupler. The litter itself remained in one piece, but was considered to be inoperable.



TEST THREE - CTM200 End to End Pull

This test was designed to simulate the impact of load placed on the CTM200 if placed in an end to end “Inline” pull. The CTM200 was placed in the SPD and rigged with a 3 point inline litter harness as specified by the Technical Rescue Riggers Guide published by Rick Lipke. The litter harness was constructed of 11mm static Kernmantle rope.



Results and Observations

Force was applied gradually over a period of 28 seconds. At approximately 15 seconds force built up to 16.55kN. The first point of failure occurred where the nose railing bracket connected to the shell of the litter. The litter maintained structural integrity at a sustained force in excess of 15 kN until both the left and



right railing brackets at the nose were pulled from the shell and one end of the litter railing sheared from the FastLock™ System. It was observed that the litter was still in one piece and could be considered functional although patient integrity could have been compromised. It was also observed that the railing of the litter was the cause of central failure due to buckling.

TEST FOUR – One Meter Drop

This test simulated a sudden, unexpected drop of the litter and the impact it could sustain from such a drop. The litter was rigged in a static litter bridle constructed of heavy gauge chain and attached to the litter with steel carabiners. The distance from the top of the litter harness to the litter in the front was 41 inches, 38 inches in the rear and 33.5 inches from the axis of the bridle to the railing of the litter at its center of gravity. The litter harness was then attached to three meters of 11mm static rope. The static rope was folded and tied to contain one meter of slack that could be instantly loosed to simulate the drop. The CTM 200 as tested weighed 19 lbs and was loaded with a Rescue Randy weighing 173 pounds for a total weight of 197 pounds. The litter was hoisted up a drop tower for the test.

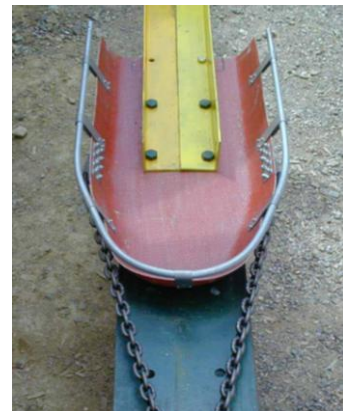


Results and Observations

The CTM200 bounced slightly (approximately 3 inches) upon impact at the bottom of the rope. Impact was measured at 6.52kN. There was a very slight flex at the midpoint of the litter on impact. There was no damage to any part of the litter or railing.

TEST FIVE – Slow pull of CTM200 Vertical Pull Brackets

This test was conducted to determine the failure strength of the CTM200 configured with Vertical Pull Brackets used in a vertical raise or lower configuration. The nose end of the litter was used and was bolted to the SPD. A static bridle was attached to the Vertical Pull Brackets and attached to the SPD at a distance of 39.25 inches from the load. The width between the Vertical Pull Brackets was 20 inches.



Results and Observations

Force was applied over a period of 12 seconds. Peak force applied was 34.58kN at which time large sections of the litter shell cracked and allowed the Vertical Pull Brackets to move forward. As the Vertical Pull Brackets moved forward against the litter railing brackets, force was transferred to the litter railing ultimately causing it to buckle.



TEST SIX – CTM200 Litter Railing Bracket Pull Out

Each CTM200 Rescue Litter contains 14 Railing Brackets. This test was conducted simply to determine the “pullout” strength of the CTM200 Railing Bracket from the litter shell. A panel of fiberglass of the same composition as the litter shell was mounted to the SPD. Force was then applied to the Railing Bracket until failure.

Results and Observations

Force was applied and at 15.03 kN the litter Railing Bracket pulled out of the fiberglass panel.

General Observations and Conclusions

In most cases the strength of the Cascade Rescue Model 200 Advance Series Rescue Litter greatly surpassed the expectations of the manufacturer and satisfied the requirements of all testing specifications. The fiberglass shell proved to be extremely tough and able to withstand a great deal of punishment. The new Cascade Rescue Fastlock™ System was never damaged in any of the tests and proved to be of superior strength.

Areas that were noted for improvement were the strength of the litter railing and the rivets used to assemble the product. Since these tests were conducted, many changes have been made to the CTM200. The galvanized mild steel railing has been replaced with 5/8 T304 stainless steel with a tensile strength of 92,100 psi. Steel hollow barrel style rivets have been replaced with solid aircraft grade aluminum pressed rivets with a shear strength of 28,000 psi and stainless steel rivets with a tensile strength of 1,300psi and shear strength of 1,150psi. The new pressed rivets also greatly improve the finish on the interior of the CTM200.

The CTM200 is an excellent choice for all high incline, backcountry and general rescue operations. Cascade Rescue will continue to improve upon its designs and test them thoroughly to ensure only the safest products of the highest quality are introduced for dedicated professionals to use.

1. The CTM200 FastLock™ System is comprised of a laser cut stainless steel interlocking bedplate and two FastLock™ Couplers machined from 6061 T6 Series aluminum, hard anodized with Teflon on each rail of the CTM200.

For more information please contact Dana Jordan at Cascade Rescue Rescue Equipment Company. Phone: (425) 888-6922 Fax: (425) 888-6945 or CascadeRescue.com.

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