What Load can One Person Hold with a Lowering Device (Descender)

Introduction

Following conversations about what load a Whaletail descender could hold compared with a Goldtail descender, in typical rescue operation, we devised a quick subjective test. The Goldtail was not available at the time of the test but the "Rope Test Lab" in the Blue Mountains published figures for this device. The test setup is different to that used here so you would expect some differences, but I would imagine the results should be of the same order of magnitude. Link http://www.facebook.com/groups/RopeTestLab/

 5 Hole Whaletail - designed for single rope.	 4 Hole Goldtail – designed for single or double rope. (pic. by Chockstone)

As we were testing we included other common descending devices to hand for comparison with the view that they may need to be used in a remote area emergency.

Any measurements will subjective, dependent on many variables. For that reason the results can only be considered "order of magnitude, indicative". The experience and strength of the person holding the rope will vary enormously, as we showed with the three people who helped with these tests. Even with the 11mm static rope used by VRA in rescue the differences between different ropes will vary widely. For instance using a stiff rope we could hold a significantly greater load than, when using a softer more pliable rope.

Test Rig

The standard rescue load is considered as 25KN (two persons, stretcher and equipment). In some instances there could be two outriders with the stretcher which gives a rescue load of 35KN.

The load cell available for this test was rated at 25Kn, so this required rigging to approximately double the range to 50KN. Test measurement showed that this was achieved. The factor was 2:1 when the system was dynamic.

A 50Kn wire hoist connected through a 5:1 mechanical advantage was used to provide the force. This set up was chosen for three main reasons:

1) it is what's available;
2) to reduce the chance of an overload of the hoist;
3) to keep the speed of the rope take-up slower, (approximately 1m per minute).

The load line was connected with a well used 5mm prussic, as a breakable safety link.

Results

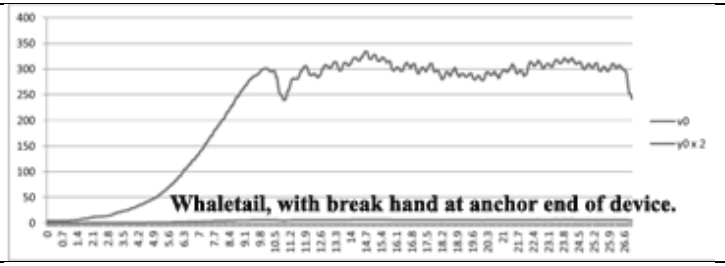
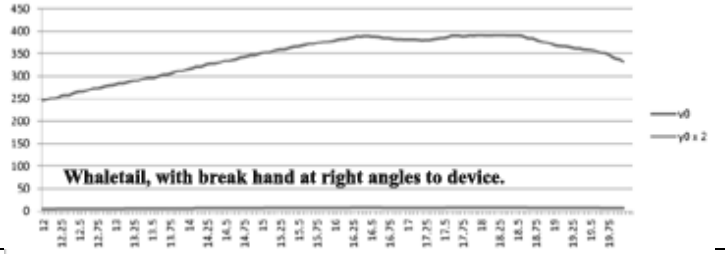
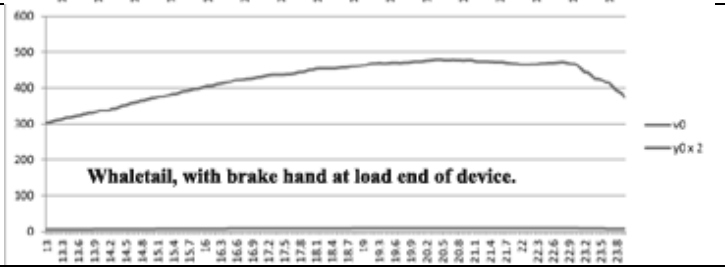
Whaletail 5 holes, (single 11mm static rescue rope)		Measured KN	
	Whaletail (brake hand towards anchor) under control.	2.9	
	Whaletail (brake hand at right angle to device) under control.	3.8	
	Whaletail, (brake hand towards load) under control.	4.7	

Figure of 8 Variants		Measured KN	
	Figure of 8, (normal thread).	1.6	
	Rescue 8, (normal thread).	2.2	
	Rescue 8, (plus using 1 horn).	3.7	
Rack – 4 bar		Measured KN	
	Rack 4 bar, (brake hand towards anchor).	1.8	
	Rack 4 Bar, (brake hand towards load).	3.9	

Kong Hydrobot		Measured KN	
	Hydrobot - single bar, (brake hand towards load).	0.8	
	Hydrobot - through lower friction point, (brake hand now towards anchor).	1.9	
	Hydrobot - over upper friction point, (brake hand now towards load).	1.8	
	Hydrobot - through lower friction point and then over upper friction point, (brake hand now towards load).	3.3	

ATC- Stitch Plate		Measured KN	
	ATC, Black Diamond Guide.	2.2	
Munter Hitch on Steel Carabiner		Measured KN	
	Munter Hitch on steel carabiner, (brake hand now towards anchor). (picture by Chockstone)	1.4	
	Munter Hitch on steel carabiner, (brake hand now towards load). (picture by Chockstone	1.8	

Pittons on Steel Carabiner			
	2x pitons on steel carabiner	0.7	
Pitstop Descender			
	Pitstop (brake hand behind)	0.8	
	Pitstop (brake hand in front)	1.9	
Progressive Capture Devices	Tests with these devices need to be conducted with extreme caution, as if the line locked due to the PCD, the system would quickly overload, breaking the device or the test rig.		
		Measured KN	
	Petzl ID, held easily controlling with rope through a carabiner as recommended by Petzle. (Picture by Petzl)	2.5 Limit set by manufacturer.	The load for this test was set by Petzl specifications of maximum 25 kn. The hardest part of the test was not to exceed the 25kn figure. We found no effort required at 25 kn

	CMC MPD, held easily controlling with rope in the S position. (Picture by CMC)	4.9	It was no effort to hold this load steadily.

Conclusion

The purpose built CMC MPD is defiantly the choice of devices for Rescue Lowering Operations, it also has the advantage that it can be quickly rigged for lifting. The Petzl ID would be adequate for the job and can also be quickly changed to lifting. The whaletail could be used by an experienced rescuer to hold a rescue load, provided maximum friction was applied by having the brake hand towards the load end of the device. Likewise the: - Rescue 8 threaded appropriately, or a 4 bar rack (it is felt the 6 bar rack would be preferable). It seems likely that frictions within the systems have allowed operators to manage lowering rescue loads.

It is hoped to do other tests when time is available using different testing set up, for instance do actual lowering tests through efficient pulleys with the required weight.