Theoretical Analysis of Rescue Belay Behaviour

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Length of rope, m:	**3**	**10**	**25**	**50**	**100**	**150**	**200**
Percentage Static Strain @ 80 kgs load, %:	3%	3%	3%	3%	3%	3%	3%
Static Elongation (Stretch) @ 80 kgs, m:	0.09	0.3	0.75	1.5	3	4.5	6
Percentage Static Strain @ 200 kgs load, %:	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%	7.5%
Static Elongation (Stretch) @ 200 kgs, m:	**0.225**	**0.75**	**1.875**	**3.75**	**7.5**	**11.25**	**15**
Spring Stiffness of Rope, k, N/m:	8720	2616	1046.4	523.2	261.6	174.4	130.8
Percentage Dynamic Strain @ 80 kgs load, %:	6%	6%	6%	6%	6%	6%	6%
Dynamic Elongation (Stretch) @ 80 kgs, m:	0.18	0.6	1.5	3	6	9	12
Percentage Dynamic Strain @ 200 kgs load, %:	15%	15%	15%	15%	15%	15%	15%
Dynamic Elongation (Stretch) @ 200 kgs, m:	**0.45**	**1.5**	**3.75**	**7.5**	**15**	**22.5**	**30**
Maximum Dynamic Force in Belay Rope @ 200kgs, kN:	3.924	3.924	3.924	3.924	3.924	3.924	3.924
Maximum Velocity of Fall during Belay Event, m/s:	**1.485682**	**2.712471**	**4.288794**	**6.06527**	**8.577587**	**10.50536**	**12.13054**
Maximum Velocity of Fall during Belay Event, kph:	5.348454	9.764896	15.43966	21.83497	30.87931	37.81928	43.66994
Equivalent Fall Height of Max. Impact Velocity, m:	**0.1125**	**0.375**	**0.9375**	**1.875**	**3.75**	**5.625**	**7.5**