SABA's Suggested minimum requirements

These requirements are based on the intended target animal's weight, the type of broadhead, and the arrow's total weight, and is provided as a *required arrow speed*. These values can be used for bow- and crossbow hunting. Note that although kinetic energy features in these tables as an intermediate value the physics and experience shows that arrow momentum has a better correlation to penetration depth. KE is just more convenient to use as intermediate value.

Steps to determine the suggested arrow speed for a particular animal:
1) From Table 1, read the penetration index(#1 - #200).
2) Use the penetration index and the arrow weight to determine the required energy for soft tissue penetration - Table 2.
3) Add to this the required energy for the hard tissue (rib) penetration - Table 3
4) Use the suggested required energy and arrow weight to read the suggested minimum arrow speed - Table 4.
When using forward opening mechanical blades, it is adviced to add another 10 to 15 foot-pounds to the required kinetic energy for blade deployment.

Discplaimer: Please note that as the animal's weight is an estimation, the speed is also an estimation. Achieving the suggested required speed does not guarentee a succesful hunt!

TABLE 1. Penetration Index

Note that some animals were placed lower or highter, depending on their specific anatomical deviations to the norm.

Animal weight kg (average large male adult)	(kg)	Broadhead resistance (Ro - as pounds) 3	5	7	9	12	13	14	15	16	17	18	19	20 lbs
suni, duker, jackal, steenbok	10	1	1	2	3	5	5	6	6	7	8	9	10	10
caracal, oribi, grysbok, klipspringer	15	1	1	3	4	6	7	8	9	10	11	12	13	14
rhebok, springbok	25	1	2	4	6	9	10	11	13	14	15	17	18	20
impala, bushbuck, bushpig, warthog, reedbuck	50	2	4	6	9	14	16	19	21	23	25	28	30	33
fallow deer, blesbuck	75	2	5	8	12	19	22	25	28	31	34	37	41	44
njala, sitatunga	100	3	6	10	15	24	27	31	34	38	42	46	50	54
black wildebeest, tsessebi, hartebeest, wild pigs	150	3	8	13	20	32	36	41	46	51	56	61	67	73
blue wildebeest, female kudu	200	4	10	16	25	39	45	50	56	62	69	75	82	89
male kudu, waterbuck, zebra	250	5	11	19	29	46	52	59	66	73	81	88	97	105
roan,sable, oryx	350	6	14	25	37	59	67	75	84	93	103	113	123	134
eland	800	11	26	45	67	106	121	136	152	169	186			
buffalo, crocodile	1000	13	30	52	79	125	142	160	179	199				
giraffe	1800	20	46	80	120	191								
rhino	2000	22	50	86	129									
hippo	4000	36	83	142										
elephant	6000	49	111	190										

**required penetration index*

TABLE 2: Kinetic energy for soft tissue penetration

Arrow weight (grain) \ Required Penetration Index	1	4	6	8	10	13	15	18	20	25	30	40	50	75	100	125	150	175	200
1300	1	3	5	6	8	10	12	13	15	19	23	31	38	58	77	96	115	135	154
1250	1	3	5	6	8	10	12	14	16	20	24	32	40	60	80	100	120	140	160
1200	1	3	5	6	8	10	13	15	17	21	25	33	42	63	83	104	125	146	167
1150	1	3	5	7	9	11	13	15	17	22	26	35	43	65	87	109	130	152	174
1100	1	4	5	7	9	11	14	16	18	23	27	36	45	68	91	114	136	159	
1050	1	4	6	7	10	12	14	17	19	24	29	38	48	71	95	119	143	167	
1000	1	4	6	8	10	13	15	18	20	25	30	40	50	75	100	125	150	175	
950	1	4	6	8	11	13	16	18	21	26	32	42	53	79	105	132	158		
900	1	4	7	8	11	14	17	19	22	28	33	44	56	83	111	139	167		
850	1	5	7	9	12	15	18	21	24	29	35	47	59	88	118	147	176		
800	1	5	8	9	13	16	19	22	25	31	38	50	63	94	125	156			
750	1	5	8	10	13	17	20	23	27	33	40	53	67	100	133	167			
700	1	6	9	11	14	18	21	25	29	36	43	57	71	107	143	179			
650	2	6	9	12	15	19	23	27	31	38	46	62	77	115	154				
600	2	7	10	13	17	21	25	29	33	42	50	67	83	125	167				
550	2	7	11	14	18	23	27	32	36	45	55	73	91	136					
500	2	8	12	15	20	25	30	35	40	50	60	80	100	150					
450	2	9	13	17	22	28	33	39	44	56	67	89	111	167					
400	3	10	15	19	25	31	38	44	50	63	75	100	125						
350	3	11	17	21	29	36	43	50	57	71	86	114	143						
300	3	13	20	25	33	42	50	58	67	83	100	133	167						
250	4	16	24	30	40	50	60	70	80	100	120	160							

TABLE 3: Kinetic energy to be added to compensate for rib breakage/thin scapula

Animal mass	10	15	25	50	75	100	150	200	250	350	800	1000	1800	2000	4000	6000	foot-pounds
	+15	+16	+18	+20	+22	+23	+25	+26	+27	+29	+34	+36	+40	+41	+46	+50	

www.sabowhunters.co.za

TABLE 4: Required arrow speed (fps) — Kinetic energy (foot-pounds)

Arrow weight (grain)

	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	110	120	130	140	150	160	170	180
1300	150	150	150	150	150	150	150	150	150	150	156	161	166	172	177	181	186	195	204	212	220	228	235	243	250
1250	150	150	150	150	150	150	150	150	150	153	159	164	170	175	180	185	190	199	208	216	225	232	240	247	255
1200	150	150	150	150	150	150	150	150	150	156	162	168	173	179	184	189	194	203	212	221	229	237	245	253	260
1150	150	150	150	150	150	150	150	150	153	160	166	171	177	182	188	193	198	208	217	226	234	242	250	258	265
1100	150	150	150	150	150	150	150	150	157	163	169	175	181	187	192	197	202	212	222	231	239	248	256	264	271
1050	150	150	150	150	150	150	150	154	160	167	173	179	185	191	196	202	207	217	227	236	245	254	262	270	278
1000	150	150	150	150	150	150	150	157	164	171	178	184	190	196	201	207	212	223	232	242	251	260	268	277	285
950	150	150	150	150	150	150	154	161	169	176	182	189	195	201	207	212	218	228	238	248	258	267	275	284	292
900	150	150	150	150	150	150	158	166	173	180	187	194	200	206	212	218	224	235	245	255	265	274	283	292	300
850	150	150	150	150	150	154	163	171	178	186	193	199	206	212	218	224	230	241	252	262	272	282	291	300	309
800	150	150	150	150	150	159	168	176	184	191	198	205	212	219	225	231	237	249	260	270	281	291	300	309	318
750	150	150	150	150	155	164	173	182	190	198	205	212	219	226	232	239	245	257	268	279	290	300	310	319	329
700	150	150	150	150	160	170	179	188	196	204	212	220	227	234	241	247	254	266	278	289	300	311	321	331	340
650	150	150	150	156	166	177	186	195	204	212	220	228	235	243	250	257	263	276	288	300	311	322	333	343	353
600	150	150	150	162	173	184	194	203	212	221	229	237	245	253	260	267	274	287	300	312	324	335	347	357	368
550	150	150	157	169	181	192	202	212	222	231	239	248	256	264	271	279	286	300	313	326	339	350	362	373	384
500	150	150	164	178	190	201	212	223	232	242	251	260	268	277	285	292	300	315	329	342	355	368	380	391	403
450	150	158	173	187	200	212	224	235	245	255	265	274	283	292	300	308	316	332	347	361	374	387	400	412	424
400	150	168	184	198	212	225	237	249	260	270	281	291	300	309	318	327	335	352	368	383	397	411	424	437	
350	160	179	196	212	227	241	254	266	278	289	300	311	321	331	340	350	359	376	393	409	424	439			
300	173	194	212	229	245	260	274	287	300	312	324	335	347	357	368	378	387	406	424	442					
250	190	212	232	251	268	285	300	315	329	342	355	368	380	391	403	414	424	445							

The tables impliment this equation, and it is provided here only for reference:

$$E_k = \frac{D_p^2 R_i}{450240m} + E_b \text{ ; where } D_p = 3.5W^{0.36},\ R_i = (760\ R_o^{0.806})^2 \text{ and } E_b = 9.6W^{0.19}$$

Ro is the *broadhead resistance* in pounds, as measured by pushing the broadhead through 1" thick beef rump steak .
W is the estimated weight of the animal in kg.
m is the arrow's weight in grains.
The result is required kinetic energy for the specific arrow.